
SUSTAINABLE DEVELOPMENT

POLICY AND URBAN DEVELOPMENT –
TOURISM, LIFE SCIENCE, MANAGEMENT
AND ENVIRONMENT

Edited by Chaouki Ghemal



INTECH

Agricultural and Biological Sciences

Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment

Edited by Chaouki Ghenai,

ISBN 978-953-51-0100-0, 490 pages,

Publisher: InTech,

Chapters published February 24, 2012 under CC BY 3.0 license

DOI: 10.5772/2426

OPEN ACCESS BOOK

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

Prof. Chaouki Ghenai

Florida Atlantic University, United States of America

FIELDS OF RESEARCH

- [Life Sciences](#) » [Environmental Sciences](#)

EXPERIENCE

- [Florida Atlantic University](#)

EDUCATION

- 1991 – 1995
Iskender Gokalp , Orleans University , Orleans
CNRS



EDITED BOOKS

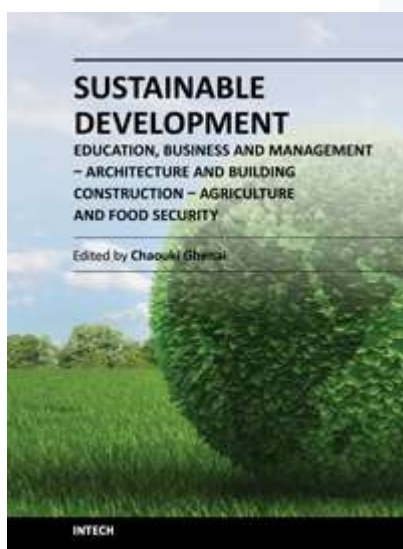
[Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment](#)



[Sustainable Development - Energy, Engineering and Technologies - Manufacturing and Environment](#)

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Some experts see the only solution in a global deflation of the currently unsustainable exploitation of resources. However, sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers

at the regional planning level. Environmentalists, architects, engineers, policy makers and economists will have to work together in order to ensure that planning and development can meet our society's present needs without compromising the security of future generations.



[Sustainable Development - Education, Business and Management - Architecture and Building Construction - Agriculture and Food Security](#)

Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Some experts see the only solution in a global deflation of the currently unsustainable exploitation of resources. However, sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level. Environmentalists, architects, engineers, policy makers and economists will have to work together in order to ensure that planning and development can meet our society's present

needs without compromising the security of future generations. Better planning methods for urban and rural expansion could prevent environmental destruction and imminent crises. Energy, transport, water, environment and food production systems should aim for self-

sufficiency and not the rapid depletion of natural resources. Planning for sustainable development must overcome many complex technical and social issues.

PUBLICATIONS

- **Book Chapter****Wind Energy**
by Chaouki Ghenai and Nevzat Sargsyan in the book [*"Paths to Sustainable Energy"*](#) edited by Jatin Nathwani and Artie Ng, ISBN 978-953-307-401-6, InTech, December 12, 2010
- **Book Chapter****Combustion and Emissions Characteristics of Biodiesel Fuels**
by Chaouki Ghenai in the book [*"Renewable Energy - Trends and Applications"*](#) edited by Majid Nayeripour and Mostafa Kheshti, ISBN 978-953-307-939-4, InTech, November 11, 2011
- **Book Chapter****Life Cycle Analysis of Wind Turbine**
by Chaouki Ghenai in the book [*"Sustainable Development - Energy, Engineering and Technologies - Manufacturing and Environment"*](#) edited by Chaouki Ghenai, ISBN 978-953-51-0165-9, InTech, February 2, 2012
- **Book Chapter****Sustainable Engineering and Eco Design**
by Chaouki Ghenai in the book [*"Sustainable Development - Energy, Engineering and Technologies - Manufacturing and Environment"*](#) edited by Chaouki Ghenai, ISBN 978-953-51-0165-9, InTech, February 2, 2012

BOOK CONTENTS

- **Chapter 1** **OPEN ACCESS** **Sustainable System Modelling for Urban Development Using Distributed Agencies** *by Bogart Yail Marquez, Ivan Espinoza-Hernandez and Jose Sergio Magdaleno-Palencia*
- **Chapter 2** **OPEN ACCESS** **European Policy for the Promotion of Inland Waterway Transport – A Case Study of the Danube River** *by Svetlana Dj. Mihic and Aleksandar Andrejevic*
- **Chapter 3** **OPEN ACCESS** **Sustainable Urban Development Through the Empowering of Local Communities** *by Radu Radoslav, Marius Stelian Găman, Tudor Morar, Ștefana Bădescu and Ana-Maria Branea*
- **Chapter 4** **OPEN ACCESS** **Sustainable Urban Design and Walkable Neighborhoods** *by Theresa Glanz, Yunwoo Nam and Zhenghong Tang*
- **Chapter 5** **OPEN ACCESS** **Sustainable Tourism of Destination, Imperative Triangle Among: Competitiveness, Effective Management and Proper Financing** *by Mirela Mazilu*
- **Chapter 6** **OPEN ACCESS** **Croatian Tourism Development Model – Anatomy of an Un/Sustainability** *by Lidija Petrić*
- **Chapter 7** **OPEN ACCESS** **Built Heritage and Sustainable Tourism: Conceptual, Economic and Social Variables** *by Beatriz Amarilla and Alfredo Conti*
- **Chapter 8** **OPEN ACCESS** **Sustainability Challenges: Changing Attitudes and a Demand for Better Management of the Tourism Industry in Malaysia** *by Janie Liew-Tsonis and Sharon Cheuk*
- **Chapter 9** **OPEN ACCESS** **Sustainable Development Global Simulation: Analysis of Quality and Security of Human Life** *by Michael Zgurovsky*
- **Chapter 10** **OPEN ACCESS** **People, Places and History – Towards the Sustainability of Social Life in Traditional Environments** *by Oscar Fernández*
- **Chapter 11** **OPEN ACCESS** **Raise It, Feed It, Keep It – Building a Sustainable Knowledge Pool Within Your R&D Organization** *by Wiebke Schone, Cornelia Kellermann and Ulrike Busolt*

- **Chapter 12**  **Social Accounting Matrix – Methodological Basis for Sustainable Development Analysis** *by Sasho Kjosev*
- **Chapter 13**  **Broadening Sustainable Development in Praxis Through Accountability and Collaboration** *by Mago William Maila*
- **Chapter 14**  **An Approach to Sustainable Development by Applying Control Science** *by Kazutoshi Fujihira*
- **Chapter 15**  **Embedding Sustainable Development in Organizations Through an Integrated Management Systems Approach** *by Miguel Rocha and Cory Searcy*
- **Chapter 16**  **Sustainable Development as an Aspect of Improving Economic Performance of a Company** *by Tereza Kadlecová and Lilia Dvořáková*
- **Chapter 17**  **Innovative Sustainable Companies Management: The Wide Symbiosis Strategy** *by Francesco Fusco Girard*
- **Chapter 18**  **Innovation Ecosystem for Sustainable Development** *by Kayano Fukuda and Chihiro Watanabe*
- **Chapter 19**  **Unraveling Stakeholders' Discourses Regarding Sustainable Development and Biodiversity Conservation in Greece** *by Evangelia Apostolopoulou, Evangelia G. Drakou, and John D. Pantis*
- **Chapter 20**  **The Environment as a Factor of Spatial Injustice: A New Challenge for the Sustainable Development of European Regions?** *by Guillaume Faburel*

Sustainable System Modelling for Urban Development Using Distributed Agencies

Bogart Yail Marquez, Ivan Espinoza-Hernandez
and Jose Sergio Magdaleno-Palencia
*COLEF and ITT
México*

1. Introduction

Developing a sustainable simulation system consists essentially of generating sustainable, artificial worlds with the capacity to produce results similar to those observed in the real world. This allows for varying parameters in a controlled, reusable experimental environment, something that cannot be easily achieved through mathematical models. The field of simulation is broad and multidisciplinary and has had an impressive growth since the 90's. While the area of simulation has been expanding to new horizons in traditional systems research, there are yet a series of unsolved epistemological issues David et al. (2010).

On the other hand, the social sciences face challenges that go beyond their capabilities of processing information. By using modern techniques such as computer agents and other methodologies, it is possible to aid in the testing and the formulation of theories Davidsson (2002).

Computer agent techniques are having a greater acceptance in recent years in different fields of science, and as a result, they have begun to be implemented as a simulation technique. Agent techniques consist on using small, independent programs called agents that are modeled to represent the social actors, be it people, organizations or corporations. Agents are designed to react to changes in their environment, which is also modeled to represent real world conditions that the actors would encounter in the given situation of interest Gilbert (2007).

A fundamental characteristic of agent based models is the ability for agents to interact, that is, they are able to transmit informative messages to other agents and can act based on the information received. Messages can represent spoken dialog between people or other indirect forms of communication. Information on actions such as observation of other agents or the perception of actions taken by other agents can also be acquired through messages. When modeling computer agents, specifying how they handle their interactions with other agents and the environment is one of the main differences with other computational models Gilbert (2007).

The complexity level of using these techniques increases as the number of agents increases. Even though it has been mentioned in the multi-agent community the need to develop and implement methodologies, surprisingly, very little has been done and therefore many areas of science have been excluded.

The motivation for this work is the need to establish a methodology for the study of sustainable systems in situations where conventional analysis cannot provide satisfactory information on the complexities of social phenomena and social actors. In general, the proposed methodology describes the use of several computational techniques and interdisciplinary theories. This growing consensus must be capable of describing every aspect of a sustainable system, as well as serve as a common language in which different theories can be juxtaposed.

1.1 Sustainable systems

Sustainability refers to the equilibrium between a species and the resources in its environment. By extension, this can apply to the exploitation of resources below the renovation limit.

Sustainability is generally associated with the definition of sustainable development, which refers to being able to satisfy the needs of the present without compromising the ability to satisfy the needs of the future generations. The concept of sustainability applies to the systems composed of human beings and nature. The structures and functionality of the human component in terms of society, economy, and rights among others should be such that they self-enforce and promote the persistence of the structures and functionality of the natural components—such as the ecosystem, biodiversity and biogeochemical cycles—and vice versa Cabezas et al. (2005). Therefore, one of the research challenges on sustainability resides in the link between the form of functioning of the ecosystems towards the structures and the functionality of the associated social system. This is why the information theory based indicators can grasp the human nature and the elements of the system and make sense of the disparity of the variables in the system Márquez, Castañón Puga & Suarez (2010).

2. Sustainable system modeling

Sustainable development is about assuring a good quality of life for the present and future generations. This can be achieved through the three strands of social equality—which are social, economical, and environmental—which recognize each other's needs, can maintain stability in these levels—with special attention to economic development and employment—and responsibly manage the natural resources available while protecting the environment Márquez, Castanon-Puga, Castro & Suarez (2010). Sustainability is even necessary among systems to ensure coexistence. As an example, the economic performance in regard to the expense of the community is not sustainable; without effective environmental protection, the economic activities will be obstructed. Sustainability does not require a perfect solution; it is in essence a goal or a vision that organizations should strive to achieve Ciria (2009).

Studies have been done on this focus such as the ones on sustainable agriculture, which is a philosophy that guides the development of agriculture systems in a multidisciplinary way in the areas of economy, environment, and social impact. Sustainable agriculture requires a global focus, one that is oriented towards solving the problems of the food industry and fibers industry Williams & Dollis (1998).

And so, liking the different levels that are required in order to create a sustainable system is a challenge that is yet to be solved, from a country's economy in relation to its available resources and the existing population to the availability of those resources to individuals and

their economic status. These social, economical and environmental variables are analyzed with a bottom-up approach based on how a social structure functions.

2.1 Social system

When dealing with social systems, certain basic characteristics in the organization must be met. One of these is that the consequences of the social systems are probabilistic and non-deterministic. Furthermore, as human behavior is not entirely predictable due to its complexity, dealing with consumers, suppliers, regulation agencies and others cannot wait for a predictable behavior Suarez et al. (2007). Organizations are seen as systems within systems. Said systems are complex, producing a whole that cannot be understood by only analyzing the individual parts. They must be dealt with as a system that is characterized by all the essential properties of any social system Yolles (2006). For this reason, the following properties must be taken into consideration when modeling organizational systems:

2.1.1 Interdependent pieces

A change in any of the components will have an effect on the other components. The external and internal interactions of the system reflect different stages of control and autonomy.

2.1.2 Homeostasis or firm state

An organization can achieve a firm state only when two requirements are met, unidirectionality and progress. Unidirectionality means that in spite of changes, the same results or established conditions will be obtained. Progress referring to the desired outcome, is a degree of progress that is within the set boundaries determined as tolerable.

2.1.3 Borders or limits

It is the marker that determines what is inside and what is outside the system. It need not be a physical marker; it consists of a closed area surrounding the selected variables that have the most interaction with the system.

2.1.4 Morphogenesis

The organizational system, distinct from the mechanical and biological system, has the capacity to modify its basic structure. This ability is identified by Buckley as its main identifying characteristic Boulding (1956).

One of the objectives of this research is to predict social behavior by using models. Social behavior is a behavior that favors those that conform to the group, producing cooperation and self-organization Jaffe & Zaballa (2010). According to Ross Ashby (2004), the word organization has a multitude of meanings, specifically, its use in the areas of computation and neural science is of great importance to this research. In social systems, the question arises of what is the behavior of individuals when in a group (cities, groups or networks), and why they exhibit such behavior.

2.2 Economic systems

Another component in a sustainable system is the economy that reigns in a city, the market economy. Salary rates are normally regulated by contracts and are subjected to the market's

rules in the middle and long term. Goods and services needed for daily urban life are also affected by the market's rules.

The industrialization process and the concentration of investment due to work specialization and the use of economies of scale generate the process of urbanization. The activities that thrive in the urban center generate job positions that are primarily occupied by the locals but also attract outsiders that are looking for better conditions. This generates a cycle that leads to sustained population growth and the demand of public services, which in turn requires taxation to keep up with demand, improved service and proper administration of tax revenue.

2.3 Environmental systems

As it is now, the market economy does not always lead to an efficient allocation of resources in the provision of public services. In order to determine optimal distribution of public investment, it is necessary to have a cost-benefit analysis, prioritizing the social aspects and considering the externalities, tending towards a balance between economies of agglomeration and diseconomies produced by clustering. To exemplify, the investments in basic sanitation (potable water and sewage systems) should not be weighted on the basis of the end-user's income, but instead on the benefit produced by lowering the mortality and disease rates which increases productivity in the population, income and quality of life.

3. Distributed agency modeling

Agent based models are an increasingly potent tool in social systems simulations as they can represent phenomena that is difficult to describe using other mathematical formalisms. However, these models have had a limited involvement in formulating social systems owing to the fact that their distinct abilities are more useful in situations where the future is unpredictable. In said situations, traditional analysis methods applied to simulation models are less efficient in the decision making process. The use of models such as policy simulators provides significant aid in taking decision in the public and private sector. This is of special relevance as these models have had to date limited impact in influencing decisions.

The application of agent based models in studying heterogeneous behavior has been successful as it allows for each agent to have different information, different rules and be faced with different situations that allows the study of the behavior at a macro level in the global system.

This modeling technique has been used to combine the anthropological data on the behavior of individuals and groups in society with detailed information of the effect of climate change on the environment Lempert (2002).

When faced with a complex sustainability problem, such as deciding what actions need to be taken to deal with global climate change, a broad range of possible scenarios must be considered. At the least, a rigorous analysis needs a way to identify and define the most important and likely scenarios. Advanced made in viable agent model simulations has also allowed new methods in decision analysis to adapt to these types of problems. Uncertainty arises when parts of a decision will not or cannot agree over one or several key components in a decision analysis to be used in non predictable models such as: the system model, the a priori statistics of any parameter describing the system model, and the value of the function used to classify the model's results. These multi-scenario simulation models provide a systematic and quantitative orientation for which scenarios information should be reviewed and extracted.

Although the use of agents in the social sciences has been stated in the field of artificial intelligence Gilbert (2007), as it is one of the first areas to have studied this topic Russell & Norvig (2004) and more precisely, in distributed systems. By themselves, agents are not enough to model a real social system, nevertheless, distributed agency based systems is an active area of research with promising results in the fields of engineering and social sciences. These types of systems also reduce the barrier between physical and sociological systems as the perceived view of the world is nonlinear.

It must be stated that this research does not use the conventionally defined agent model—which defines agents as atomic concepts or actors—but instead uses the distributed agent model or distribution agents—which does not define independent actors but instead considers the organism that extends throughout the whole of the system. Agents can be any process, it can change any system based on the independently contained information.

The idea behind a distributed organism modeling language derives from a vision of the world in which appearance is omnipresent, where compounds are irreducible to their components and exist in different dimensions where different rules apply Suarez et al. (2008). Distributed agencies attempt to solve problems between groups of agents, finding the solution within the result of the cooperative interaction between agents.

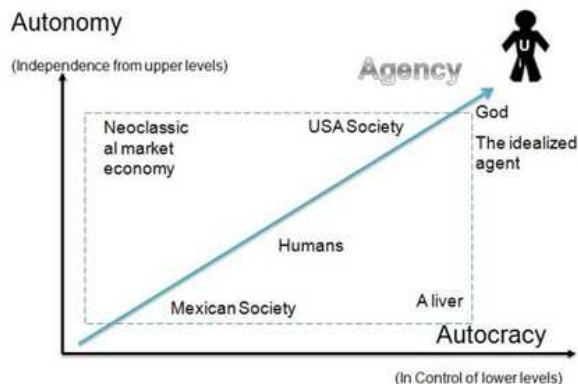


Fig. 1. Levels agents represented hierarchically

Communication facilitates cooperation; the degree of cooperation between agents can be from full cooperation to hostile. In the first case there is a high cost for the total communication between agents. In the second case some agents could block the objectives of others. To have the cooperation and coordination mechanisms in an agent system succeed, an additional system must exist that enables the members of the system to reach agreements when each individual agent is defending its own interests. This system should reach mutually beneficial solutions, taking into consideration all points of view. Such a system is known as negotiation Gilbert (2007).

Applications of this technology are considered very useful for distributed industrial systems development such as process control, e.g., automatic management of intelligent buildings with private security and resource management. Other areas have developed applications for air traffic control used in airports like Sydney, Australia Julian & Botti (2000). Distribution agents is a promising strategy that can correct an undesirable centralized architecture Russell & Norvig (2004). Throughout the focus of traditional multi-agent systems and utility

maximization, actors choose the best alternative given the set of possibilities that is found in each level.

The main distinction from the proposed focus is that the phase space includes the transformations made by an upper level. On the other hand, an agent is composed of subcomponents belonging to a lower level that can possess their own agencies. It is an agent's responsibility to present its subcomponent's individual phase spaces with optimal solutions that are acceptable to the parent upper level agents. In other words, agents found in subcomponents optimize the phase spaces in their parent agents, while the parent agents must consider the manipulation of this world of possibilities in order to reach the desired global behavior. To this effect, if an agent were to be considered a corporation, this level would be composed of the subdivisions that form the company, and these in turn are directed by groups of people. The company as a whole is also located in a level that is ruled by legislation relating to industrial practices, which are a component of an upper level that forms a specific society.

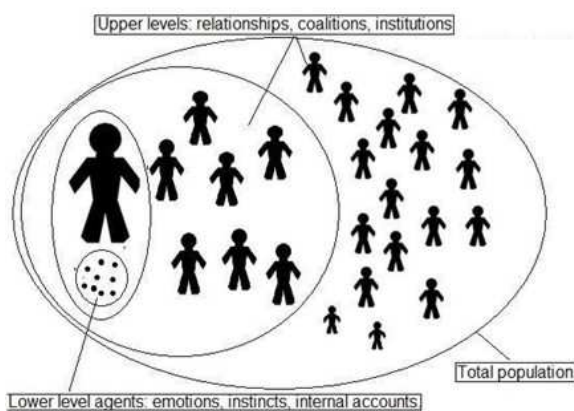


Fig. 2. Multiple levels of identity of distributed agency

4. Case study

Urban simulation that considers sustainability has remained an interesting topic in research for many years. Aspects such as urban growth, congestion, and segregation have a high demand in advanced modeling focuses. Each of the focuses and techniques that have been applied present advantages and drawbacks. Even as aggregation techniques have been criticized for their poor results in these types of models, they have been receiving renewed attention in recent times Benenson & Torrens (2004). Among these techniques, the agents based models are considered the most promising as they provide a detailed understanding of the structure and processes of urban systems Márquez, Manuel & Saurez (2010). Combining these techniques with geographic information systems (GIS) will greatly improve urban simulation.

There has been greater acceptance of agent modeling of urban systems in the last decades Gilbert (2007). Agent based models and artificial societies are very similar being the same techniques in dynamic systems, cellular automata, genetic algorithms, and distributed agent systems. The differences are centered in the simulation of systems and in research program design Drennan (2005).

The location being studied is Ciudad Juárez, a Mexican city in the northern part of the state of Chihuahua in a region known as El Paso del Norte and bordering with El Paso, Texas in the United States of America. Its geographic environment can be delimited by the municipality of Juárez, which extends for 3,599 km^2 .

The city is settled between the Sierra de Juárez and the valley of Juárez in a geographical area historically formed by fluvial deposits originating from the stream of the Rio Bravo. Its terrain is rugged to the west over the hills of the Sierra de Juárez and with smooth slopes with an east to west direction in the valley area. The heights of the most elevated terrains located in the Sierra de Juárez are above 1,800 meters over the mean sea level (msl). The inhabited area over the hills in the mountainous range consists of elevations between 1,250 and 1,350 msl. Most of the urban sprawl is located between the elevation of 1,150 and 1,200 msl and distributed in the valley of Juárez and extending to the south.

Therefore, for our proposed work-in-progress case study, if we consider a municipality an agent, this upper-level agent is composed by subcomponents, which in our case study of the city of Juárez, Mexico, will be represented by the AGEBS that compose this city. AGEBS is the terminology used to describe the different areas of the city that are in turn composed of neighborhoods. The data set of the city of Juárez is divided into 549 areas, known as AGEBS. "The urban AGEBS encompass a part or the totality of a community with a population of 2500 inhabitants or more in sets that generally are distributed in 25 to 50 blocks" INEGI (2006)

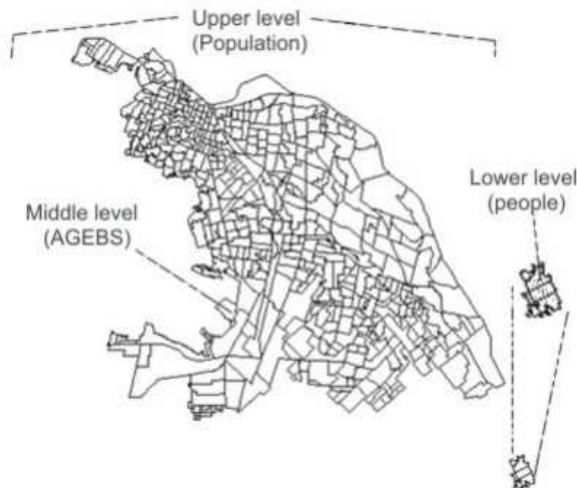


Fig. 3. Levels of agents represented on the City of Juárez

A city has several qualities that align with the definition of complexity. That is why performing a simulation of a city requires the study of a complex system and emergence. The use of simulations in the study of a city's urban growth helps perform social experiments while avoiding costs and risks. Simulation tools are already readily available that apply different techniques and models to study growth. This research applies the distributed agency methodology on a sustainable system for a city located in Mexico, creating a model of a sustainable system for urban growth as a secondary objective.

To develop the simulation methodology, the concept of a city and its influencing processes must be understood. The concept of a city according to Camagni (2004) is based on generalizing process that begins from the historical and geographical existence of the cities and continues to consider the city as a significant whole, an autonomous socioeconomic entity (Camagni (2004)). A city constitutes a production entity, in which a group of goods and services are internally produced; all of these internal and external processes that engulf it can be represented by distributed agencies offering the ability to represent the surrounding environment, take autonomous actions and simulate actions such as consumption and productive activities among others. The use of distributed agencies to create an urban simulation describes satisfactorily the processes of cooperation, communication, and decisions.

5. Proposed methodology

The methodology to be implemented represents an innovative focus on creating a simulation architecture. Named Distributed Agency (DA), this methodology represents a general theory of collective behavior and the formation of structures; it redefines the level of agency in two forms. Primarily, there are no obvious agents; each of these entities that represent an emergent force is the result of organized sub-agents in the lower levels. In the second form, agents can belong to different levels. The language of distributed agency expresses the observed behavior as the result of agents maximizing their objective functions (Suarez et al. (2009)).

This research intends to develop a sustainable system methodology using various mathematical and computational theories that are not conventionally used in the social sciences and provide a new focus for the creation of computer simulation architectures. The research shows how the DA methodology in combination with other techniques can be used to simulate social behavior, using agents with limited reasoning capacity and complex interactions. The simulations expand the knowledge available on social complexity, setting the basis for a nonlinear methodology to study the scenarios that have been developed using existing traditional methods. With this multi-focus study, it is intended to show how agents interact in their environment, their behavior and the relationships between different levels imitating the ones found in the real world. (Márquez, Castanon-Puga, Castro & Suarez (2011)). The DA methodology consists of eight steps that are :

5.1 Determining the agency levels and their relations

This phase analyses the existing relations in the social system and determines the levels of the system. In order to accomplish this, the problems that need to be solved are identified and their functions are described for each level in a physical frame. The decision and parameter input and output variables are also identified. An intrinsically holistic philosophy must be pursued without reducing the system to its basic components, since no phenomena can exist by itself in a sustainable system, where each node is defined by its link with other nodes (Heylighen (2008)). That is why it is necessary to establish the objective functions of each level of agency and the prevalent nodes and links.

Taking the case study of the sustainable development of Ciudad Juarez, the total population, and all related factors such as immigration and birth rate, is to be analyzed at a macro level with a top-down approach. The micro level interactions such as spouse selection, decision to start a family, and number of children depending on the education and social level is analyzed with a bottom-up approach.

To achieve this reproduction modeling a macro system, dynamic systems are used. A dynamic system allow the representation of all the elements and relations of the sustainable system's structure and the evolution of the system in time Márquez, Castañon Puga & Suarez (2010). It also outputs the mathematical equations of the macro level model, the results of these equations define the characteristics of the macro agency level. Another part will be determining the mid level agencies, an agent's actions in its environment and the relation between agencies this way allowing the observation of micro level cases.

Some proposed classifications that have been defined by researchers involved in urbanism define a structure with different layers or levels, depending on the interactions and the different structures. The graph shown in figure 1 has been referred to as "Camagni's wedding cake" which shows three layers or levels (international, regional, and local) and various structures (hierarchical, non hierarchical, and mixed). The elements in each layer are interrelated, forming a network in each level, in a similar way cities are interrelated forming a complex set of link.

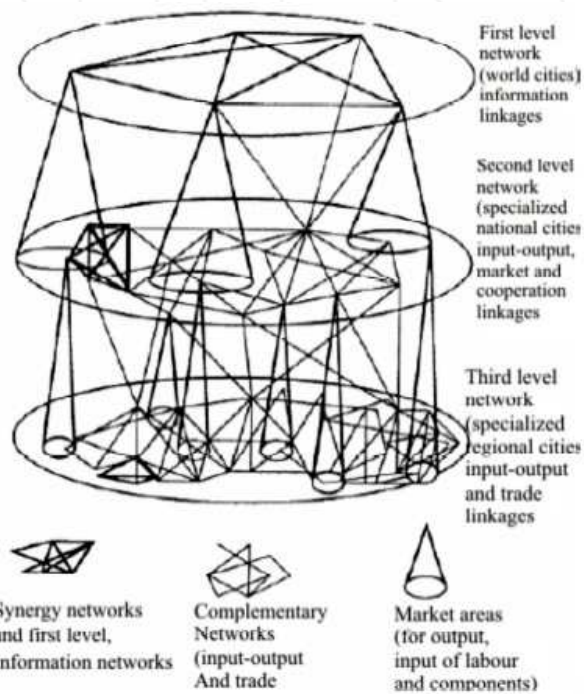


Fig. 4. Camagni's wedding cake

The highest level in this case study is the sustainable system, the proceeding three levels are the economic, environmental and social systems.

5.1.1 Social systems

A city's urban growth is composed of "vegetative growth + migration balance". Both elements are studied by the tools provided by demographics. A city's growth is driven by economic

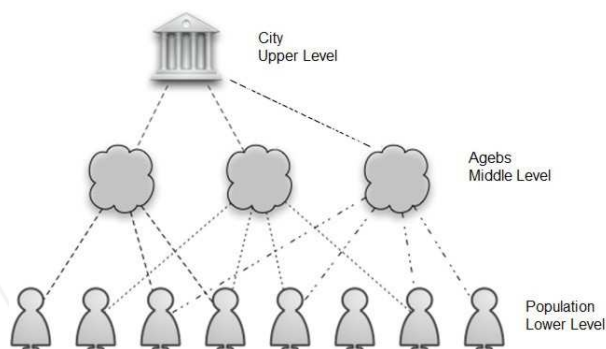


Fig. 5. Multiple levels represented

growth. Growth and optimal size of a city can be studied through simplified theoretical models. With the growth of population, the scale of production and job market rises, and the technological development and public service efficiency increase. Simultaneously, the diseconomy also increases, leading to higher unemployment, congestion, pollution, crime and social distortion. These factors are detrimental externalities that have little effect on the ones taking the decision Márquez, Castanon-Puga, Magdaleno-Palencia & Suarez (2011).

With the appearance of industrialization, the development process and population growth in cities is accelerated. This is a job creating process but also demands services since the people that fill the job positions should be located close to their place of work. These people will demand housing, urban services, food, clothing and furniture among other goods and services. Urban agglomerations then arise with the demand of the inhabitants to perform their activities and receive goods and services.

Aside from vegetative growth, the urban phenomenon is bolstered by migration flows. These flows are made up of people that are constantly arriving in cities looking for better conditions and opportunities. They generally have a rural background or originate from less developed countries. Because of the broad effect that population has in the development of a city, the total population of Ciudad Juarez is the variable that is extracted from the social system.

5.1.2 Economic systems

Economic theory states that as population increases, the scale of production and job market increases. In the study of a city's urban growth, it is important to analyze the process from its foundation without losing sight of important events as the industrialization process, migration flows. Factors such as rent rates, public service demand are intrinsically intertwined with job creation which is the variable extracted for the economic system.

5.1.3 Environmental systems

The variable that is taken into account for this system is the water supply being an essential part of any economy and society. Therefore, the sustainable management of this resource is a necessary condition for a sustainable society and economy. The sustainable use of water is defined as the use of an amount capable of sustaining a society and can develop in an indefinite future without altering the integrity of the hydrological system or the ecosystems

that depend on it Gleik et al. (1996) .It is increasingly difficult to achieve this balance, but still, to approximate sustainable growth, all converging factors must be studied.

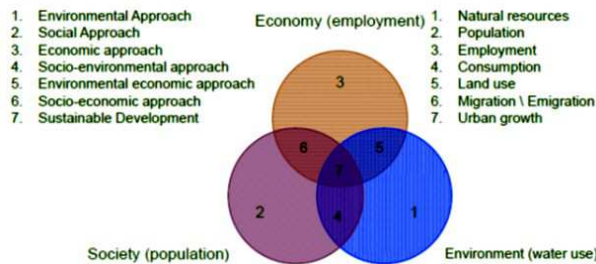


Fig. 6. Sustainable system

5.2 Data mining

The continuous increase of available information, originating from existing projects such as data bases necessary for the simulation of sustainable systems makes the use of data mining indispensable. Sustainable development requires a great deal of data to generate reliable models. To determine the data relevant to the three inherent systems of sustainability, it is necessary to review real statistical and geographical data originating from government institutions such as the National Institute of Statistic and Geography (INEGI by its name in Spanish, Instituto Nacional de Estadística y Geografía) and the National Population Council (CONAPO, by its name in Spanish, Consejo Nacional de Población). These institutions provide the necessary quantitative information for the social system. Data for the economic system is provided by the National Survey on Occupation and Employment (ENOE by its name in Spanish, Encuesta Nacional de Ocupación y Empleo) and for the environmental system the data is obtained from the Municipal Committee of Water and Disinfection of Juarez (JMAS by its name in Spanish, Junta Municipal de Agua y Saneamiento de Juarez).

Data mining is an implicit method of extracting information, such as weather patterns, with the intention of gaining knowledge Dubey et al. (2004). Significant progress has been achieved in this field during the last fifteen years; most of the research effort has been focused on the development of efficient algorithms capable of extracting knowledge from data, leaving the philosophical basis neglected Peng et al. (2008). The selection and processing of information leads to the use of high performance computing, with exploits such as social simulation and tools that give meaning and use to the information obtained. For this reason, it is important to pay attention to the conceptual frames and use it as the basis for developing the proposed methodology.

5.3 Rule generation

Using the Neuro-Fuzzy system to automatically generate the necessary rules, this data extraction phase using a fuzzy system becomes complicated as it is necessary to determine the necessary rules and what variables to consider. Implementing the Nelder-Mead (NM) search method, being more efficient than other methods such as genetic algorithms, more precise and compact models can be created as it was demonstrated in other experiments ?. It is a numerical method designed to minimize an objective function in a multi-dimensional

space, approximately searching for an optimal local solution in an N variable problem when the objective function has smooth variations Stefanescu (2007).

To generate the rules, the following markers must be considered:

5.3.1 Total population

Population growth, as previously mentioned, consists of “vegetative growth + migration balance” illustrated in the following formula:

$$PT = [N - M + I - E] \quad (1)$$

Where:

PT: Total population

N: Birth rate

M: Mortality rate

I: Immigration

E: Emigration

5.3.2 Employment

To measure employment, the result of both the work force and total population is considered. Employment rate is determined by fifteen variables, one for each AGEb .

$$FL = \frac{PEA}{PT} \quad (2)$$

$$Po = P2 + P3 + P4 + P5 + P6 + P7 + P8 + P9 + P10 + P11 + P12 + P13 + P14 \quad (3)$$

$$TE = \frac{Po}{PEA} \quad (4)$$

Where:

FL: Work Force

PEA: Economically Active Population

PT: Total Population

TE: Employment Rate

Po: Occupied Population

P2: Occupied population in the secondary sector

P3: Occupied population in the tertiary sector

P4: Occupied population as employee or working-class

P5: Occupied population as day laborers

P6: Occupied population that is self-employed

P7: Occupied population that works up to 32 hours a week average

P8: Occupied population that works from 33 to 40 hours a week average

P9: Occupied population that works 41 to 48 hours a week average

P10: Occupied population that does not receive compensation for their work

P11: Occupied population that works or less than the monthly minimum wage

P12: Occupied population with an income of 1 to 2 minimum monthly salaries

P13: Occupied population with an income of 2 to 5 minimum monthly salaries

P14: Occupied population with an income greater than 5 minimum monthly salaries

PEA: Economically Active Population

5.3.3 Water consumption

Considering the proposed markers for water consumption made in studies by Cervera Cervera (2007) and proposing environmental damage variables based on JMAS, INEGI, the XII general population census and Vivienda 2000, the following equation is obtained :

$$D = VD_1 + VD_2 \quad (5)$$

$$CA = \frac{VAFUDM}{TOVP} - D \quad (6)$$

Where:

VAFUDM/year = Annual volume of water billed for domestic use in cubic meters = 115,633,582.

VAFUDL/day = Annual volume of water billed for domestic use in liters per day.

TOVP = Total number of occupants in residence.

D: Environmental damage or degradation

VD1: Private residences with plumbing connected to sewage, ravine, river, lake or sea.

VD2: Private residences without water, plumbing or electricity.

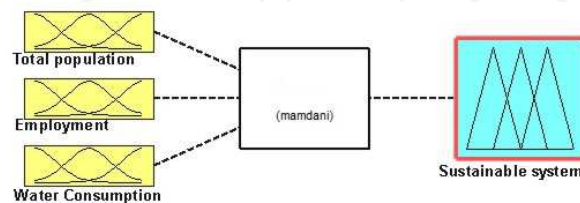


Fig. 7. Sustainable system

Most models with agents applied to natural resource management are structured with two elements, the agents that represent the entities in the modeled system and a simple cellular automaton as the spatial representation. The sole use of cellular automata in general has limited the modeling possibilities since this abstraction process can be restrictive Galán-Ordax et al. (2006). By combining different modeling techniques, more realistic representations can

be obtained, which is why the initiative to integrate fuzzy logic to extract rules from statistical data in data bases, all is needed is to input the equation and the necessary agency rules will be generated.

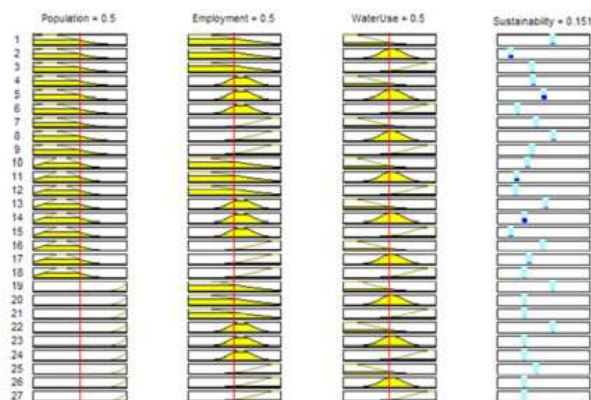


Fig. 8. Generated sustainability rules

5.4 Distributed agency model

Existing relations are very important in complex systems modeling, as they intertwine the system. A phenomenon can only be conceived in relation to another phenomenon and no phenomenon can exist by itself. The nodes are defined by their relations with other nodes and links through which they connect. This is an intrinsically holistic philosophy, it is not possible to reduce a system to individual components Heylighen (2008).

Undertaking the simulation of a sustainable system implies a holistic analysis, carrying out a multi-level analysis. The goal is to establish a mechanism in which different levels can be referenced within a reality with a general methodology. Each level is different from the rest, this means that by grouping several agents from a lower level, this group will behave as a single entity.

The implemented methodology represents a new approach to creating a simulation architecture. This distributed Agency (DA) methodology represents a general theory of collective behavior and the formation of structures. The DA approach treats agents as something agent-like, contrasting with traditional approaches where entities are or are not considered agents Suarez et al. (2009) .

5.5 Implementation

Months of work can be required to gather information, build, verify, and validate models, to design experiments, evaluate, and interpret results. The cost of a simulation is high, as it depends on the gathering of different types of information, from qualitative to quantitative. The initial foundation work and maintenance of simulation capabilities involves having trained personnel, software, and hardware among other costs Benenson & Torrens (2004). Another issue faced is the use of a tool that could simulate the different levels of a model in a single software.

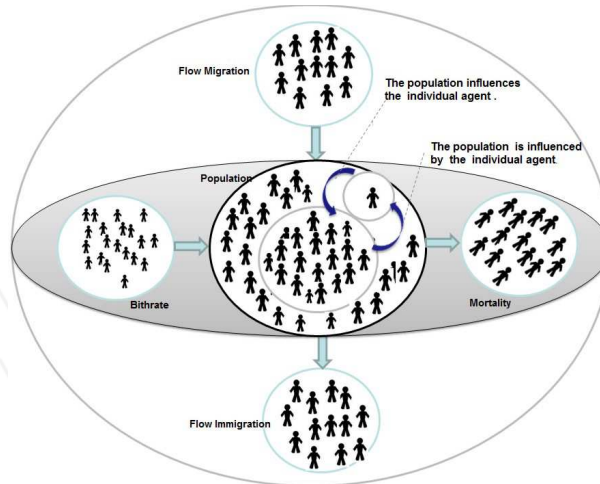


Fig. 9. Bottom-up and top-down model of the population

As an example, in the simulation of Ciudad Juarez, to represent the lowest levels of agency, 1,313,338 independent particles (the city's population in 2005) and their interactions must be managed if the upper level is to be used endogenously. The model that is presented in this work is based on the main sustainable relations between demographics, employment, the consumption of potable water, and the changes in land use caused by these factors.

Different aspects must be considered in order to choose a suitable platform. Among them is an orientation to creating agent based models which is necessary to simulate continuous events; most platforms are event based. The platform must also be configurable in various aspects such as the having individual selection and job management. Lastly, it must ease the development process, allowing researchers to quickly test models, theories and strategies in areas with dynamic and complex simulations.

Using the NetLogo platform, it is possible to simulate social phenomena, model complex systems and give instructions to hundreds or millions of independent agents all acting holistically Wilensky (1999). It also permits the use of a geographical information system with special and statistical data. These features make it possible to explore the relation and behavior of agents and the emergent patterns that arise from the interactions within a geographical space. NetLogo can be defined as a programming language for the modeling of multi-agent systems integrated with a social and natural phenomena simulation. The NetLogo environment can simplify exploring emergent phenomena Vidal (2007), and is also suitable for the modeling of complex systems varying in time, allowing or independent instructions to be given to the agents at the same time. The mentioned aspects can give the opportunity to discover the link between the micro level behavior of the individuals and the macro level patterns that arise from the interactions of the individuals Wilensky (1999).

5.6 Model validation

Real world simulations that include the population as an objective must include some form of validation. In econometrics, there is abundant data to verify population and economic studies while in other areas such as anthropology, there is a shortage of data. The supply of

this data is a secondary concern. The main concern is for the data sets to adapt to an agent's architecture. An example of this is the study that centered on the cognitive origins from social theory Drennan (2005).

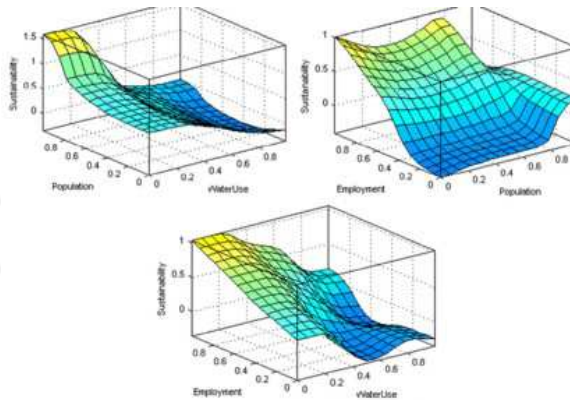


Fig. 10. Graphic representing the selected variables to measure the sustainable system

Aside from the population growth caused by vegetative growth and migration flows, employment is a marker that better reflects the relation between the economic and demographic factors. The primary occupation of Ciudad Juarez comes from the manufacturing sector (maquiladoras), which drives the changes in land use. By creating the maquiladoras, the demand for industrial usage has increased. With an increased job offer, migration increases and thus the population increases Romo et al. (2009). In consequence, the demand for residential land use is increased and results in the creation of new residential districts.

The use of natural resources such as water depends on the unique properties of the city. Ciudad Juarez has a dry arid climate, an annual mean temperature of 17.3°C , an annual mean precipitation of 223.8mm, an average of 48.1 rainy days and an average of 1.8 snow days Sánchez (1997).

To evaluate the model of Ciudad Juarez, it is a fast growing city with an inherent demand for land and public services that has overwhelmed the urban planning schemes, in particular, in environmental issues such as water consumption. This growth phenomenon puts stress on the environment, manifesting itself as an increase in waste production, excessive gas emissions, vehicle congestion, and other effects. It all contributes to the degradation of the environment with effects in the air, ground and water Romo et al. (2009).

The superficial waters of the Rio Bravo that enter Ciudad Juarez are used in their entirety for irrigation in the valley of Juarez, an annual supply of 60 thousand acre-feet or approximately 74 million mm^3 . The Rio Grande is the only renewable source of water for the Ciudad Juarez-El Paso region; Ciudad Juarez is entirely dependent on the aquifer called Hueco Bolson. Water extraction has increased in recent years, with an annual average rate of 2.5%. In 1990, 119.8 mm^3 of water was extracted, in the year 2000, an extraction of 153 mm^3 was reported and by the year 2005 the rate was 147.3 mm^3 . The approximate annual extraction is 175 mm^3 , this pumping provides a service capacity of 330 liters per inhabitant per day.

It is estimated that the Hueco Bolson aquifer has a surface of 260.89 acres (the approximate extension of the urban sprawl of Ciudad Juarez) JMAS (1997), and has an annual recharge rage of 35 mm^3 . This means that the extraction rate in Ciudad Juarez is approximately five times greater than the recharge rate provided by rainfall JMAS (2005). Nevertheless, the aquifer also receives subterranean recharges in a north-south hydraulic gradient coming from the U.S. side. These recharges have not been properly quantified.

5.7 Simulation and optimization

The initial simulation process has been carried out in two tiers, i.e., the macro and the micro levels. To illustrate we use the macro model of the dynamic systems from the top-down model. The dynamic systems allow us to depict all the elements and relationships from the sustainable system's structure. In addition, we will be able to visualize missing links or connections between the entities, and therefore adjust the corresponding mathematical equations in the model.

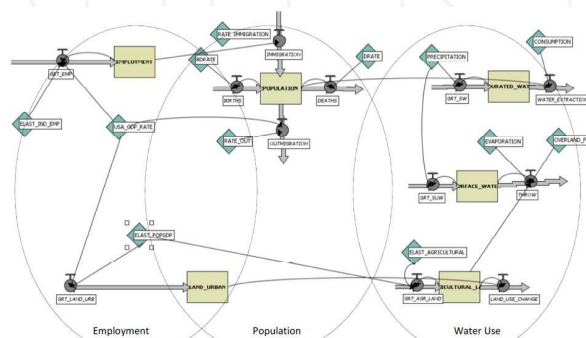


Fig. 11. Macro level sustainability implemented in NetLogo

On the other hand, obtaining the most relevant data will permit the representation of higher-level agents. In the context of this study, these will be: social, economic and environmental agents striving for harmony in all the aspects. The modeling process of this project is based upon methods and mathematical expressions, such that represent the theoretic behavior of the land use in the proposed representation. The simulation is presented in a geographical space using the NETLOGO framework. This software proves to be useful in representing geographical systems as well. Using agents during the modeling process provides a better comprehension of the structure and processes in urban systems. The integration of modeling with geographical information systems has dramatically improved the possibilities of urban simulations. We can visualize agents at the meso level, in the way they are affected by their surroundings and relationships within the same levels and the adjacent levels, i.e., superior and inferior levels.

5.8 Output data analysis

In the first part of the presented urban simulation model, the focus is on the social-environmental aspect. It can be observed how the sharp demographic growth from Ciudad Juarez has incremented along with the consumption of drinking water. Ciudad

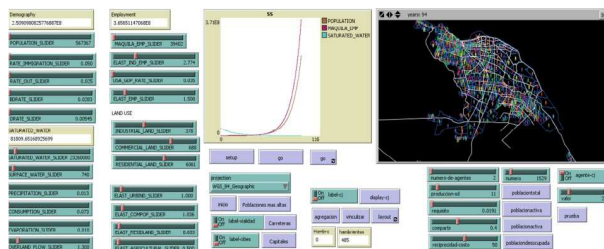


Fig. 12. Sustainability's meso level, implemented in NetLogo

Juarez's water system obtains its entire water supply from the Hueco Bolson aquifer, with an extraction rate that exceeds by many times the natural replenishment rate. Based on this information, the simulation model determined that in twenty years' time this resource will be insufficient to provide city's water needs. In parallel, the urban model simulation found that Ciudad Juarez is strongly linked to the American economy due to its nature of border town, situation that may lead in the future to financial crises. However, there is still data and relationships not clearly defined and required in the model. If the existing variables are accounted for in each system and linked between each other, an interesting output is obtained which need to be examined in the respective disciplines (social, economic and environmental). It should be noted that developing a sustainable model using different simulation techniques could prove to be a valuable instrument during planning stages. The usage of dynamic systems supported the construction of new theoretical models and contributed to expand our understanding of the connections within the systems. This partly to the availability of a global perspective of the situation and some concrete instances provided by the relationships in the lower agency levels.

6. Conclusion

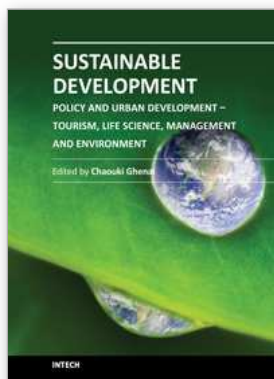
Developing a methodology for a sustainable system may imply the use of different techniques, theories and the researcher's perceptions which often differ between each other. Usage of a unique statistical methodology in this context could be insufficient given the requirements of encompassing a complex system. The proposed methodology is developed using a holistic approach, analyzing the diverse levels of dimension and time, applying nonlinear dynamics where required, harnessing the emergent properties of the model, and the self-organizing processes and interactions between several levels in the manifold respective dimensions. The interdisciplinary nature of this field sets the main goal when using this methodology, to explore the relationship between the diverse social and computational theories linked to complexity sciences. The outcome of the use of the methodology provides a reliable alternative to complement, substitute and expand the traditional approaches in the context of social sciences from the point of view in which complex systems are studied to developing the techniques proposed in this work. Multidisciplinary connections and multi-levelled modeling is still an unexplored field in computational social sciences and in the context of social simulations as well. Currently, this methodology has proven to be a way to achieve further advances in the objectives set by scholars in the area of social studies. The accuracy of statistics used in social sciences, can be improved by extending the number of variables, and its validity is kept when analyzed at a single level, however, most of the social, economic and environmental issues are part of a higher complex system. Thus, it is a difficult task to embrace a general methodology for any complex system, not only by reason of the multiplicity of

variables suitable for measurement, but also due to the nonlinear dynamics, self-organization and interactions between levels and dimensions. Hence, analyzing complex systems under the approach of complex systems and multi levels is greatly required. The use cases presented here can be linked together to the interactions between multiple levels only if the most significant relationships are clearly identified. The methodology applied to a sustainable system may imply a vast amount of information with different theories and computational techniques. The presented sustainable system used a diversity of simulation techniques being these key instruments for planning efforts of any type. The use of dynamic systems helped create new theoretic models and understand the underlying relationships within the system, visualizing these outcomes globally. Distributed agencies were helpful to represent particular use cases and the interpersonal associations between agencies. The proposed methodology was developed holistically, the analysis of the sustainable system, was studied at a macroscopic level determining all the processes in between job opportunities, population and water sources. This analysis provides a model that is simultaneously dependent and influential of lower levels. The intermediate hierarchies are considered given that most of the analysis ranges between boundaries without accounting for the middle sections. This can be accomplished by keeping in mind the relationships between components at different levels.

7. References

- Ashby, R. (2004). Principles of the self-organizing system, *E:CO Special Double Issue* 6: 102–126.
- Benenson, I. & Torrens, P. (2004). *Geosimulation, Automata-based Modeling of Urban Phenomeno*, Geosimulation, John Wiley and Sons, London.
- Boulding, K. (1956). General systems theory the skeleton of science, *Management Science* 6(3): 127–139.
- Cabezas, H., Pawlowski, C., Mayer, A. & Hoagland, T. (2005). Sustainable systems theory: ecological and other aspects, *Journal of Cleaner Production* 13(5).
- Camagni, R. (2004). Urban economics, *Investigaciones regionales*, N. 5 pp. 235–237.
- Cervera, L. (2007). Indicadores de uso sustentable del agua en Ciudad Juárez, Chihuahua, *Red de Revistas Científicas de América Latina y el Caribe, España y Portugal*.
- Ciria (2009). Sustainable construction procurement.
- David, N., Caldas, J. C. & Coelho, H. (2010). Epistemological perspectives on simulation iii, *Journal of Artificial Societies and Social Simulation* 13(1): 14.
- Davidsson, P. (2002). Agent based social simulation: A computer science view, *Journal of Artificial Societies and Social Simulation* 5.
- Drennan, M. (2005). The human science of simulation: a robust hermeneutics for artificial societies, *Journal of Artificial Societies and Social Simulation* 8(1).
- Dubey, P., Chen, Z. & Shi, Y. (2004). Using branch-grafted r-trees for spatial data mining.
- Galán-Ordax, J. M., López-Paredes, A. & del Olmo-Martínez, R. (2006). Modelado y simulación basada en agentes con sig para la gestión de agua en espacios metropolitanos.
- Gilbert, N. (2007). *Agent-Based Models*, Sage Publications Inc., Los Angeles.
- Gleik, P. H., Postel, S. L. & Morrison, J. I. (1996). The sustainable use of water in the lower colorado river basin.
- Heylighen, F. (2008). Five questions on complexity.
- INEGI (2006). II conteo de población y vivienda 2005. instituto nacional de estadística geografía e informática.
- Jaffe, K. & Zaballa, L. (2010). Co-operative punishment cements social cohesion, *Journal of Artificial Societies and Social Simulation* 13: 4.

- JMAS (1997). Proyecto de las plantas de tratamiento de aguas residuales norte y sur y obras complementarias de alcantarillado de cd. Juárez, Chihuahua.
- JMAS (2005). Plan de trabajo 2005, gobierno del estado de Chihuahua.
- Julian, V. & Botti, V. (2000). Agentes inteligentes: el siguiente paso en la inteligencia artificial, *Horizonte 2025*.
- Lempert, R. (2002). Agent-based modeling as organizational and public policy simulators.
- Márquez, B. Y., Castañón Puga, M. & Suarez, E. D. (2010). On the simulation of a sustainable system using modeling dynamic systems and distributed agencies, in N. C. (INC) (ed.), *INC2010: 6th International Conference on Networked Computing*, IEEE, pp. 86–90.
- Márquez, B. Y., Castañón-Puga, M., Castro, J. R. & Suarez, D. (2011). Methodology for the modeling of complex social system using neuro-fuzzy and distributed agencies, *Journal of Selected Areas in Software Engineering (JSSE)*.
- Márquez, B. Y., Castañón-Puga, M., Castro, J. R. & Suarez, E. D. (2010). On the modeling of a sustainable system for urban development simulation using data mining and distributed agencies.
- Márquez, B. Y., Castañón-Puga, M., Magdaleno-Palencia, J. S. & Suarez, E. D. (2011). Modeling the employment using distributed agencies and data mining.
- Márquez, B. Y., Manuel, C. n.-P. & Suarez, D. (2010). Sustainable system simulation for urban development using distributed agencies.
- Peng, Y., Kou, G., Shi, Y. & Chen, Z. (2008). A descriptive framework for the field of data mining and knowledge discovery, *International Journal of Information Technology and Decision Making* vol 7: 639–682.
- Romo, L., Córdova, G., Brugués, A., Rubio, R., Ochoa, L., Díaz, I., Lizárraga, G., Guerra, E., Aniles, M., Sapién, A., Mota, M. & Fong, J. (2009). Zonificación y ordenamiento ecológico y territorial del municipio de Juárez.
- Russell, S. & Norvig, P. (2004). *Inteligencia Artificial. Un Enfoque Moderno*, 2 edn, Pearson Prentice Hall.
- Sánchez, J. (1997). Monografía de ciudad Juárez.
- Stefanescu, S. (2007). Applying nelder mead's optimization algorithm for multiple global minima, *Romanian Journal of Economic Forecasting*. pp. 97–103.
- Suarez, E. D., Castañón Puga, M. & Marquez, B. Y. (2009). Analyzing the Mexican microfinance industry using multi-level multi-agent systems.
- Suarez, E. D., Rodríguez-Díaz, A. & Castañón Puga, M. (2007). *Fuzzy Agents*, Vol. 154 of *Studies in Computational Intelligence*, Springer, Berlin, pp. 269–293.
- Suarez, E. D., Rodríguez-Díaz, A. & Castañón-Puga, M. (2008). *Soft Computing for Hybrid Intelligent Systems*, Vol. 154, Springer, chapter Fuzzy Agents, pp. 269–293.
- Vidal, J. M. (2007). *Fundamentals of Multiagent Systems with NetLogo Examples*.
- Wilensky, U. (1999). NetLogo software.
- Williams, D. & Dollisso, A. (1998). Rationale for research on including sustainable agriculture in the high school agricultural education curriculum, *Journal of Agricultural Education* 39, No. 3.
- Yolles, M. (2006). Organizations as complex systems: An introduction to knowledge cybernetics.



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Bogart Yail Marquez, Ivan Espinoza-Hernandez and Jose Sergio Magdaleno-Palencia (2012). Sustainable System Modelling for Urban Development Using Distributed Agencies, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainable-system-modelling-for-urban-development-using-distributed-agencies>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

European Policy for the Promotion of Inland Waterway Transport – A Case Study of the Danube River

Svetlana Dj. Mihic and Aleksandar Andrejevic
*Faculty of Business and Law Studies, Novi Sad
 Serbia*

1. Introduction

Sustainable development, as a global development concept, represents a multi-dimensional phenomenon and it includes many different indicators of human activities. When trying to view such a large concept it is necessary to individualize, measure and follow the movement of those indicators that are considered the most important and the most influential from the point of view of sustainability of future development. In certain number of cases, big changes in values of some indicators do not have a significant influence. However, indicators that show the state of the field which is exploited and use of energy belong to the group of the most important indicators of sustainable development in general [1].

In all fields of human activity, certain forms and amounts of energy are used in different ways and with a different efficiency degree, which depends on a big number of diverse factors. Anyhow, theory and practice show to the fact that transport in general is absolutely the biggest energy consumer and contributes to pollution in biggest amount [2]. That being said, a lot more attention needs to be devoted to consideration and implementation of solutions that will lead us to the lower energy consumption and lower exploitation for transportation needs.

In traditional sense, we can talk about air, land and water transport. Water transport is considered ecologically most acceptable for several reasons. Above all, in order to carry out water transport, natural waterways (rivers, canals, seas and oceans) are used, with the use of some waterways whose purpose is to shorten the distance during a certain trip. Another point is that, while conducting a water transport, many modern high-capacity means of transport are used and they allow heavy load transport. Apart from all of this, these means of transport can use ecologically acceptable fuels, especially biodiesel and its blends. Water transport, if conducted properly, does not jeopardize environment too much, it does not create waste, it does not create much pollution and it does not harm the view of the landscape, which can entirely retain its characteristics. Lastly, it is important to say that the economists today completely agree on one thing – water transport is absolutely the cheapest way of transport nowadays.

Because of everything above-mentioned, in all European countries, as well as inside the European Union, the possibilities to exploit and to use these existing waterways are

seriously considered. Namely, the analyses show that there is an extremely well-developed network of waterways in Europe which are only partially used.

It has been estimated that around 30,000 kilometers of rivers and canals are running through Europe. They are evenly distributed in all European countries. Besides, in Europe there are some canals which were built on purpose and which connect north and south, east and west, Europe, Asia and the rest of the world. European rivers provide homes to some of the biggest and most developed capitals and cities. These areas are also famous for being the most developed ones and the most inhabited ones. In spite of favorable natural conditions, in the EU countries, water transport covers only 5.6% of total land transport in those countries. In the most developed European countries (which belong to Rhine region) water transport is constantly decreasing. From 12% in 1970 to 7% in the year 2000. At the same time, the total transport increased for 18% in the period of 30 years.

In order to promote the total transport, European Commission passed a so-called White Paper "European Transport Policy for 2010: Time to decide" by which Europe declares its willingness to intensify river transport as an economic, efficient, reliable and ecologically acceptable way of transport [3]. Likewise, the Declaration of European Ministers of Transport signed in Rotterdam in September 2001 called upon Member and Accession States to implement Pan-European RIS by the year 2005 [4].

The European Parliament resolution following the White Paper sided the creation of high performance, geographically-comprehensive information systems of inland waterways to be extremely important in this connection and asked the Commission to submit a proposal for harmonized technical provisions towards the implementation of River Information Services (RIS). In the session of the Transport Council of 9th October 2003, The Netherlands, supported by other Member States, welcomed the Commission's initiative to put forward a proposal for a Directive on River Information Services. Meanwhile, this resulted in a RIS Directive, which creates a European-wide harmonized framework for River Traffic Information Services in order to ensure compatibility and interoperability between current and new RIS systems and to achieve effective interaction between different information services on inland waterways of international importance [5].

The harmonized river information services (RIS) on inland waterways in the Community Directive was published in the official journal of the European Union on 30th of September 2005 and came into force on 20th of October 2005.

2. Regional, continental and global relevance of Danube River

Danube is, together with River Volga, the longest European river. The length of the river from its spring in Germany, to its mouth in the Black Sea is 2,850 km. Danube connects 10 European countries. Taking into consideration the strategic concept of Europe as a region with long term sustainability strategy, European Commission has started considering the important potential, ecologic and economic relevance of unexploited waterway transport, by which the biggest attention is paid to the most important European river- Danube. River Danube is a waterway which makes an integral part of Trans European Transport Network (TEN-T). Via canal network, Danube connects Rotterdam harbor in the Netherlands with the Black Sea, that is, with Russia on the east. Because of all of this, Danube is thought to be the most important river in Europe, if not in the world.

Via Danube-Rhine-Main Canal, the length of waterway has been extended to 3,500km, and in that way western and south-eastern Europe have been completely connected. Danube has a navigable length of 2,411 km out of which 1,156 km (or 48%) are border sections. The countries which belong to Danube waterway are: Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldavia and Russia (via Black Sea). Given the position of Europe as a continent and considering the Danube's flow direction, this river can be seen as the "gate of Europe", that is it can be its water connection to Russia, Asia, Africa and via Mediterranean Sea it can be connected to the rest of the world (Fig. 1).



Fig. 1. Container Liner Services on Danube - Constanta as a gateway to Europe
Source: Graphics: Austrian Institute for Regional Studies and Spatial Planning

Apart from its global relevance, Danube's water flow is of vital importance for entire Europe and especially for the region and the countries through which it flows. Danube has multiple significance for the development of the region. Above all, Danube represents the cheapest and ecologically the most acceptable way of transport. This fact is especially important if taken into account that Danube flows through and connects some of the highly developed world countries which constantly increase their level of export and import services, which, of course, requires quality and efficient transport.

Besides, Danube embodies a sort of ecosystem with its own characteristics and regions and cities which it flows through have great historical and cultural importance and hence act as a backbone for sustainable tourism in this part of the world. Danube region and its countries

are in part the most developed European countries and in part there are countries which are on the road to economic development. The prognoses point to the fact that the other Eastern European countries will grow economically and more intensely in the following decade. Therefore, contemporary Europe thinks of Danube as of the basis for development of this region, it sees it as a connection between European Union, Balkan countries in south and Russia, which is considered a region with special development potential.

All countries that are on Danube flow have marked a significant degree in economic development. Ninety million inhabitants live in the Danube region and they produce a Gross Domestic Product (GDP) of around 450 billion euro. Based on the predictions made by BMVIT and European Commission, the average growth rate degree in some countries of this region could happen in the period between 2010 and 2015 and it could be considered extremely favorable. Namely, all Danube region countries will show growth of GDP. This growth is predicted to be of 2.2% per inhabitant in Germany and even 4.9% per inhabitant which is expected in Croatia. This positive trend will impose the need for more intense and for a better organized river transport on Danube [6].

The European Union believes that Danube should represent the point of integration in this region and hence help and accelerate the progress of less developed countries, especially in Croatia, Serbia and Turkey, which are the only countries out of the EU at the moment. The countries through which Danube does not flow could also profit from the upgrading of water transport, in an indirect way at least. All of the Danube region is expected to show an extremely encouraging period of economic growth, and as a consequence it will have higher needs for transport.

There is a wide range of speeds that Danube's flow can take. Near the spring of the river the average speed is 6.5 km/h. Near Vienna the speed is 6 km/h. Afterwards the speed slightly decreases so that when entering Romania it is 4.6 km/h and on its way to the Black Sea the speed is 2.2 km/h. There are 78 bridges in total, whereas the biggest number of bridges is in bigger cities like Vienna and Budapest [7].

Regardless the fact that Danube does not flow through Russia, this country is extremely interested in Danube's waterway, especially given the fact that Russia borders with the Black Sea which represents the mouth of Danube river. Danube can be used for transport of natural resources and of products from Russia to the rest of the Europe and world, as well as vice versa. This fact shows how important is the need for a more precise long- term sustainable transport on this waterway.

3. Transport research on Danube River

Danube has been used for transport for a long time, but the precise data about transport on this river can be followed starting only from the year 1950, which was taken as the first year of the research. The final year of the research is 2005 or 2009 depending on the availability of the data. The data for the last year have been given in the form of an assumption, based on the movement on Danube in the last period, with a goal to get a clear and unique picture about character of transport on Danube in this period of 60 years, which was also the period of a strong economic development of Europe. The research covered the analysis of the following parameters [8]:

- Description and analysis of the existing fleet;
- The amount and analysis of heavy load transport;
- The amount and analysis of passenger transport;
- The influence these characteristics had on ecology.

The analysis of the data was made based on the research results, and suggestions have been given on how to improve the quality and quantity of traffic on Danube, to make its sustainable use possible by giving a significant contribution to sustainable economic and ecological development of entire west, central and south-east region of Europe.

3.1 Danube fleet

The development of Danube fleet has been monitored statistically since 1962. For the needs of this research the authors had at their disposal the data for the period since 1965, taking into account that some data are registered every 5 years, so that the data for year 2010 were not yet available. The research shows that the number and the power of the fleet has been increasing year after year. The basic changes in the characteristics of the fleet used on Danube in the period from 1962 to 2005 are the following:

- The number of the entire fleet grew from 3,142 vessels in 1962 to 4,529 vessels in 2005 which represents growth of 144%;
- The total heavy load which was transferred by the Danube fleet increased from 1,807,219 tons in 1962 to 4,385,986 tons in 2005 which represents growth of 242%;
- The biggest number of Danube fleet is used in Germany, Austria, Romania and Ukraine. The number of vessels in Serbia, Croatia and Moldavia is for 5% lower than the total number of vessels on Danube.

These mentioned growths point to the fact that Danube fleet transports more and more heavy load but not due to the bigger amount of vessels but because their capacity and operational power grow. From the point of view of sustainable transport on Danube this tendency can be considered extremely favorable, being that energetic efficiency could be one of the key solutions to problems of energy consumption today.

3.2 Heavy load transport

The volume of heavy load transport on Danube has been monitored since 1965 and it includes the analysis of the amount of transported goods and the analysis of traffic in harbors on Danube River. The analysis in this field gave extremely precious data when talking about the possibility of realization of water transport on this waterway. Namely, the objective of this research is promotion and stimulation of efficient and ecologically acceptable transport of bigger heavy loads by waterway. The amount of load has been monitored on three different bases: the load which entered the river's flow from the Black Sea, the load which used Danube to get to the Black Sea as well as the load transported between Danube harbors without reaching the Black Sea. By analyzing these data the authors concluded that the transport on Danube in the last 40 years recorded 3 characteristic periods, as shown in Fig. 2.

First and foremost, this diagram shows that the total amount of heavy load transported on Danube increased 4.8 times in comparison to the initial year, that is 1950. During this period,

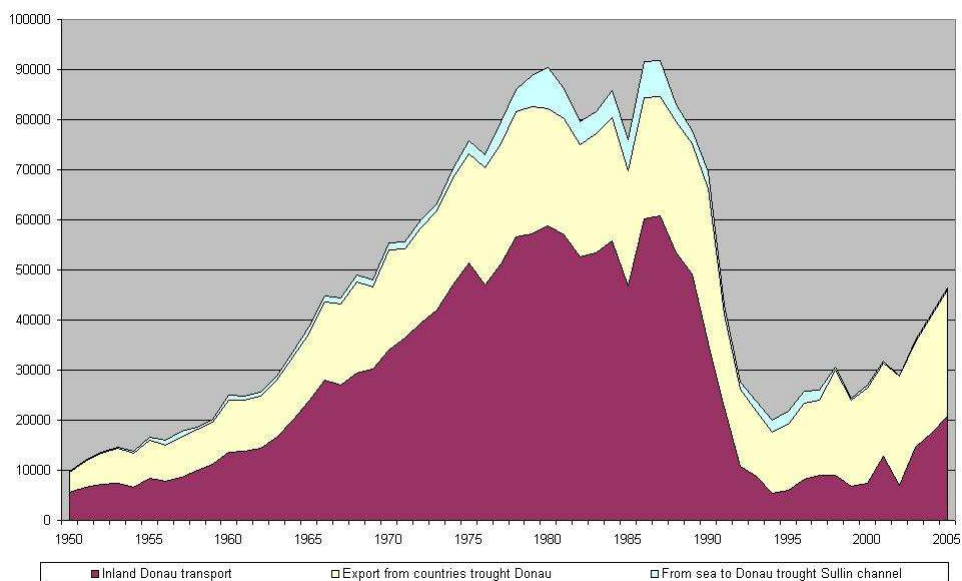


Fig. 2. The total of heavy load transported via Danube in the period from 1965 to 2005

the economic growth of some countries in this region directly affected the increase in transport as well. The growth registered each year reached its maximum in 1980 when a heavy load transport of 8 million tons was recorded. Such a high level of transported goods has been maintained until 1990. After that, there was a long period characterized by sudden decrease in the volume of transported goods, which is explained by the fact that transporters mostly used land transport. What brought to this decrease was also the worsening of economic and political situation and changes in countries of this region which belong to eastern Europe and in most cases they have accessed the process of political and economic transition. After the sudden decrease, the transport on Danube started recording some growth which was, however much slower so that in the last available year regarding the data(2005), the traffic equal to the traffic of 1970 was recorded. Because of these reasons, the promotion of Danube and sustainable transport development on it are of extreme importance.

The biggest volume of goods was recorded with the load entering the Danube through the Black sea. Somewhat less amount of goods refers to the goods transported between Danube harbors. The least amount of transported goods is represented by the goods which was imported from the countries of this region towards the Black Sea and further on. All this shows that in the past Danube, as well as now, has been used as a river by which different goods is imported in Danube region countries, and it is mostly referred to raw materials and unfinished products meant to be further processed. The least amount of goods is represented by raw materials or finished goods produced in the countries of this region and which are addressed to markets outside of Europe. It is very encouraging to see that transport among Danube harbors is well developed. The sustainable development of Danube traffic and this region as a whole insists on maximizing the use of Danube as means

of road which can, whenever that is possible, substitute traditional land and railway traffic which represent much bigger a threat to the quality of the environment of this densely populated part of the world.

The biggest growth in the amount of transported goods was recorded in Romania, where transport increased 6.8 times respect to 1950. In the same period, the transport in Austria also increased, 5.7 times. The lowest growth was noted in Slovakia, 1.7 times.

Besides the general overview of transported goods in this monitored period, the traffic in harbors situated on Danube was also analyzed. The results of transport carried out in Danube harbors from 1965 to 2005 was given in Fig. 3.

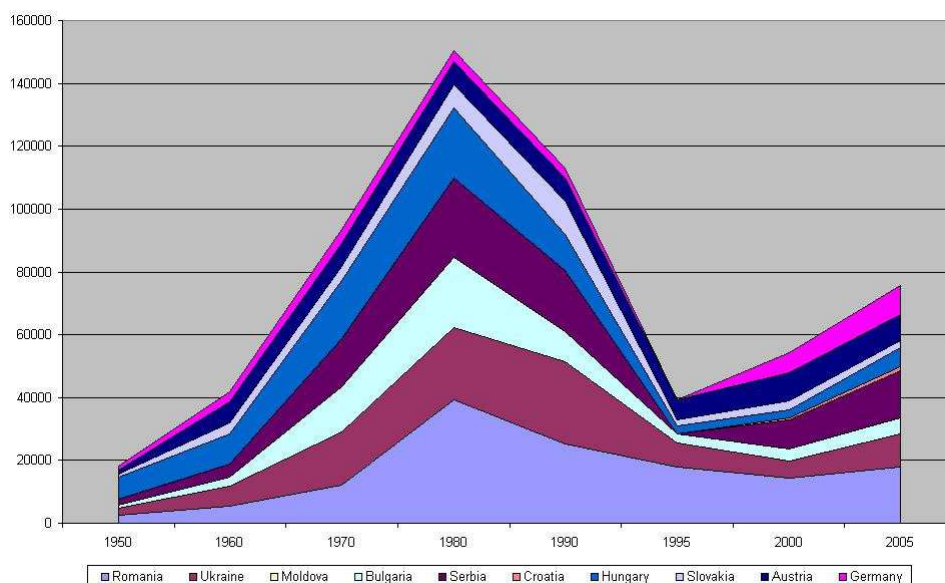


Fig. 3. The traffic in harbors on Danube divided by countries for the period from 1950-2005 (thousands of tons)

The traffic of goods in Danube harbors completely follows the tendency of transport on Danube in the monitored period. With the increase of transport of goods, the traffic in Danube harbors grew as well and it reached its maximum in 1980. After that the traffic in harbors suddenly decreases so that in 2000 it starts recording a new growth, with the expected positive tendency.

The biggest traffic was noted in harbors in Germany, Austria, Slovakia and Hungary, whereas the lowest values were recorded in Romania and Ukraine. Taking into account that Romania and Ukraine are as well the countries that have at their disposal 40% of entire Danube fleet, these results point to the fact that heavy load only travels through these countries but does not stop in their harbors. This situation opens the possibility for additional engagement of Ukrainian and Romanian harbors as a place for loading the goods produced in these countries. For the moment Danube in Romania and Ukraine has only a

transition character. It is encouraging to know that traffic in Danube harbors in Serbia is increasing, even though it is a country with the least developed fleet in comparison to the other countries from this monitored sample.

The goods transported via Danube is very diverse. Mostly there are iron ore (25.6%), then processed and unprocessed metals (22.7%), coal (9.1%), oil and oil derivatives (8.5%), cement (7.5%), grain goods (6%), processed metals of metal industry (5.4%), natural resources: wood (4.3%), colored metals ores (3%), finished metal products (2.7%) and the least transported goods is agricultural goods like fodder (1.6%). These data show that Danube is not enough used for transport of agricultural products for no reason at all, especially given the fact that Danube flows through almost exclusively agricultural regions and where the production of food represents the basis for export of food from the countries of Danube region, above all for Hungary, Serbia, Croatia, Bulgaria and Romania.

3.3 Passenger transport

Passenger transport on Danube has been statistically followed from 1964 and the updated data have been available for the year 2005. Based on the general insight and for the needs of planning of sustainable transport on Danube, the analysis has been made regarding the changes in the number of transported passengers from 1964 to 2005 which is shown in Fig. 4.

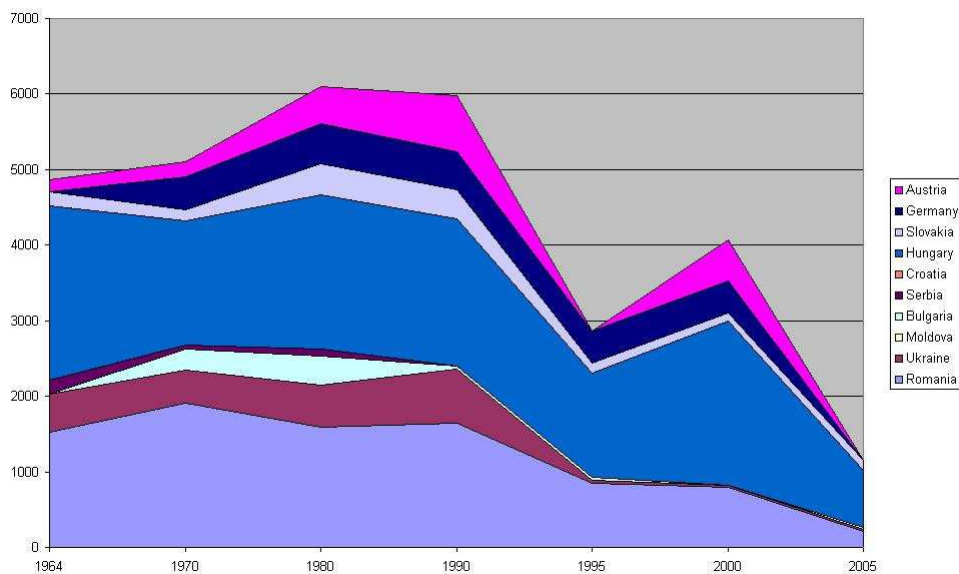


Fig. 4. Passenger transport on Danube from 1964 to 2005 (expressed in thousands)

Unlike the heavy load transport, where the constant growth was noted, passenger transport on Danube shows somewhat different characteristics. The biggest number of passengers was transported in the period between 1980 and 1990 (which coincides with the volume of

the transported heavy load). Also, the biggest number of passengers was transported in Austria, Germany, Slovakia and Hungary. After that period, the passenger transport suddenly decreased and it reached its lowest point in 1995 which can be explained by the use of other, faster means of transport as well as by the wars and unstable political situation on the Balkans, given that general safety was very low and some of the bridges on Danube completely destroyed. After this period the number of passengers started growing rather insignificantly, for later it would start decreasing once again. The last year's data say that 1.2 million passengers were transported in 2005.

By monitoring countries, the biggest fall in number of passengers was noted in countries which at some point in past had the biggest number of passengers on Danube (Austria, Germany, Slovakia) which means that the promotion of water transport has to be adjusted to the requirements of the region. Also, based on this diagram it is easily noticeable that the number of passengers in Serbia is constantly low and it is especially surprising to know that there is a really small number of passengers in Romania, taking into consideration that Romania has big fleet. The fleet is primarily directed at heavy load transport, which means that planning the sustainable waterway transport must consider the investment projects to buy the fleet for transport of people.

4. Ecology and transport on Danube

Even though transport on Danube continues to show low intensity throughout the last 20 years the quality of the water has been harmed, being that there is a lot of waste water from many nearby industrial areas but also from cities located near the river. Regardless the strict laws which regulate the purification of water before letting it out, Danube has been significantly polluted. Given the impossibility to detect the sources of pollution, for the needs of the research the quality of the water has been decided not only based on the fact if it was pollution created by transport or in some other way.

Danube water in its upper waterway belongs to the II category (there is a moderate pollution in the river and good oxygen supply, there is a diversity of species and an abundance of algae, insect larvae, snails, entomostracans, aquatic plants which can cover wide areas and there is a lot of fish diversity). This type of water quality can be considered satisfactory, being that Danube in its upper waterway flows through Germany and Austria which are the countries that have reached very high level of development. Certainly, adequate laws in these countries (as well as in the EU in general) contribute a lot to these relatively good parameters of quality of Danube water in this area.

After going through Vienna, the capital of Austria, Danube water loses on quality and it changes to the III category (higher organic pollution; rather low oxygen content which affects fish; local sludge deposition; frequent and mass occurrence of sewage bacteria and ciliates; sponges, leeches and isopods can be often found; scarce aquatic vegetation). At some points going downstream from Vienna, the quality decreases even more and it become the IV category water (restricted living conditions for higher life forms; extremely high organic pollution; highly infected by organic, oxygen-depleting wastewater; total oxygen depletion is often caused by bacteria, flagellates and ciliates; suspended wastewater constituents cause turbidity or haziness; dense population of larvae and oligochaeta.)

Going through Hungary and reaching Belgrade, the capital of Serbia, the Danube water situation changes once again. It becomes the V category water and going downstream all the way to the Black Sea, Danube water is extremely polluted and at certain points it is even considered to be of VI or VII category [9]. Such a low water quality in this area is not so low only due to the highly developed industry, given that these are countries with a lower development level, but the insufficient and inadequate laws regarding environment.

The traffic on Danube affects the quality of Danube water depending on the quality of the fleet and on the frequency of ecological incidents. Given the age of the Danube fleet, European Union started a whole range of initiatives whose goal is to upgrade the quality of Danube water in its entire flow. For that reason, The Danube River Protection Convention has been enforced. It was created in the framework of the ECE – Convention for protection of trans-boundary waters that was enforced in 1998 and it is the only legal document regulating the transport on Danube and it includes Danube's tributaries as well. The basic objectives of this Convention are:

- Sustainable development and use of Danube as water resource and natural wealth of common interest
- Control of pollution of Danube
- Preventing further pollution of Danube
- Ecologically and economically justified use of Danube
- International collaboration
- Promotion of water transport
- The use of ecological energy as power generating fuel

The importance of Danube waterway for the EU can be seen in the fact that at the moment there are over 400 different projects on Danube which are being prepared or are already in process and their total value is around 5 billion dollars [10] and this money is to be distributed in the following way:

- Municipal waste water collection and treatment plants: 3.57 billion US dollars
- Industrial waste water treatment: 0.81 billion US\$
- Agricultural projects and use of land: 0.16 billion US\$
- Rehabilitation of wetlands: 1.12 billion US\$

Bearing in mind that Danube waterway is very important and taking into account how much money has been invested into these projects, their realization is conducted under the supervision of the EU and it is conducted in 3 phases. In the first phase, completed in the end of 2003, the definition of Danube basin and Danube region was conducted together with conducting the analysis and upgrading the institutional frame necessary for collaboration among Danube areas and countries. The second phase of this enormous project was finished until the end of 2006, and it covered the analysis of the quality of Danube water, definition of ecology and source of pollution, as well as ways to control and monitor. After this phase there was a possibility to define clear strategic objectives and ways to realize them. In majority of Danube countries the third phase of the project is taking place. It covers conduction of certain activities. Given the character and volume of planned measures, the end of the first phase will be finished in 2021, even though there are some indications that it could last until 2027. All these things point to the need of clear and precise planning in all fields regarding the use of Danube, especially regarding the planning of sustainable traffic.

Its intensification has been predicted, and this fact in uncontrolled conditions can lead towards highly increased ecologic pollution.

5. Improvement in use of Danube River waterway

5.1 European policy for the promotion of inland waterway transport

In accordance with regulations conducted so far regarding the development of Europe, which is supported by the results obtained after the analysis of 60 years of Danube waterway, it is clear why all European countries support the development to intensify transport on Danube, certainly by respecting the concept of sustainability of transport and development in general. Considering the fact that Danube's potential has not been used enough, the new concept was defined as an all-embracing basis for the promotion of inland waterway transport. The name of the project is PLATINA.

Realization of Danube waterway promotion is connected to a lot of different problems which, above all, refer to the different levels of economic and institutional development of the countries through which Danube flows. The need for sustainable use of one river is possible only if all the activities, whose primary objective is equalization in position of some countries, are performed. Only in this way will it be possible to see Danube as unique, undivided and safe waterway, from source to mouth of river. For that reason, PLATINA projects points out the following primary activities :

- Establish a knowledge network bringing together all relevant actors concerned to assist in the implementation of NAIADES in Europe (EC, Member States and third countries),
- Provision of technical expertise and support,
- Provision of organizational, infrastructural and financial support and
- Platform deals with areas that require non-legislative coordinative actions at the European level.

These activities will be adjusted to the needs of each country. In order to proceed with efficient implementation of Danube promotion project, it is first necessary that every country makes its own personal action plan, which has to cover the following parts:

- Improvement and maintenance of waterway infrastructure

Each country that uses Danube waterway shows different quality of river and transport infrastructure. That being said, it is necessary that all the countries be put in the state which will suit the requirements of contemporary river transport [11].

- Exploitation of Danube's waterway potential

The results of this and similar researches confirm the fact that Danube's waterway is not being sufficiently used. Besides, the economic predictions of intensity regarding the economic development of Danube region in the following decades shows that there will be higher growth in industrial development and that imposes the need for more intense transport. Because of this, every country needs to think of Danube's waterway as of one of the most dominant existing waterways in the future [12].

- Building capacity for waterway and navigation authorities as well as for related administrations

The development of administrative and institutional systems which provide support and which intensify transport on Danube.

- Implementation of River Information Services on Danube

To create and implement the unique RIS system in all the Danube region countries represents one of the most important conditions for integration of the region [13]. In this way, Danube's waterway will surpass international borders and it will represent the unique waterway whose users will be able to use independent information and logistic support, which is something that will contribute to upgrading of the quality of sustainable transport.

- Implementation of Transport Management

The implementation of contemporary transport management primarily refers to providing the project with monitoring, control and navigation systems by which it is possible to control the traffic, to prevent delays, to reduce the cost of fuel and to reduce the cost of fleet maintenance [14, 15]. Besides fleet control, contemporary or modern transport management provides some solutions to the synchronization of harbors, load and unload equipment, container services and it provides the solution for bridges on Danube's waterway.

- Modernization of the fleet

The results of the research show that there are unfavorable characteristics when it comes to vessels used for transport on Danube. Especially worrying indicators of quality of the fleet are noted in the lowest developed countries (Serbia, Moldavia). It is necessary to proceed with adequate adjustments of existing vessels and with the purchase of new vessels which according to their characteristics fit with modern day economic, transport and ecological requirements. At this point it needs to be said that all the countries in the region have good conditions for production of biodiesel [16], which is considered excellent when used in naval engines.

- Development and integration of ecological strategies and concepts for Danube River

Danube represents a unique ecosystem with lower characteristics in some of its parts. Besides, some parts of Danube river bank represent protected natural, cultural and historical places. Sustainable development of transport on Danube needs to provide preservation and improvement of ecological maintenance of these regions.

- Creation of an international traffic model for the Danube region

It is necessary to analyze the existing infrastructure that is directly or indirectly related to Danube's waterway. All forms of land transport that are connected to Danube (roads, railways) have to be considered a priority in terms of investments for maintenance and for extending capacities. Also, it is necessary to decide future transport corridors which will connect industrial and agricultural capacities to Danube. Special attention needs to be given to modernization of international transport corridors, borders and customs free zones.

5.2 Applications and projects at work across Europe

The realization of PLATINA project proceeds via wide range of special projects whose goal is to promote certain aspects of inland waterway transport. All the mentioned projects are

ongoing and each of them affects the creation of sustainable transport on Danube, as well as on other waterways in Europe. Due to the canal connection of rivers Danube, Rhine and Main, these projects cover almost entire territory of central, northern and southern Europe. The developments of national stand-alone telematics services, which vary in functions, standards and architecture, brought challenges to the current service regime. Some of the existing applications are [17, 18]:

- **ARGO** (Advanced River Navigation), a German navigation system for inland waterway skippers. It provides data on the fairway conditions and actual water levels in real time.
- **BICS** (Barge Information and Communication System) is a voyage and cargo (especially dangerous cargo) reporting system used in The Netherlands, Germany and other countries. The main aim of BICS is to support the reporting duties of the skipper/fleet operator towards the authorities.
- **BIVAS** (Inland Navigation Intelligent Demand and Supply System) is an internet-based interactive freight transport virtual marketplace.
- **DoRIS** (Donau River Information Services) is an Austrian system that can automatically generate traffic information by means of AIS transponders. The tactical traffic image is currently being tested for use by waterway authorities and skippers. In 2005 the roll-out of the DoRIS systems was performed on the Austrian section of the Danube and the operational test started in the beginning of 2006. Furthermore a subsidy program for RIS equipment is being provided for accelerating the penetration of RIS on the user-side.
- **ELWIS**, a German Electronic Waterway Information System, which provides a series of (fairway) information services.
- **IBIS** (Informatisering Binnenscheepvaart), a Flanders centralized database system, allows administrations to deliver navigation licenses, locate ships within their territory and collect data on inland navigation.
- **GINA** (Gestion Informatisée de la Navigation), a reporting application for Wallonia dedicated to the invoicing of navigation fees and the generation of statistics.
- **IVS90**, a ship reporting system used by Dutch waterway authorities supporting lock planning, vessel traffic services, calamity abatement and statistics.
- **NIF** (Nautischer Informations-Funk), a German service to transmit messages related to water levels, high-water notifications, water level predictions, ice and mist messages, and police messages.
- **VNF2000**, a French information network used to invoice navigation tolls and to produce traffic statistics.
- **VTs's Rhine**, Vessel traffic management services are installed on the Rhine in two difficult stretches: in the gorge section reach around the Lorelei in Germany with narrow bends and strong currents, and on the meandering Lower Rhine in The Netherlands with heavy traffic. These differing operational practices and facilities in Member States reflect the current incompatibility of information systems, standards, and installations. Legislative and technical support for harmonized information services at a pan-European level become more and more necessary to guarantee the efficiency and safety for cross-border navigation and logistics. This was one of the principal motivating factors in the development.

Planned infrastructure projects:

- Germany: Straubing – Vilshofen (Danube km 2,321 – km 2,249)
- Austria: Vienna – cross border section with Slovakia (Danube km 1,921 – km 1,873)
- Hungary: Palkovicovo – Mohacs (Danube km 1,810 – km 1,433)
- Bulgaria - Romania: Iron Gate II – Calarasi (Danube km 863 – km 375)
- Romania: Calarasi – Braila (Danube km 375 – km 1,75)

The number and volume of mentioned investment projects show that modernization of Danube water way represents one of the most important initiatives which lead towards economic and ecological improvement of the region, which is based on sustainability and long-term stability.

5.3 Development and implementation of RIS

River Information Services (RIS) are the harmonized information services that support traffic and transport management in inland navigation, including interfaces to other transport modes. RIS do not deal principally with internal commercial activities between companies, but is available for interfacing with commercial processes. RIS streamline information exchange between public and private parties participating in inland waterborne transport. The information is shared on the basis of information and communication standards [19]. The information is used in different applications and systems for enhanced traffic or transport processes.

Modern logistics management requires extensive information exchange between partners in supply chains. Implementation of communications and information technologies in organizational and operational processes is a crucial prerequisite to increase operational efficiency and safety in today's market. RIS facilitate the inland waterway transport organization and management. Through effective information exchange, transport operations (such as trip schedules and terminal/lock operation plans) could easily be optimized, providing advantages for inland navigation and enabling it to be integrated into the intermodal logistic chains [20].

The degree of RIS system development in some Danube countries is different [21] but it is also conditioned by the influence of a big number of complex factors. The influence of the RIS development degree on the development of sustainable water transport is extremely intense, hence a short overview of its development in some countries is shown in further text.

Germany is one of the most developed world countries and it has a fully developed and implemented RIS system. The situation is similar in Austria as well. In this country there is a separate RIS centre which coordinates the functionality of the system in the entire territory of the country. The system of water level information, skipping service as well as availability of tactical traffic information all function. Electronic reporting system is still in development. The situation is similar in neighboring countries, Slovakia and Hungary [22, 23].

Somewhat more unfavorable situation regarding this issue is noted in Moldavia. Instead of fully developed RIS system, in Moldavia there is a tactical information transport center. There is no skipping service. In Romania all VTS centers are functional throughout the

entire Danube waterway and there is also the skipping service. The full implementation of RIS system is in process and it is conducted with the help of the adequate EU institutions. In Bulgaria the situation is almost the same with the difference that in Bulgaria there is no skipping service.

Regardless of the fact that Croatia does not belong to EU, this country has a quality and well implemented RIS system. Water level and tactical information services are provided and there is also a skipping service. Electronic reporting system is in the process of development. The most unfavorable situation is in Serbia. In this country there is only one center that can provide with traffic information whereas the full implementation of RIS system still in process and it is supervised and helped by the EU.

5.4 The promotion of Danube waterway

The whole EU strategy is based on promotion and realization of conditions necessary for development of countries in this part of the world as well as all the activities conducted in them. Because of this, the special attention needs to be given to changes in traffic field which at the moment represents the biggest pollution threat for the environment. Based on the dimension of the problem and complexity of traffic in Europe, an all-inclusive sustainable development strategy, which concerns, apart from the other things, intensifying of water traffic in European waterways. These objectives are directed towards sustainable development of traffic and they include complex activities which have been going on for more than 20 years and therefore require special intensive and efficient promotion [24].

In Europe there are many organizations which deal with promotion of Danube waterway and they have the same objective to make Danube an intensive and ecologically more acceptable waterway in the future. If this balance of sustainability is reached, the stability in quality of Danube and river bank area, as well as improvement of quality of life of this area's inhabitants is provided. Given the importance of this problem and considering the number and diversity of Danube region countries, many governmental and non – governmental organizations follow and support the promotion of Danube waterway. Some of the most important are:

- Danube Commission with headquarters in Budapest, capital of Hungary, is at the moment the most important international organization which deals with regulation, promotion and implementation of sustainable transport on Danube. This organization consists of all the countries that can be found on Danube's waterway, including Russia, which is connected to Danube via Black Sea. The main source of finances of this commission is the fund of all country members.
- UN Economic Commission for Europe, Inland Transport Committee, the organization with headquarters in Geneva, Switzerland. The main goal of this organization is the technical development on inland transport as well as the development of laws and regulations in this area. This organization is financed by the UN.
- European Conference of Ministers of Transport gathers all the transport ministers of all European countries whose objective is the implementation of all sustainable and ecologically acceptable forms of transport on the territory of entire Europe. The sustainable development of traffic on Danube is one of the priorities of this organization whose headquarters are in Paris and is financed by European countries.

- Transport Infrastructure Needs Assessment: Corridor 7 is the association dealing with the development of transport infrastructure in inland waterways and it is financed by the EU Commission for the development of traffic. The headquarters of this organization are in Vienna, capital of Austria.
- Southeast European Cooperative Initiative: Danube Transport Working Group is the organization of Danube region countries with headquarters in Vienna. This organization deals with the development of traffic on Danube and it is financed by the EU member countries and by the USA.
- Stability pact for South Eastern Europe is a special organization in the EU, founded with the objective to support and provide stable development of countries in this region which were over the past years exposed to a number of negative influences. The headquarters of this organization are in Brussels, Belgium.
- Joint Austrian/Romanian initiative; Danube Co-operation Process is an association which stimulates the cooperation among all the countries which are situated on Danube waterway and its goal is to decrease border issues and limitations. It is financed by Riparian states, Stability Pact and European Commission.
- Via Donau is founded and financed by Austria, with headquarters in Vienna. The main goal of this association is improvement in quality and long-term sustainability of river traffic and implementation of RIS system on entire Danube waterway.

This is an overview of the most important organizations which deal with promotion of Danube waterway from different aspects. Their number, importance and financial sources speak about the relevance that sustainable development of Danube waterway has in all the countries of Danube region and in Europe in general.

6. Conclusion

The development of inland waterway transport is one of the long-term priorities of sustainable development of EU. Danube and Rhine- Main Canal as well as Danube's tributaries represent the most important waterway in Europe, therefore the biggest efforts of EU are put in analysis and improvement of sustainable water transport on Danube waterway.

By analyzing the available data which refer to the use of Danube waterway in period starting from 1950, it was stated that Danube waterway was used for the needs of traffic with different intensity. By analyzing the amount of freight transport, the number of passengers and heavy load in Danube harbors it is confirmed that Danube was intensely used as a waterway up until 1990 and after that its popularity decreased. After the year 2000, with the beginning of all-inclusive initiative of EU on promotion of inland water transport, some growth in use of Danube was noticed but that growth cannot be considered sufficient neither acceptable.

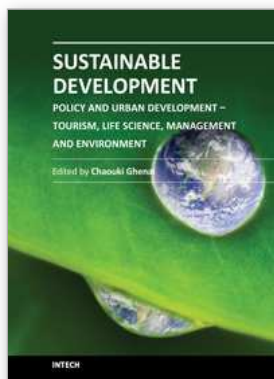
Therefore in Danube region countries, as well as in EU as a whole, many projects have been developed and there are many ongoing activities which were explained in this research. The objective of all these things is to promote and improve sustainable water transport on Danube. These activities mostly refer to modernization of Danube fleet (with emphasis on use of biodiesel as a power generating fuel), construction of adequate infrastructure, development and implementation of a unique information system on Danube as well as

many promotional activities. EU predicts that the first phase of the activities, which deals with improvement of sustainable water transport on Danube, will be over in 2027.

7. References

- [1] Mirjana Golusin, Olja Munitlak Ivanovic, *Definition, characteristics and state of indicators of sustainable development in countries of Southeastern Europe, Agriculture, Ecosystems and Environment*, vo. 130, issues 1-2,(2009), 67-74.
- [2] Olja Munitlak Ivanovic, Mirjana Golusin, Sinisa Dodic, Jelena Dodic, *Perspectives of sustainable development in countries of Southeastern Europe, Renewable and sustainable energy review*, Vol. 13, Issue 8, (2009),pg 2179-2200.
- [3] *White Paper "European Policy for 2020: Time to decide"*, European Commission "Declaration of Rotterdam", Pan European Conference on Inland Waterway Transportation, September (2001) 58-62.
- [4] DoRIS "Donau River Information Services", <http://www.doris.bmvit.gv.at/>
- [5] The strategic importance of the Danube for a sustainable development of the region, Workshop "Cross-programme ETC Danube projects", Austria, 2009.
- [6] *Danube waterway – European key axis*, OSCE, Economic and Environmental forum, Austria, 2008.
- [7] *Statistic ouverage 1950-2005*, Donau Commision
- [8] Jürg Bloesch, The International Association for Danube Research (IAD) –portrait of a transboundary scientific NGO, *Environmental Science and Pollution Research*, Springer, (2009), 23-29.
- [9] ICPDR / International Commission for the Protection of the Danube River
- [10] PINE "Prospects of Inland Navigation within the enlarged Europe", Feb 2003-Feb 2004, DG TREN project
- [11] Reinhard Pfliegl via Donau - Danube Transport Development Agency Donau-City-Strasse 1, A-1220 Vienna, Austria
- [12] "Guidelines and Recommendations of River Information Services", PIANC, 2002.
- [13] THEMIS "Thematic Network in the Optimal Management of Intermodal Transportation Service", April 2000-April (2004), 5th Framework Programme thematic network, <http://hermes.civil.auth.gr/themis/project.htm>
- [14] COST 326 "Electronic Chart for Navigation" - European cooperation in the fields of scientific and technical research, 1994-1997, <http://www.cordis.lu/cost-transport/>
- [15] Doc Dr Svetlana Mihić Mr Saša Raletić, Kaizen kao način upravljanja performansama, XIV Medjunarodni naucni skup SM 2009 - Ekonomski fakultet Subotica, 21.05-22.05 Maj (2009) Palić - Subotica Zbornik spg.55 ISBN 867233224-5 COBISS.SR-ID 239684103
- [16] PINE "Prospects of inland Navigation in Enlarged Europe, SWP1.3 'Information and Communication systems'", Feb 2003-Feb (2004), DG TREN study
- [17] EMBARC "European Maritime study for Baseline and Advanced Regional and Coastal traffic management", Dec 2001-Nov 2004, 5th Framework Programme research project, <http://www.euro-embarc.com/>
- [18] INDRIS "Inland Navigation Demonstrator for River Information Services", Jan 1998-June 2000, 4th Framework Programme research project
- [19] ALSO DANUBE "Advanced Logistic Solutions for the Danube Waterway" May 2000- May 2003, 5th Framework Programme research project <http://www.alsodanube.at>

- [20] COMPRIS “*Consortium Operational Management Platform for River Information Services*”, Sept. 2002 – August 2005, 5th Framework Programme research project <http://www.euro-compris.org>
- [21] BICS “*Barge Information and Communication System*”, <http://www.bics.nl>
- [22] D4D “*Data warehouse for the Danube waterway*”, May 2001-May 2005, Interreg III B project, <http://www.d4d.info>
- [23] SPIN-TN, “*Strategies to Promote Inland Navigation*”, June 2000-June 2005, 5th Framework Programme thematic network, <http://www.spin-network.org>
- [24] Doc. Dr Svetlana Mihić, Asis. Saša Raletić, Use of open innovation as possible marketing strategy in logistic, International Conference on Industrial Logistics “*Logistic and Sustainability*” March 8-th to 11-th, (2010) ICIL 2010 Rio de Janeiro Brazil ISSN: 2177-0514 Proceedings page no.191



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Svetlana Dj. Mihic and Aleksandar Andrejevic (2012). European Policy for the Promotion of Inland Waterway Transport – A Case Study of the Danube River, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/european-policy-for-the-promotion-of-inland-waterway-transport-a-case-study-of-the-danube-river>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Sustainable Urban Development Through the Empowering of Local Communities

Radu Radoslav, Marius Stelian Găman, Tudor Morar,
 Ștefana Bădescu and Ana-Maria Branea
*Faculty of Architecture, "Politehnica" University of Timișoara, Timișoara,
 Romania*

1. Introduction

The financial, economical, social and ecological crisis that violently outburst worldwide after 2008 is the result of structural challenges, such as globalization, climate changes, the pressure on resources, migrations, social exclusions, demographical changes, the ageing of population, mobility, etc., which all have a strong urban dimension, which was determined, at an international level, mainly by the "SPRAWL"-type growth (Saunders, 2005), which only encourages the economical side of the development. In order to overcome this crisis, we propose, as short, medium and long-term strategies, the analysis and the solutions that we found for the problems of the city of Timișoara (Romania). These studies take into consideration the works of C. Butters (Butters, 2004), who states that regional sustainable development cannot be achieved, and therefore neither that of each city, community or neighbourhood, without gradually improving all of the following aspects, at the same time: the social one, which brings social diversity, accessibility, identity, security, variety, involvement and sociability; the economical one, which can be achieved by cutting revenue expenditure, improving functions, diversifying activities and adjacent financial structures, services and communications, by management and flexibility; the ecologic one, through a more harmonious use of land, through biodiversity and bio-climate, by producing non-pollutant energy, re-naturalising the water cycle, recycling, adequate accessibility and by improved overall health.

The desire to exit this crisis has determined, throughout the majority of the European cities, new types of strategies, with objectives, development directions and clear measures, that are adopted, with small differences, all across the European Union, and that accentuate the importance of good governance at a European/national/regional/local level. From our point of view, however, good governance applied only to those four levels, as stated in the European documents, is not enough; we believe that the local level should be divided in a number of subunits. For the four initial levels of governance, the research methods are clearly formulated, according to the 2007 Leipzig Charta. Solving the problems regarding social exclusions, structural changes, the ageing of population, climate changes and mobility is the main theme of this European document, which hopes to lead to economic prosperity, social balance and a healthy environment. In this document, the prosperity mentioned above depends on an increased attention paid to the subunits of the local level, which

includes *"the underprivileged neighbourhoods, in the context of a city as a whole"* (Leipzig Charter, 2007). It is clear that this act refers to an integrative aspect of governance, which implies a harmonious relation between the inhabitant and its physical environment. The relations between the spatial units and the corresponding social units (Lang, 1994) form a Behaviour Setting. Between these Behaviour Settings, there is a continuous competition for occupying the best position in order to solve the economical and social differences, which depend on a certain type of governance. This competition has always been tempered by cooperation relationships, which are, most of the times, not planned. The European act that completes the Leipzig Charter, namely the 2010 Toledo Declaration, supports *"a good governance, based on the principles of transparency, of participation, of responsibility, of efficiency, of subsidiarity and of coherence"* (Toledo Declaration, 2010). The proposed hierarchy, namely the European/national/regional/local hierarchy, cannot stop here because good governance should reach the level of a group of inhabitants that live in appartaments served by the same staircase of a condominium building, passing through the Behaviour Settings levels of a District, a Neighbourhood (a Territorial Unit of Reference according to the Romanian legislation), a Vicinity Unit and of a Group of Housing Units (Radoslav et al., 2010a). This implies the implementation of two contemporary administrative principles, namely subsidiarity and procesuality. The first principle refers to establishing a connection between the decision and the level upon this decision has the most important effects, while the second aspect takes into consideration the open character of the options and of the decisions regarding territorial planning. Good governance, *"a more efficient and effective use of public resources"*, should be provided in order to *"increase the direct public participation of the citizens"* (Toledo Declaration, 2010). The current Romanian legislation states that 30% of the taxes cashed in by the States' Budget should remain at the disposal of the central government, 26% should go to each county's government, while 44% should go to the local governments. When Romania will be reorganised from an administrative point of view, this distribution will most likely be modified: 10% of the taxes will remain at the disposal of the central government, 20% will go to the regional governments (a new administrative form), 30% to each county's government, while 40% will go to the local governments, which represents a step forward towards descentralization. The Toledo Declaration also supports *"an implication, a taking on tasks and a responsabilization of the factors, at multiple levels and from an integrative point of view"*. What we propose is that 40-45% of the money that remain at the local level be redistributed to the subunits previously mentioned through the similar appliance of the principles of subsidiarity and procesuality.

All these are attractive generic sentences, but problems appear when we try to apply this statement in everyday life. *Where, who and how* can this desiderate be applied? *Where* means the delimitation of an area, with a certain autonomy, *who* means the delimitation of a community with a certain identity (Radoslav, 2000) that operates within that area, while *how* refers to the governance of the area and of the community that form a Behaviour Setting thus delimited. Therefore, we can speak of the Spatial Unit named Earth, that should harmonize, within a Behaviour Setting, with the Social Unit of earthlings, Europe with Europeans, Romania with Romanians, Banat (a region in Romania) with the people who live in it, Timis (a county in Romania) with those who inhabit it, Timisoara with its citizens. It is obvious that these delimitations are the result of a continuous historical process, in which the whole precedes the parts and in which the identity is being born where only homogeneity existed before (Alexander, 1987) and that these Behaviour Settings are made

out of different parts, that function in a complex manner. In the competition between Behaviour Settings of the same level good governance plays a key role.

2. The relationship between larger Behaviour Settings (European, National, Regional and Local) and good governance

Our studies, developed within the Research Group for a Sustainable Territorial Development – “Politehnica” University of Timișoara, have concentrated on different levels of Behaviour Settings: European, Euroregional, Regional, County, Growth Pole, Municipality, District, Neighborhood, Vicinity Unit, Block or Group of Housing Units, for which we propose measures for good governance, according to the principles of the two European documents. In this chapter, parts of our studies will be presented, that justify the holistic triade – economic, social and ecological – as starting point for the transparency of information needed by all actors that operate in the area, especially by citizens, their participation in the subunits of the local level being absolutely necessary.

2.1 The relationship between the Behavior Setting of the European Union and good governance

According to the first ESPON scenarios (when Romania was not part of the European Union), the city of Timișoara was situated outside the area of European integration with strong potential in Central Europe, which ended just after Budapest, and also outside the area of European integration with future potential, which started in Athens, passed through Sofia and ended at Bucharest. After Romania became part of the European Union, Timișoara received a very important part, according to the ESPON Cohesion based scenario for 2030 (ESPON 3.2, 2006), as hinge between the extensions of the two areas mentioned above (fig. 1). From a demographical point of view, many East-European cities have experienced decreases in population of approx. 15% in the last 20 years, percentage very close to that of Timișoara. By 2065, up to a third of the European population will be older than 65. Due to reduced fertility, high life expectancy and migration, the European Union will maintain its total population until 2050. But the structure of the population will change, because the number of youngsters and working people will decrease. According to the same ESPON study, our area is part of the regions with slow urbanization and decreased population. These phenomena, together with the mixing of population through emigration and immigration, will lead to the possibility of losing the identity, flexibility and diversity of an area. The decrease in population will lead to loss of usage efficiency of all types of existing infrastructure. The towns from the area can no longer ensure education, sports and health facilities, commerce, public transport, universities, etc. The implementation, through good governance, of the two principles (subsidiarity and processuality) at all the levels of the Behaviour Settings, cannot be done without the support of the population, which should become an informed partner. Without good governance, the situation can aggravate in all sectors. A proposed measure of good governance is “polycentrism”, which implies promoting some complementary and interdependent network of large cities, as well as medium and small ones that can lead to the integration of the rural environment, as alternatives to the metropolis or to the capital cities. In order to consciously accomplish this polycentrism, some common evaluation criteria of the towns (population, competitiveness, connectivity, education system, innovation, etc.) are needed.

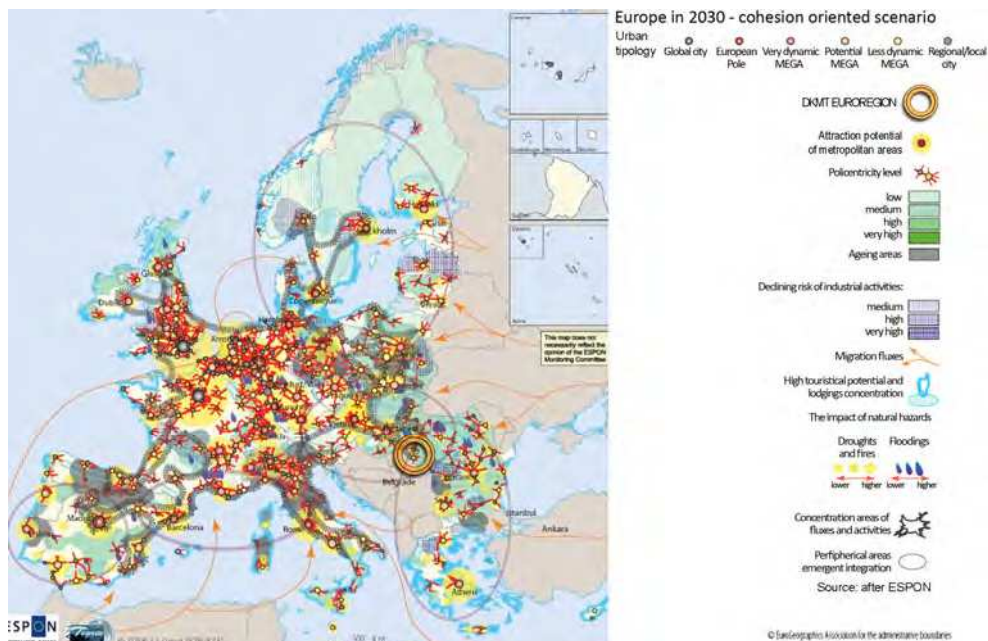


Fig. 1. The Behaviour Setting of Europe in 2030 – cohesion oriented scenario

2.2 The relationship between the Behavior Setting of the Danube-Cris-Mures-Tisa (DKMT) Euroregion and good governance

The next level of our studies refers to the good governance of the Behaviour Setting of the Danube-Cris-Mures-Tisa (DKMT) Euroregion (fig. 2), in which Timișoara plays the main role as a growth pole. The problems regarding the harmonization of the transfrontalier areas that compose this Behaviour Setting refer to the creation of equilibrium between the component regions of the European neighbour countries. In the transfrontalier area Romania-Hungary-Serbia economical differences, as well as socio-political ones appear due to their development in the last 70 years, differences that have been accentuated by Romania's complete isolation after 1980 and by Serbia's after the 1990s. The organization of the European Union leads to the transformation of this transfrontalier area into a very important Behaviour Setting (fig. 3), whose purpose will be reached when equilibrium between the forces of the counties and regions of the three countries will be created. This is a very delicate issue, because if this situation is not fully understood, the desire to expand or to dominate the others will be very difficult to manage.

According to fig. 1, considering the attraction potential of the metropolitan areas, the Growth Pole Timișoara is closer to the attractiveness of Belgrade. According to our study from 2007 (Radoslav et al., 2010b), the polycentric development of the DKMT Euroregion, composed at that time by two counties from Voivodina (Serbia), four counties from Hungary and four counties from Romania (later, the county of Hunedoara left this Euroregion), proposes a central superpole Timișoara-Arad, with more than 700.000 inhabitants, supported by Szeged and Novi Sad towards the West and by the inter-city

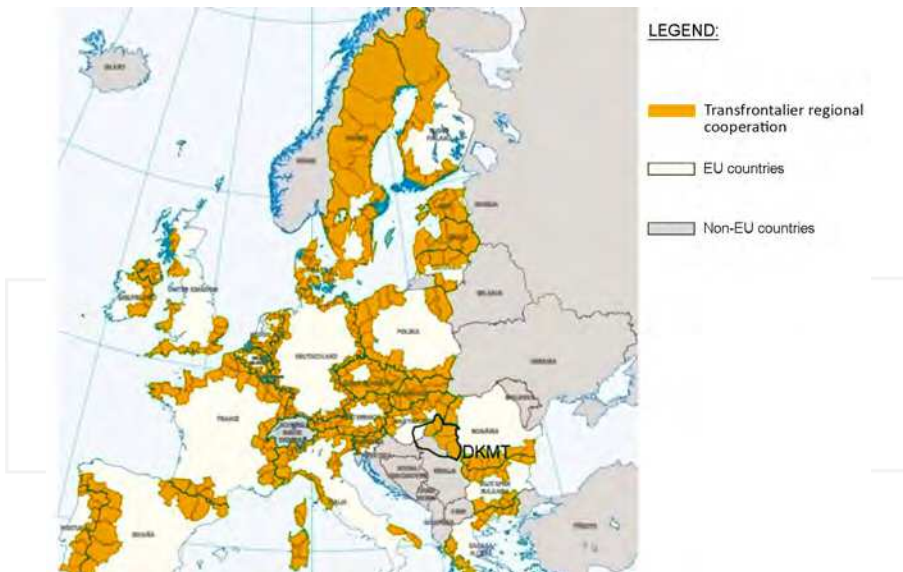


Fig. 2. The Behaviour Setting of the DKMT Euroregion and the other transfrontalier regions of cooperation in the Behaviour Setting of European Union

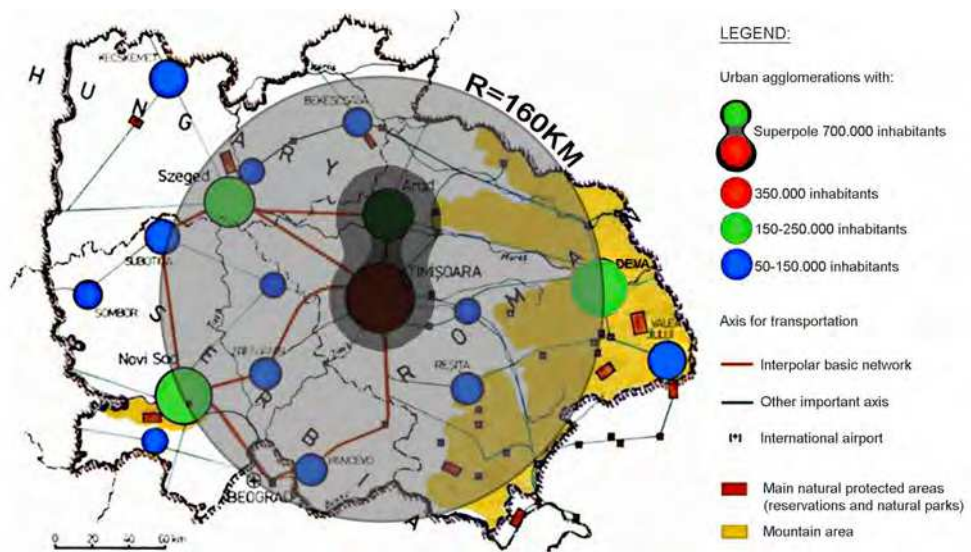


Fig. 3. The Behaviour Setting of the DKMT Euroregion

development area Deva-Hunedoara-Simeria (Radoslav et al., 2010b), named "Provincia Corvinia" towards East. The influence radius of this superpole is of approx. 5.000 km, which makes it a Euroregional pole. Each of the three supporting poles has a population between 170.000-250.000 inhabitants and gravitates at a distance of approx. 150 km from the

superpole Timișoara-Arad. The Behaviour Setting of this superpole demonstrates that the influence radius of 30 km between the Growth Pole Timișoara and the Development Pole Arad overlap near the villages Vinga and Orțișoara, which compels their cooperation (Radoslav et al., 2010b) through the creation of a logistic pole – supporting pole at middle distance between Timișoara and Arad. This is the only way to strengthen and expand the transeuropean network – with special attention paid to the reduction of travels, expansion of general interest services in the rural and peripheral areas, ecological problems, as well as to the protection of farmland. Also, transfrontalier risk management can be promoted, including the impact of climate changes, by intensifying territorial cohesion politics.

2.3 The relationship between the Behavior Setting of the Western Development Region and good governance

The next level of the study refers to the harmonization through good governance of the Behaviour Setting of the Western Development Region, Romania (the former Banat region, between 1948-1964, currently a non-administrative development unit) (fig. 4). The Western Development Region has a surface of 32.034 sqkm (13,4% of the Romania's surface), and is composed by four counties (Arad, Caraș-Severin, Hunedoara and Timiș), with 42 towns (out of which 12 are cities) and 276 communes, with a total of 318 territorial-administrative units and a large number of villages abandoned in the last 20 years. The population of the region was 1.930.458 inhabitants in 2005 (with a decrease of 14% in the last 15 years) and a density of 61,1 inhabitants/sqkm. The urbanization percentage of the region is 63,6% urban population, larger than the national average of 54,9% (The Regional Development Agency for the Western Region, 2011). From an economical point of view, the region has an

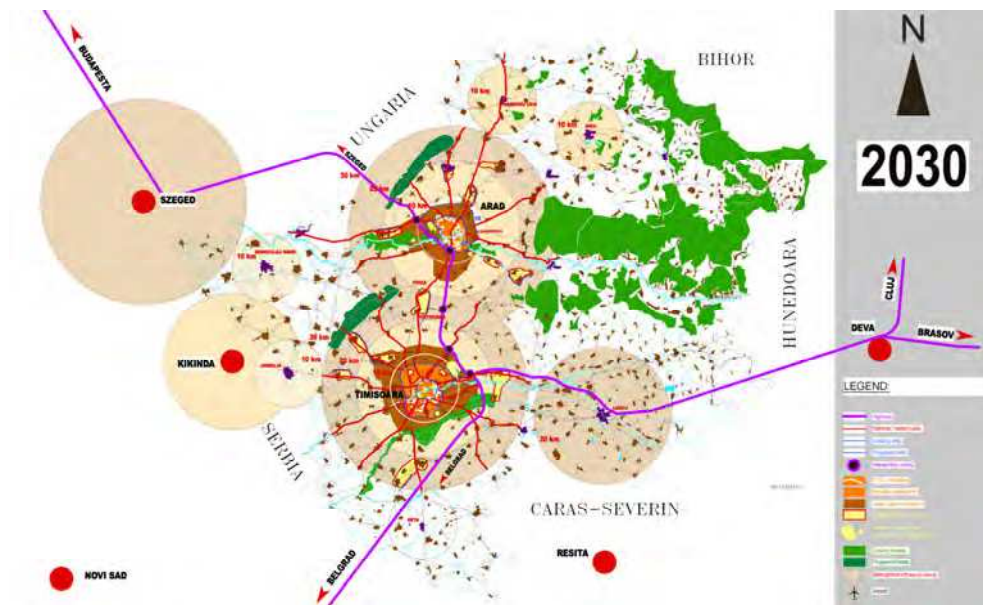


Fig. 4. The Behaviour Settings of the Growth Pole Timișoara and of the Development Pole Arad

estimated GDP for 2011 of approx. 1,3 billions euro (The Romanian National Prognosis Comitee, 2011), similar to most of the other eight Romanian development regions, but much less than regions with similar population from Europe. Considering the environment, the climate is temperate, continental and moderate. As a consequence of the global climate changes, between 1992-2002 a deficit of precipitation of 14,6 mm has been registred. The multiannual average temperature shows an increase of 0,5°C in the last 20 years. These phenomena have determined, in the last years, a series of storms and floodings, as well as warmer winters, with the resulting effects (The Regional Development Agency for the Western Region, 2011).

2.4 The relationship between the Behavior Setting of the Timiș County and good governance

The next level of the study refers to the harmonization through good governance of the Behaviour Setting of Timiș County. Considering the population, this Behaviour Setting had 658.837 inhabitants in 2005, with a decrease of 20.000 inhabitants since 2002, and a predicted decreasing trend until 2025. The structure of the population is even more interesting; 13,6% of the population is over 65, trend that will reach 17% in 2025. The average life expectancy is 71,43 years, while the active population represents 48%. This structure determines a very low unemployment rate, of only 2,3%, in comparison to the 7% national level (The Regional Development Agency for the Western Region, 2011). From an economical point of view, Timiș County is estimated to have the highest GDP of all Romanian counties in 2011, of approx. 600 millions euro, but also four times higher then the GDP of the poorest county from the Western Development Region – Caraș-Severin (The Romanian National Prognosis Comitee, 2011). From an ecological point of view, in Timiș County there has been an increase of the average temperature by 0,5°C in the last 20 years, that complicates even more the situation in the areas prone to natural hazards, especially in the areas with floods and landslides, unstable areas (situated towards East, North-East and South-East from Timișoara) and in the highly seismic area situated in the South of Timișoara (fig. 5). In the areas situated in the vicinity of villages where zootechnics was intensively developed, there

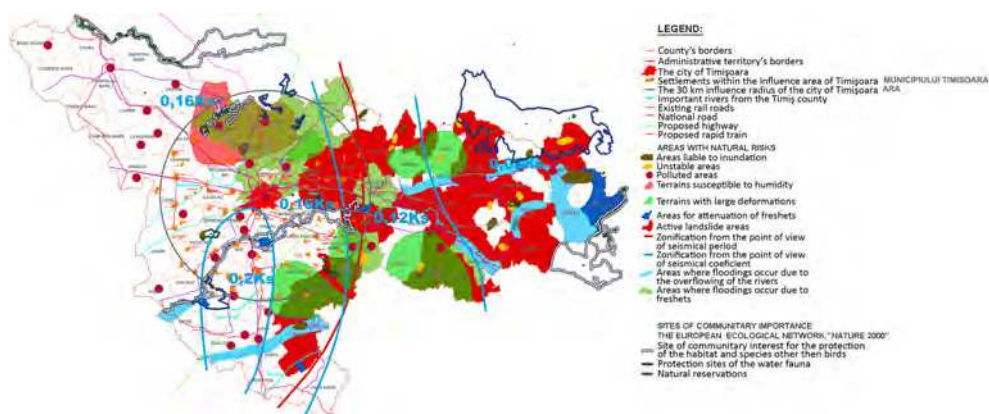


Fig. 5. The Behaviour Setting of Timiș County – areas with natural risks and sites of community importance

are some acute pollution problems, which imply an extension of the Growth Pole Timișoara with the exclusion of these areas. In Timiș County there also exist some protection areas. In our proposals, these areas should be amplified in order to mitigate part of the previously mentioned risks by planting a forrest belt (a green corridor).

2.5 The relationship between the Behavior Setting of the Growth Pole Timișoara and good governance

The next level of our study refers to the harmonization through good governance of the Behaviour Setting of the Growth Pole Timișoara, which is a juridical association of eight territorial administrative units around Timișoara. From the point of view of urbanization, it has been proposed a maximal growth of the built areas up to the traffic belt and afterwards only alongside the radial penetrations, in order to reduce land use and stop the uncontrolled expansion. The terrain yet unbuilt up to the traffic belt is proposed, in our studies, to be building prohibited, so that this areas become natural areas of protection. Through this act of governance, this terrain, together with the green belt, can contribute to the protection of the natural areas, landscapes, forrests, water resources, farmlands, to the promotion of the local eco-economy, as well as to the strengthening of connections between these areas and the city (fig. 6). From an environmental point of view, one of the greatest problems of the city of Timișoara is the quality of the air (The National Agency for the Protection of the Environment, 2011). The number of days in which certain areas of Timișoara are exposed to a concentration of particles in the air high above the European admitted average (PM 10, with a diameter under 10 micrometers) was 136 days in 2008. The admitted values of the pollution with the PM 10 particles is of 40 g/m³ within a year and 50 g/m³ within a day, but not more then 35 times a year. The current situation regarding the pollution in the Growth Pole of Timișoara is the result of two types of factors – interior and exterior to the city. The interior factors are caused by the investement boom, begun after the year 2000, which was based only on real estate profiteering and concentrated on the communist era industrial areas, where the buildings were demolished and the terrain kept unbuilt. Through this policy, to which the local authorities were passive, the investors hoped to obtain a constant raise in the terrain price, but after 2009, the speculative bussiness in real estate suddenly ended and, as a result, in Timișoara's city center there are now approx. 100 ha of unbuilt terrain, phenomenon that affects the quality of the air. The exterior factors take into consideration the winds that blow from the North-West (13%) and from the West (9,8%) bringing dust from the fields of Panonia. This phenomenon has been aggravated by the merging of traditional agricultural lots, which are rather long and narrow, a prerequisite of intensive agriculture, thus forming large plots in different growth stages. The green spaces ("the cities' lungs") balance temperatures and purify the air. Thus, a hectar of vegetation/forrest gives 220 kg of oxygen daily, consuming at the same time 280 kg of carbon dioxide and retaining 50% of the atmospherical dust (The National Agency for the Protection of the Environment, 2011). Following our proposals, between 2001-2009 a 100 m wide protection forrest was planted in the administrative territory of Timișoara, towards the Nort-West, occupying a surface of 50 ha. This first measure must be accompanied by a much more complex one that should concentrate on unifying the previously mentioned natural protected ares, which are situated towards North-West, by a green corridor irrespective of the auto belt (fig. 6).

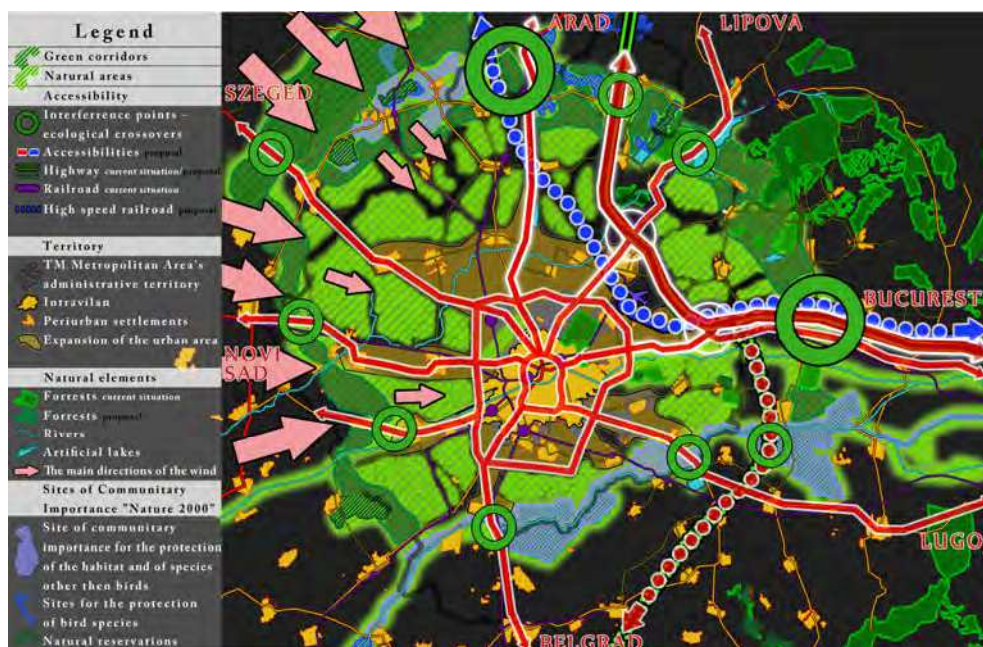


Fig. 6. The Behaviour Setting of the Growth Pole Timișoara

Only by strengthening the polycentric development and inovating the network of metropolitan areas through cooperation with rural and peripheral settlements, through new forms of governance, partnership between rural and urban areas and drafting regional and subregional development strategies can the Behaviour Setting of the Growth Pole Timișoara enter the European competition. At this level of our study, besides Timișoara's expansion towards the North, due to the attraction between Timișoara and Arad, there can also be noticed an expansion towards the East, near the Euroregional "Traian Vuia" Airport of Timișoara, which could become a multi-modal transportation hub that will allow for the optimization of urban logistics. In this hub the future urban train, that will cross Timișoara (and that can continue up to Arad) meets the airport, highway and possibly the high speed railway (300 km/h), which should, in this case, have a station in this point (fig. 7). By doing so, the central area of Timișoara can be freed from the existing railway barrier. The participation of the citizens from a Behaviour Setting to the decisional process implies their involvement in all stages of territorial and urban planning. This cannot be achieved without a prolonged democratical exercise, while currently in Romania this participation is only formal (an imposed requirement to the authorities by the European norms). As a consequence, in this transition stage towards a consolidated democracy, the position of our Research Group for Sustainable Territorial Development is concentrated on supporting of the citizens' rights to be informed by data transparency, involved and have access to justice.

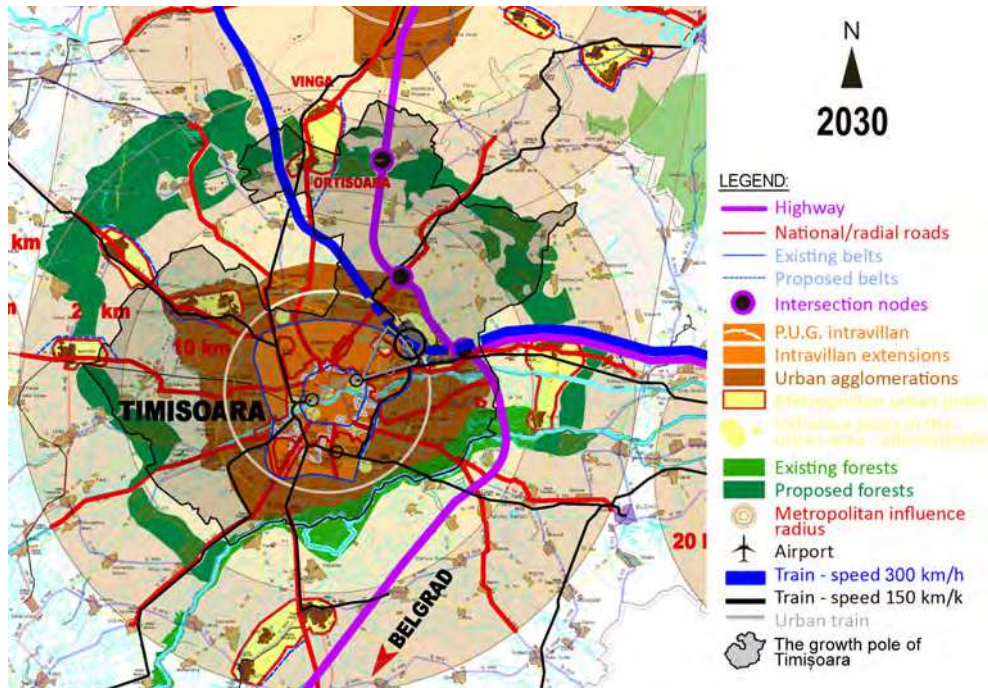


Fig. 7. The Behaviour Setting of the Growth Pole Timișoara

2.6 The relationship between the Behavior Setting of Timișoara City and good governance

The next level of our study deals with the good governance of the Behaviour Setting of Timișoara City. It has a surface of 13.003,87 ha, out of which 6870,21 ha are intravillan. The city population is 334.089 inhabitants (including 16.438 commorants, of which the majority are students), according to the 2002 census, with a decrease in population of 14% in comparison to 1990. In the residential area (2643,74 ha - 53,15% of the intravillan area), the average is 2,2 rooms/housing unit, with a density of 367,70 housing units/1.000 inhabitants. The overall density in the existing intravillan is 49,1 inhabitants/ha, while the average residential areas' density is 126,37 inhabitants/ha. The inhabitancy index is 13,1 sqm inhabitable surface/inhabitant. From the total of 122.195 housing units, 71,30% are in condominium type buildings, while 28,70% are individual housing units (fig. 8).

Hopefully, through good governance, a density of 58,22 inhabitants/ha will be reached, an aspect of whose necessity will be further developed in our studies. This low density (fig. 9), in comparison to the densities in Europe, makes it difficult for certain facilities to survive without substantial subventions. Our study Master plan for the densification of the urban pattern in Timișoara City (Radoslav et al., 2009), presents a series of measures for each Neighbourhood, Vicinity Unit and Block, to reach a density of 25 housing units/ha in the individual housing units areas (in comparison to the existing density of 3-5 housing units/ha), and 250 housing units/ha in the condominiums areas (in comparison to the

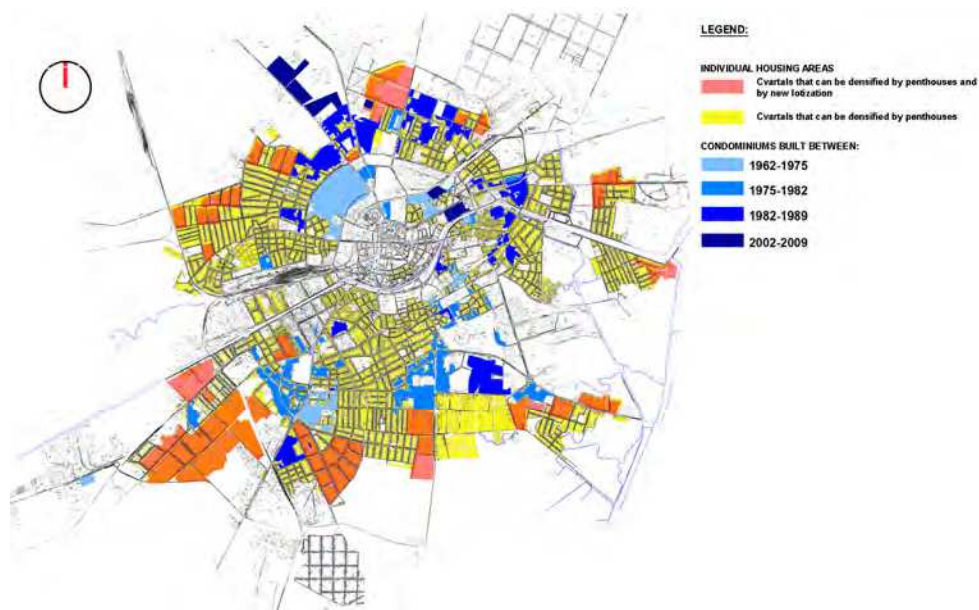


Fig. 8. Typology of housing units in the Behaviour Settings of the Vicinity Units of Timișoara City (condominium and individual housing units)



Fig. 9. The density of the population across the territory of the Behaviour Settings of the Neighbourhoods of Timișoara City

existing 300 housing units/ha), by transforming the housing units on the ground floors into service areas. The proposed measures deal with avoiding the deepening of the social polarization and of the potential risk of social fragmentation, stimulating the labour market, reduction of school dropout rates, as well as of the risk of underprivileged districts formation in already vulnerable areas. Timișoara green areas' surface is 510 ha, out of which parks 117,57 ha, green squares 21,58 ha and Pădurea Verde forest 50,7 ha. 84% of this surface is actually occupied by vegetation. Even though in 2005 the green surface represented over 16 sqm/inhabitant it was poorly distributed, as the green spaces were concentrated in the city center (fig. 10). It is therefore necessary to create a park in the South-East part of the city. Consistent with the approved national document no. 114/2007, by the end of 2010 the green surface should have reached 20 sqm/inhabitant and should reach 26 sqm/inhabitant by 2013.

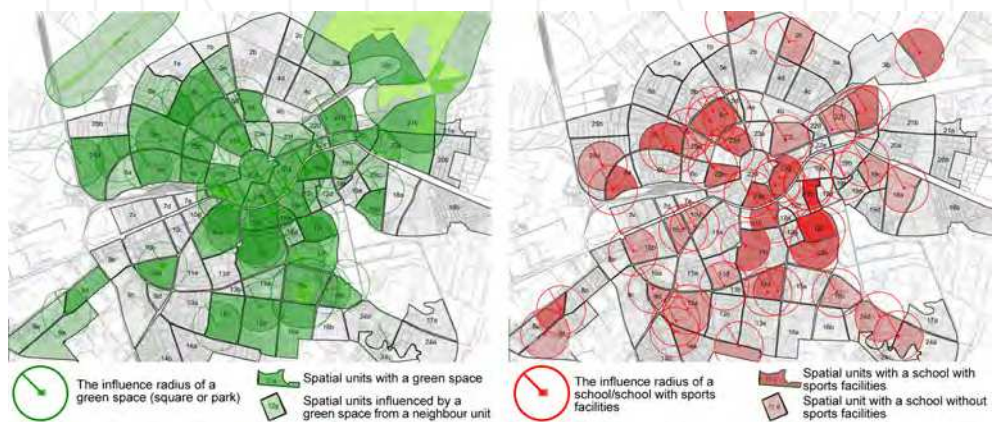


Fig. 10. The current situation of the green areas and of the schools and sports facilities in the Behaviour Settings of the Neighbourhoods of Timișoara City

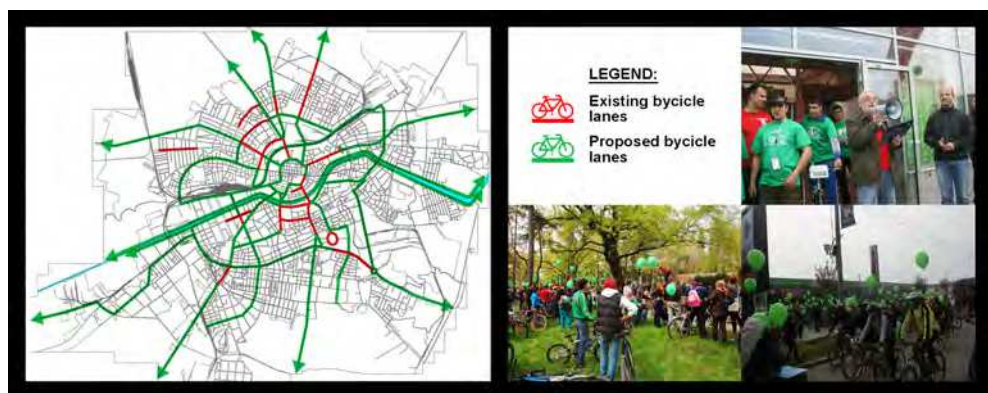


Fig. 11. The current situation and our proposal regarding bicycle lanes of the Behaviour Setting of Timișoara City, which benefits from the support of the population

In order to accomplish this basic need, the local administration should buy approx. 60 ha, out of which 30 ha for parks should be within the city (in the Romanian legislation, a park must have over 10.000 sqm). For the rest of the green spaces, such as a network of green squares in every Neighbourhood, 300-500 m at most from any housing unit, a series of measures should be provided at the level of each Behaviour Setting of the Neighbourhood. Another measure refers to the realization of a major non-motorized transportation network (bicycle lanes, fig. 11) in order to reduce pollution, which is based on the philosophy of a system of radials up to the ring no. 2, connected through rings, as well as of a system of by-passes alongside the Bega Canal and the railroad, which will complete the current, not yet structured, network. All of these measures are currently in process of implementation, due to the pressure of the NGOs.

3. The relationship between the Behaviour Settings of the subunits and good governance

The hierarchy cannot stop here because local governance (through the previously mentioned subsidiarity and procesuality principles) must reach the level of a group of inhabitants, passing through District, Neighbourhood, Vicinity Unit, Block, Group of Housing Units and the units around a Condominium Building's Staircase. From here onward, the involvement of the citizens as an active part in the decisional process must be even stronger, so that every spatial unit will become a Behaviour Setting. This implies the existence of a District Council (a consultative non-juridical entity), in every District in the city, of an association at the level of every Neighbourhood, Vicinity Unit and Block, as well as encouraging the already existing Owners' Associations (juridical entities), at the level of every Staircase of a Condominium Building. These councils and associations should have a very important role in the decisional process regarding their spatial unit, as well as in the distribution of money from the taxes cashed in by the States' Budget (in particular, the 40-45% that form the local budget), which should be redistributed to each and every level mentioned above. Only this way can the Toledo Declaration, that supports *"an implication, a taking on tasks and a responsabilization of the factors, at multiple levels and from an integrative point of view"* be applied. Governance should now take place, on a local level, through the Decisions of the Local Council (Radoslav, 2000), which should be based on participation and support of every organization from every Behaviour Setting that is affected by that decision.

3.1 The relationship between the Behaviour Setting of a District and good governance

With the increase in size of some cities, a new unit, namely the Behaviour Setting of a District, with its own rules regarding governance, appeared in order to provide better administration. But this Behaviour Setting can be composed of very different spatial and social dimensions (in Bucharest, the capital city of Romania, it can have hundreds of thousands of inhabitants, in Timișoara – tens of thousands of inhabitants, while in Lugoj, a smaller city near Timișoara, the Behaviour Setting of a District can have a few thousands of inhabitants).

In Timișoara 18 such Districts Behaviour Settings function, based on the city's tradition (fig. 12). Problems become even more complicated as these districts are, most of the times, composed by more than one social community, with a certain identity, life style, human



Fig. 12. The Behaviour Settings of the Districts of Timișoara City

behaviour and different human needs, which require specific rules. The defining characteristics of a district are its accessibility to parks (green spaces larger than 10.000 sqm), the main transportation and bicycle lanes' networks, public spaces – the major public square and the district's promenade, highschools, swimming pools, the district's health and major commercial networks and the sacred places (eclesiastical buildings and cemeteries). The catholic confession has placed its churches in the historical areas of the city, the orthodox confession has positioned its churches depending on Neighbourhoods, while the neoprotestants placed their churches depending on the Vicinity Units – fig. 14). However, these Districts are not always perfectly divided into smaller units, with identifiable social units (one such subunit could belong to two different Districts), due to the interventions which influenced their development in the communist era, and this leads to the improper functioning of the Behaviour Settings of the Districts.

One of the major dysfunctionalities of these subunits is the presence of the main traffic roads inside the Behaviour Settings. This became an even bigger problem during the last years, because of the increase in the number of autovehicles that populate the streets of Timișoara. Thus, in comparison to a total number of 239.924 autovehicles in 1997, the 2011 traffic comprised 368.248 autovehicles, which indicates an increase in traffic with more then 53% during the last 14 years (Urbanistic General Plan for Timișoara, 2011). An element that can contribute to the good governance of the Behaviour Setting of the District through a stronger involvement are the District Councils, which have a consultative character and have functioned in Timișoara since 2000, but they did not always take into consideration the point of view of the associations that represent lower subunits, influenced by that decision.



Fig. 13. The main commercial network of the Behaviour Setting of Timișoara City

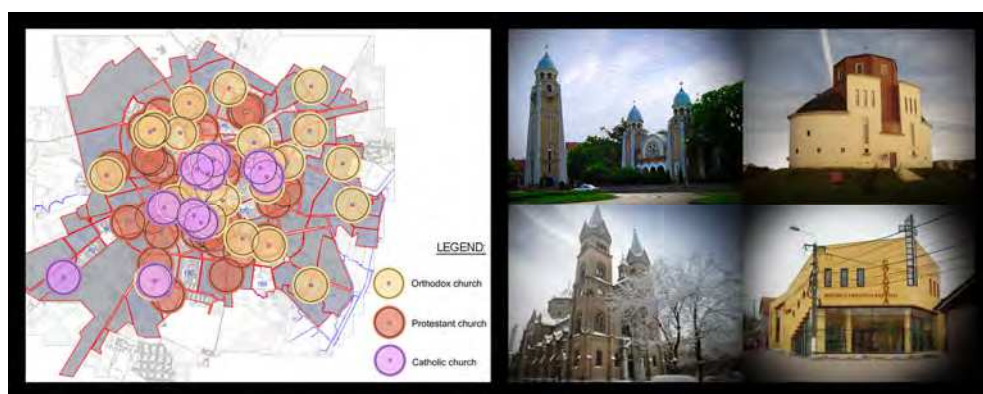


Fig. 14. The churches of the Behaviour Settings of the Districts of Timișoara City

3.2 The relationship between the Behaviour Setting of a Neighbourhood and good governance

Our studies have introduced new levels of governance, such as the Neighbourhood, Vicinity Unit, Block or the Group of Housing Units. We have focused on the Neighbourhood, which we consider to be a Basic Spatial Unit for a Behaviour Setting, as well as on its delimitations and on the methods that allow the introduction of the needed functions, through good governance. The Neighbourhood proposed by us has a social dimension of approx. 5.000-10.000 inhabitants (Alexander, 1977) and a physical one of approx. 350x750 m, which represents an area of approx. 7-40 ha. These Behaviour Settings have some common overall characteristics that offer them an identity, such as a landscape with similar characteristics, a representative historical evolution in a certain period of time, population with homogenous structure, similarity in the shape and areas of the lots and buildings, of occupying the terrain or a similar legislative regime of the properties, homogeneous urban rules regarding the allowed functions, etc.

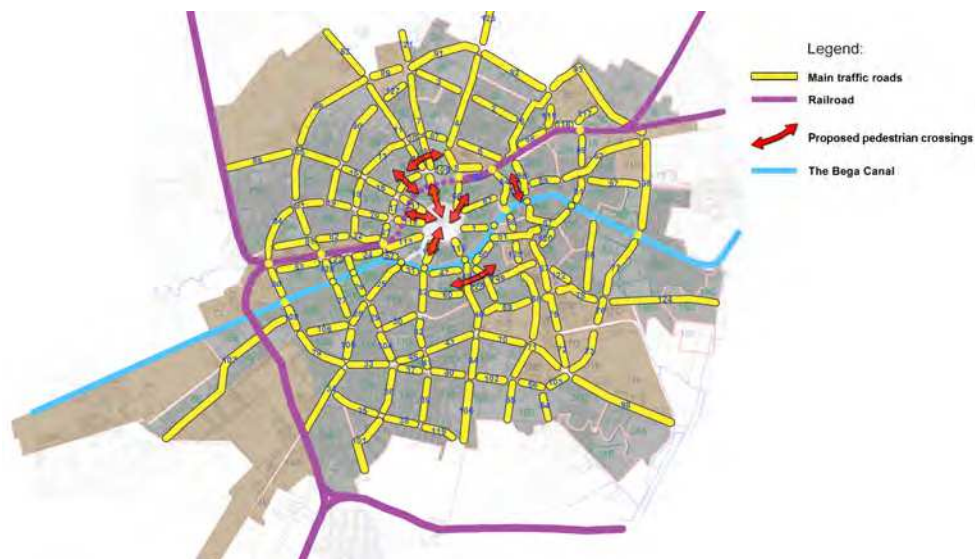


Fig. 15. The main traffic roads network which delimit the Behaviour Settings of the Neighbourhoods of Timișoara City

The delimitations between the Neighbourhoods have been determined by major natural barriers, such as the Bega River, or by built elements, such as streets with major traffic or the railroad, that currently crosses Timișoara City's central area. Thus, major traffic is not admitted within the limits of a Neighbourhood, where the speed limit is 30 km/h. In Timișoara, over 100 such Neighbourhoods have been delimited, out of which more than 70 have as main function residential. In these particular Neighbourhoods, bicycle and pedestrian traffic have priority. If the criteria of the population number cannot be achieved, more Neighbourhoods can be connected by under and overground pedestrian crossings (fig. 15). From our studies regarding this type of situations, we present a solution proposed for the Northern part of Timișoara City, as shown in the fig. 16. The analysis of each Neighbourhood was based on many criteria, out of which we mention a Neighbourhood's connectivity to the public transportation system, as well as the network of public stations, provided with attractive functions and activities and situated no more than 300-500 m from any housing unit (fig. 17). The study of this pattern proves that there are some peripheral Neighbourhoods that do not have access to the public transport system, because their density does not reach 25 inhabitants/ha (fig. 9), minimum prerequisite for the efficiency of public transport. This leads to the inability to support a public transport which is cheap and accessible to everybody, especially in the peripheral neighbourhoods, where it should play a key role in order to diminish the physical isolation of these neighbourhoods.

Another important pattern which we analysed for these Behaviour Settings is the access to green squares (green spaces of approx. 5.000 sqm), so that no housing unit is more than 300-500 m from this facility. One can observe that more than 50% of the Behaviour Settings of Neighbourhoods of our city do not respect this criterion, but for this pattern, the citizens' participation in promoting it is very important (fig. 10). These green squares must

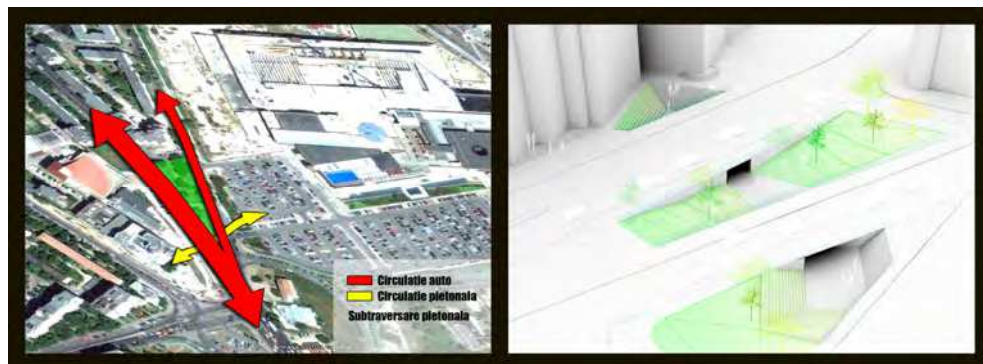


Fig. 16. Proposal for a pedestrian underground crossing that unites the Behaviour Settings of two Neighbourhoods in the Northern part of Timișoara City



Fig. 17. The public transport network and the bus stops in the Behaviour Settings of the Neighbourhoods of Timișoara City

eventually form a green network, which should be uniform throughout the city, together with the district parks and the green riverside of the Bega Canal. Another important pattern is access to water, that could be achieved, in the years to come, through the rehabilitation of the Bega Canal (fig. 18), thus becoming an important axis on the East-West direction. Besides this major operation, the 20 ha of water canals that exist on the outskirts of Timișoara City must also be emphasized. These proposals regarding the green and blue spaces are merely trials that sustain the closing of the metabolic urban cycles at a local level.

The need to ensure an equal opportunity for education, as well as professional training oriented towards market demands and inclusion leads to the conclusion that in every Neighbourhood there should be a high school, with sports grounds and other sports facilities, situated at no more than 300-500 m from every housing unit (fig. 10), accessible without crossing a major traffic road. Our studies show that the problems regarding this pattern are not entirely solved, especially the ones concerning the sports grounds and other sports facilities. Without good governance, this situation can lead to social fragmentation and massive school dropout rates. For this level, the participation of the population is also



Fig. 18. The riverside of the Bega Canal – current situation and proposal from disertation papers within the Master of Urbanism and Territorial Planning, coordinated by The Research Group for a Sustainable Territorial Development



Fig. 19. The network of education facilities, services, commerce and other public facilities in the Behaviour Setting of the traditional Fabric Neighbourhood from disertation papers within the Master of Urbanism and Territorial Planning

very important, in order to encourage the buying and afterwards the maintaining of the terrains needed for these facilities, with municipal funds and funds belonging to the Behaviour Setting of that certain Neighbourhood. Obviously the main commercial network (fig. 13), a result of the consumer society, is well represented. A very important factor in supporting the eco-products of the Growth Pole Timișoara is the creation of farmer markets in every Neighbourhood, but the local community of each Neighbourhood should provide some measures, through approved rules, that will maintain the services and commerce in the area (fig 19), which is very affected by the aggressive presence of the multi-national corporations' chains of stores. The public spaces network (Radoslav & Cosoroaba-Stanciu, 2010; fig. 20), that makes the life within a community more animated and healthier (Gehl, 2011), is very similar to the one existing in the year 1900, when Timișoara City's population was half of what it is today.

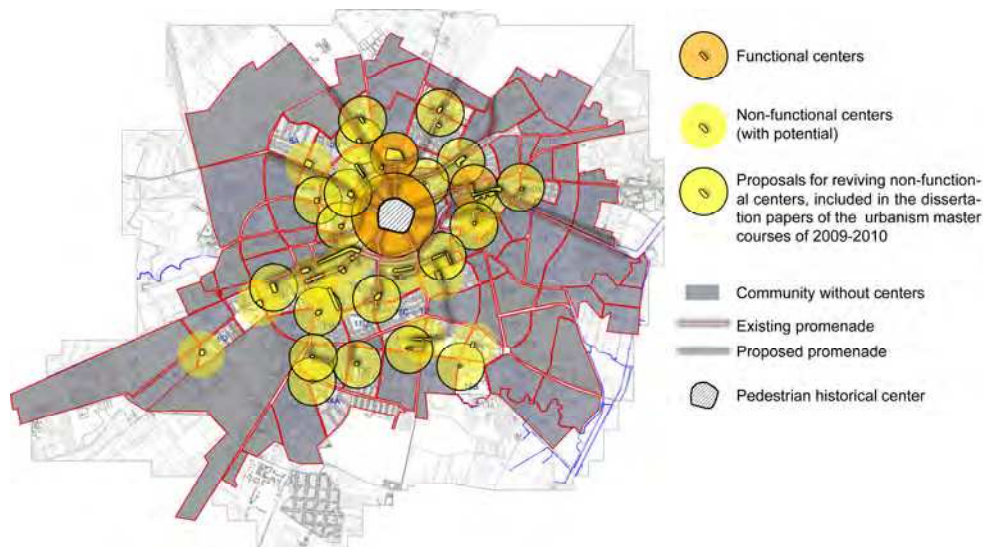


Fig. 20. The public spaces network of the Behaviour Settings of the Neighbourhoods of Timișoara City (current situation and proposal)

The dissertation papers within the Master of Urbanism and Territorial Development, "Politehnica" University of Timișoara, produced 50 such proposals, out of which we present a few (fig. 21). These projects raise the attractiveness of the Behaviour Setting of the Neighbourhoods, encourage inhabitants to identify with the place and the strengthening of democracy, co-existence, changes, civic progress, diversity and, last but not least, freedom, both individual and collective, which are key elements of the European spirit. We also mention that the studied patterns of the health network, the working community network, etc., have begun to naturally coagulate in clusters, action that must be continued through specific measures, all part of our strategies of regenerating the urban economy (fig. 19). One of the conclusions of these studies was that the Neighbourhoods that do not have a reasonable density (fig. 9) cannot sustain neither one of these functions, needed for a Behaviour Setting to function correctly, a school, sports fields, a green square, public transport, salubrity, etc., without substantial financial support from the larger whole. In Timișoara, there are some peripheral Neighbourhoods, that resulted either by the absorption of villages with agricultural activities over time, or by new sprawl-type developments, with a density of approx. 5-10 housing units/ha in this situation. In conclusion, these areas should urgently and compulsory go through a densification process, that should not affect the current value of the properties, nor the identity of the place (as it happened in the last few years, through insertion of multi-leveled condominium buildings in areas with a low story limit, without the neighbours consent). A second conclusion is that the Behaviour Setting of Vecinity Units in Timișoara City, together with the Behaviour Setting of every Neighbourhood, should have *"a powerful control of the available terrain and of the speculative development"* (Toledo Declaration, 2010), especially regarding lacking public facilities (green spaces, education facilities). The Master Plan for the Densification of the Urban Pattern in Timișoara (Radoslav et al., 2009) proposes the solving of these problems after having a series

of discussions with the population and only by taking into consideration the identity of the existing communities.



Fig. 21. Proposals for public spaces in the Behaviour Setting of the Neighbourhoods of Timișoara City from dissertation papers within the Master of Urbanism and Territorial Planning

3.3 The relationship between the Behaviour Setting of a Vicinity Unit and good governance

The following level of the study refers to the good governance of the Behaviour Setting of a Vicinity Unit, with a social dimension of approx. 500-1.500 inhabitants; thus, more Vicinity Units compose a Neighbourhood. In Timișoara, 248 Vicinity Units have been identified (fig. 22), for which building regulations have been established (Radoslav et al., 2009), in such a way that the identity of the place will not be destroyed and the existing value of the properties will not be diminished. These rules have been very important for the population in those areas, since it helped them get used to having access to justice, as, in their race towards profit, the developers have built, after 2005, a series of condominiums in the areas of individual housing units, often without the neighbours consent and without abiding regulations regarding the minimum distances needed for natural daylight and intimacy. The regulations regarding the allowed plot occupancy, land use and densities have been drastically ignored.

An operation that has lowered the quality of life in the Vicinity Units was the process of adding attics to condominium buildings in the areas with a density of over 300 housing units/ha, which lead to even higher densities and emphasized the absence of the necessary facilities such as green spaces, kindergardens, schools, sports grounds, parking, etc. The programme presented in the Master Plan for the Densification of the Urban Pattern in Timișoara studies (Radoslav et al., 2009) was an attempt to stop these errors by establishing some rules for each Vicinity Unit that should respect the technical norms. As an example of good governance, one can observe the programme that begun in the year 2000 regarding the playgrounds for children, which is almost entirely completed (fig. 24), as well as the one concerning public water fountains, a network that is present in every Vicinity Unit (fig. 25).



Fig. 22. The Behaviour Settings of the Vicinity Units of Timișoara City



Fig. 23. Commercial spaces, created through apartment refunctionalizing on the ground floor of condominium buildings, in the Behaviour Settings of the Vicinity Units of Timișoara City



Fig. 24. The playground network in the Behaviour Settings of the Vicinity Units of Timișoara City and examples of such playgrounds



Fig. 25. Existing public facilities in the Behaviour Settings of the Vicinity Units of Timișoara City, public fountains and water pumps, and lacking functions (planned parking spaces)

3.4 The relationship between the Behaviour Setting of a Block and good governance

The next level of the study refers to the good governance of a Block, with a social dimension of approx. 100-500 inhabitants; several Blocks can form a Vicinity Unit, and within the limits of a Block traffic is completely forbidden. Quality of life is also determined by the acceptance of the idea that people try to give the place they live in a personality of its own (Alexander, 1977; fig. 27). Unless we offer inhabitants the facilities they need, they tend to use the public terrain according to their own rules, which prevent the area from developing harmoniously – the green areas are occupied by vehicles (fig. 25). Good governance implies rules established through Decisions of the Local Council, regarding the terrain in front of the condominium buildings, which should be provided with playgrounds, sitting areas for elders or commerce (fig. 28). For each of the 1089 of Timișoara's Blocks, there have been established some measures and rules that encourage social life preventing these Blocks from becoming underprivileged areas.



Fig. 26. The Behaviour Settings of the Blocks of Timișoara City



Fig. 27. Modified balconies in the Behaviour Settings of the Blocks of Timișoara City

3.5 The relationship between the Behaviour Setting of a Group of Residential Units and good governance

The last level of the study refers to the good governance of the Behaviour Setting of a Group of Residential Units, which is divided according to the two types of residential units, namely individual housing units and collective housing units (the units around an Apartments Building's Staircase); this Behaviour Setting has a social dimension of approx. 30-100 inhabitants. The people's discontent with condominium-type projects, focused only on economical efficiency maximization, is obvious, as are their attempts to adapt these buildings to their needs by their own means. For good governance, it is compulsory to accept the rules of organic growth (Alexander, 1977) in order to maintain the health of these Behaviour Settings, thus resulting intervention methods that should take into consideration the interests of the members of the corresponding social groups. These needs can be found in our proposals, which are approved by Decisions of the Local Council, such as the need for an exterior public room in front of a condominium building, ground floor modified balconies (fig. 28), direct access from the apartments towards the green space situated in



Fig. 28. Exterior public rooms in front of condominium buildings, modified ground floor balconies, elder in the park and improvised green areas in the Behaviour Setting of a Group of Residential Units of Timișoara City

front of the building, diverse facades and balconies, added roofs, the thermic isolation of the facades, as well as other operations that imply exemption from local taxes.

4. Conclusion

"The urban regeneration" and "the integrated approach" require a new **"urban alliance"**, shared by all actors involved in the process of "building the city": the owners, the finances, the inhabitants, the public authorities, the experts, etc., at all the levels of Behaviour Setting mentioned above. This new "urban alliance" should be based on consensus and it should be legitimized by new forms of governance, in which the social networks play a very important role. The public financing for urban regeneration is the engine that attracts private funds, which should join the Public-Private Partnerships. Thus, the public budget, that consists of 40% of the taxes which remain at the disposal of the local authorities, should be further redistributed, according to the principles of subsidiarity and procesuality: 40% should remain at the disposal of the local authorities, 30% should go to Districts' authorities, 20% should go to the Neighbourhoods, while 10% should go to the Vicinity Units. Besides these, financial stimulents should be created, as well as tax exemption for private companies, thus raising the involvement of the private domain, financial agents and other urban actors in the urban regeneration. The purpose of this proposal is the strenghtening of good governance at every level, that should be directed towards **revalorification, recuperation and reinventing of the "existing city"**, thus optimizing the human, social, material, cultural and economic capital, which has developed throughout the history, as well as using these elements in order to build efficient, inovating, inteligent, more durable and socially integrated cities (Toledo Declaration, 2011). The spread of internet use from the early '90s has favoured the formation of a new society, which, at first sight, seems not to take into consideration spatial limits, in which the public-private relationship seems to be destroyed and which seems to anihilate the specificity of local communities. This situation has peaked at the begining of the 21st century, with the spreading, at global level, of the 2.0 web, or of the "web of social interaction". Social networks, such as Facebook, Twitter or hi5, as well as blogs occupy an increasing role in the private lives of the internet-users world over. Our opinion is that by facilitating access to information through these methods, the social networks strengthen the cooperation of the inhabitants for the satisfaction of the human needs (Maslow, 1987) in every Behaviour Setting, through the submination of the control of information at a central level. Thus, the Behaviour Settings are no longer enclosed, which makes living in them much more pleasent, according to the analysis on a Behaviour Setting of a Neighbourhood from Timișoara, coordinated by R. Radoslav (Isopescu et al., 2009) and presented at the 2009 Rotterdam Biennale of Architecture. This situation leads to a new type of public debate, both on a horizontal, as well as on a vertical level. This type of functioning is very much alike to the one in which Europe, the Euroregion, the Region, County, Growth Pole, City, District, Neighbourhood, Vicinity Unit and Block are organised in a network, as parts of a larger whole. In case good governance is not applied in time, the connections between the leaders and the citizens can be broken; this phenomenon is already present, with high intensity, in almost every European city, and especially in the Romanian ones. Our developing studies are currently concentrating on the qualitative evaluation (with total, partial or zero satisfaction) regarding a variety of patterns reffering to the human scale.

5. Acknowledgement

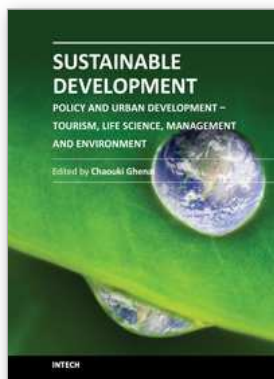
We thank: IGEAT – Institut de Gestion de l'Environnement et d'Aménagement du Territoire, Université Libre de Bruxelles, for the 2006 ESPON project 3.2. Spatial Scenarios and orientations in relation to the ESDP and Cohesion Policy (Final Report)

The strategic grant POSDRU 107/1.5/S/77265, inside POSDRU Romania 2007-2013 co-financed by the European Social Fund – Investing in People.

6. References

- Alexander, C.; Ishikawa, S. & Silverstein, M. with Jacobson, M.; Fiksdahl-King, I. & Angel, S. (1977). *A Pattern Language. Towns. Buildings. Construction*, Oxford University Press, ISBN 0-19-501919-9, New York
- Alexander, C.; Hajo, N. & Artemis, A. (1987). *A New Theory of Urban Design*, Oxford University Press, ISBN 0-19-503753-7, New York
- Butters, C. (2004). A Holistic Method of Evaluating Sustainability, Building and Urban Development in Norway, In: *www.universell+untforming.miljo.no*, 14.07.2011, Available from:
<http://www.universell-untforming.miljo.no/file_upload/idebank%20article%20chris%20butters.pdf>
- Gehl, J. (2011). *Viața dintre clădiri – Utilizările spațiului public*, Editura Igloo Media, ISBN 978-606-8026-12-1, Bucharest
- German EU Presidency & German Federal Ministry of Transport, Building and Urban Affairs (BMVBS) (2007). Leipzig Charter on Sustainable European Cities, In: *www.eukn.org*, 13.07.2011, Available from:
<http://www.eukn.org/E_library/Urban_Policy/Leipzig_Charter_on_Sustainable_European_Cities>
- IGEAT – Institut de Gestion de l'Environnement et d'Aménagement du Territoire, Université Libre de Bruxelles (2006). ESPON project 3.2. Spatial Scenarios and orientations in relation to the ESDP and Cohesion Policy. Final Report, In: *www.espon.eu*, 14.07.2011, Available from:
<http://www.espon.eu/export/sites/default/Documents/projects/ESPON2006P_projects/CoordinatingCrossThematicProjects/Scenarios/fr-3.2_final-report_vol1.pdf>
- Isopescu, B.; Piscoi, C.; Rigler, R.; Sabău, S.; Sgîrcea, M.; Spiridon, A.; Tomescu, A. & Văleanu, P.; coordinated by Radoslav, R. (2009). *inBetween*, Editura Politehnica, ISBN 978-973-625-939-5, Timișoara
- Lang, J. (1994). *Urban Design – The American Experience*, John Wiley & Sons, ISBN 0-471-28542-0, New York
- Maslow, A. (1987) *Motivation and Personality* (3rd edition, revised by Frager, R.; Fadiman, J.; McReynold, C. & Cox, R.), Harper & Row, ISBN 978-006-041-987-5, New York
- Radoslav, R. (2000). *Topos comportamental – Armonizarea dintre spațial urban și comportamentul uman*, Editura Marineasa, ISBN 973-9485-71-5, Timișoara
- Radoslav, R.; Anghel, A. & Branea, A. (2009). *Densification of Singular Housing Neighbourhoods. Scientific Bulletin of the "Politehnica" University of Timișoara, Romania*, Tomul 54(68), Fascicola 1, (2009), pp. 37-41, ISSN 1224-6026

- Radoslav, R.; Branea, A.; Gaman, M. & Morar, T. (2010). Master Plan for the Densification of Urban Fabric in Timisoara. *Urbanismul Serie Nouă*, No. 4, (April 2010), pp. 74-77, ISSN 1844-802X
- Radoslav, R.; Branea, A.; Badescu, S.; Gaman, M.; Morar, T. & Nicolau, I. (2010). *Organic Growth. Studies for Territorial Development, Urbanism and Urban Design*, Editura Orizonturi Universitare, ISBN 978-973-638-440-0, Timisoara
- Radoslav, R. & Cosoroaba-Stanciu, E.. (2010). The Renewal of Public Spaces as an Instrument of Urban Regeneration in Local Communities of Timisoara, *Selected Topics in Energy, Environment, Sustainable Development and Landscaping*, 6th WSEAS International Conference on Energy, Environment, Ecosystems & Sustainable Development (EEESD 10), 3th WSEAS International Conference on Landscape Architecture (LA 10), ISSN 1792-5924, ISSN 1972-5940, ISBN 978-960-474-237-0
- Saunders, W.S. (2005). *Sprawl and Suburbia*, University of Minnesota Press Minneapolis, ISSN 0-8166-4755-0, London
- Spanish EU Presidency (2010). Toledo Informal Ministerial Meeting of Urban Development Declaration, In: *www.eukn.ro*, 13.07.2011, Available from: <http://www.eukn.org/News/2010/June/Ministers_of_Housing_and_Urban_Development_approve_the_Toledo_Declaration>
- The National Agency for the Protection of the Environment (2011). Calitatea aerului ambiental. Raportarea anuală, In: *www.arpmtn.anpm.ro*, 13.07.2011, Available from: <http://arpmtn.anpm.ro/articole/raportarea_anuala-51>
- The Regional Development Agency for the Western Region (2011). Regiunea Vest, In: *www.adrvest.ro*, 13.07.2011, Available from: <<http://www.adrvest.ro/index.php?page=domain&did=47&maindomain=yes>>
- The Romanian National Prognosis Comitee (2011). Prognoze, In: *www.cnp.ro*, 13.07.2011, Available from: <<http://www.cnp.ro/ro/prognoze>>
- Urbanistic General Plan for Timișoara (2011) Fase 1. Fundamental studies – analysis and diagnosis, In: *www.pugtm.ro*, 21.09.2011, Available from: <<http://www.primariatm.ro/uploads/files/PUG/TRAFIC/parte%20scrisa>>



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Radu Radoslav, Marius Stelian Găman, Tudor Morar, Ștefana Bădescu and Ana-Maria Branea (2012). Sustainable Urban Development Through the Empowering of Local Communities, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainable-urban-development-through-the-empowering-of-local-communities>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Sustainable Urban Design and Walkable Neighborhoods

Theresa Glanz, Yunwoo Nam and Zhenghong Tang
University of Nebraska-Lincoln
 USA

1. Introduction

Urban development within the United States has not remained stagnant as evident by the development patterns that have evolved over time. When urban development was beginning in the United States there was a mix of land-uses which were necessary due to the limited transportation options available at the beginning of the twentieth century and before. Sustainability was related to self-preservation and was partially focused on the ability to get to the needed destination which was accomplished through use of one of the following available transportation modes; horse, trolley, train, and/or walking. A close proximity to the frequented locations was highly desirable due to the limited range of these transportation modes. However, as the evolution of the automobile occurred and became more attainable by households, urban development began a transformation that would help push housing away from the city center and away from desired destinations such as places of employment, shopping, and school. By the mid 1900s, the private automobile was becoming the primary mode of transportation for households and cities would begin tailoring infrastructure to accommodate the increasing numbers of automobiles in use. Sustainability during the height of suburban neighborhood development has been related to personal space preservation and has had little to do with public transportation, environmental preservation, and household finances.

For middle income families in the United States this reliance on the automobile coupled with living in the suburbs would not become a major financial hardship until the beginning of the twenty-first century when fuel prices would dramatically increase in a short period of time. Based on the U.S. Energy Information Administration website prior to the beginning of the 2005 hurricane season (which runs June through November of each year) the average monthly retail prices for gasoline in the United States Midwest region were consistently below \$2.00 per gallon. Beginning with the 2005 hurricane season, fuel prices would progressively increase until the average Midwest retail price reached a monthly average high of \$3.99 per gallon in June 2008 (other regions were higher such as the western state of California where fuel prices averaged \$4.48 per gallon). Based on the Bureau of Labor Statistics Consumer Expenditure Survey the annual cost of gasoline and motor oil expenditures would rise 69.9% between the years 2004 and 2008; during this same time period the median household income in the United States would remain stagnate. Had the “ideal” suburban home and the need to own a car to commute to and from the suburbs become a unsustainable reality for many households?

This chapter discusses how walkable neighborhoods contribute to the goal of sustainable communities. The topics covered are the history of neighborhood development, defining walkability and measurement tools, and the application of walkability principles into new developments and incorporating walkability into redevelopment projects. The first section provides an overview of neighborhood development in the United States and incorporates such ideas as presented through Clarence Perry's Neighborhood Unit design through the current movement of New Urbanism. The second section explains what walkability is and the elements to consider when trying to assess the environmental qualities that contribute to walkability. The following sections focus on the principles being used in new urban developments that encourage walking and include a case study. The final section discusses opportunities and actions needed to incorporate walkability in existing neighborhoods.

2. Neighborhood development patterns

Within the United States urban neighborhoods can typically be classified into three distinct development types each representing a different attitude towards the mixing of land uses as well as each having different emphasis on the importance of the automobile; the three neighborhood types being discussed are traditional, conventional, and New Urbanism. Traditional neighborhoods were the prevailing type of urban development prior to World War II, conventional neighborhoods flourished during the years following World War II and New Urbanism is a relatively recent design movement that is a response to the sprawl created by the conventional suburban neighbourhood and derives its design elements from the early pre-suburban neighborhoods of the inner city.

Traditional neighborhoods are those neighborhoods built during the first or second ring of development in an urban setting within the United States. Living in these neighborhoods meant that a person lived in or close to the city center where he/she could easily walk to their intended destination which was necessary as the automobile was not widely used or owned by American households prior to the mid 1900s. Traditional neighborhoods are characterized by streets that are laid out on the grid system, close proximity to the city center where there may be a mix of land uses, higher population density, and buildings that are set relatively close to each other due to the smaller lot sizes. These neighborhoods may have historically been serviced by public transportation such as trolleys due to the higher population density which could help subsidize the transportation system. In addition to allowing for easy mobility, there were a multitude of accidental and intentional socialization opportunities due to the tightly built and mixed-use environment. Within these inner neighborhoods the residents could find shopping and employment opportunities as well as housing but it was the functionality of the neighborhoods that determined what type of housing was available. To help maximize proximity to destinations, due to lack of transportation options, housing units could be found above stores or to be tightly clustered together, such as row houses.

These early neighborhoods were not without problems. There were issues with substandard housing, lack of open space and crime to name just three. Housing advocates pushed for housing reform to relieve problems with congestion and to reduce the incidents of widespread illness due to the overcrowding and unsanitary conditions often found within the early inner neighborhoods. The quest for housing reform would begin to push housing outward where there could be an increase in space between homes, where open spaces for

recreation could be incorporated, and where the number of units per lot could be reduced to one. In the 1920s zoning would begin playing a crucial role in this separation of housing from other neighborhood functions such as employment and shopping. The 1926 Supreme Court case of *The Village of Euclid vs. Ambler Realty Company* declared that exclusive zoning was not unconstitutional and could be construed as police power in safeguarding against conditions that could be considered detrimental to human health. This case would help set the stage for future exclusively zoned developments in which seemingly all types of land uses would be segregated.

Suburban neighborhoods are a product of The Zoning Enabling Act, housing reform and the post World War II era when people wanted to move away from the congestion and crowding of the inner city areas and home ownership became a driving economic goal for many families. Conventional suburban neighborhoods, which have been the predominant type of residential development since the end of World War II, are often referred to as cookie-cutter developments due to the repetitive exterior designs of the homes which typically feature a prominent drive-way and garage. These neighborhoods are zoned primarily for single family homes and the infrastructure is designed to contain streets that are curvilinear and that may terminate in cul-de-sacs which may not be pedestrian friendly. The automobile dominates the transportation system in the conventional neighborhood as stores, schools, and employment may be outside of a reasonable walking distance and out of the reach of the public transportation system. Additionally, walking in suburban neighborhoods may be limited to leisure walking as accessibility of public transportation may be restricted or non-existent due to the distance from the city center and/or lack of ridership that would support the cost of operating a transportation system to the area. The private automobile truly dictates the street system when the development occurs on the urban fringe.

One of the first recognized suburban neighborhoods in the United States is Levittown New York which was created in the late 1940s. This development was initially built in response to the shortage of available housing for returning veterans and their families. With its sea of single family homes and curvilinear streets it offered affordable housing in five architectural style choices and by 1951 more than 17,000 homes had been constructed in Levittown and the surrounding areas, according to Levittown Historical Society's website (www.levittownhistoricalsociety.org). The infrastructure pattern and the repetition of exterior architecture of homes built in Levittown, New York would be repeated again in a second Levittown in Pennsylvania in the 1950s. Levittown is often considered the first built suburban neighborhood in the United States and the street pattern and repetition of architecture used in this early suburban development continues to be found throughout conventional suburban neighborhoods today.

There is an important distinction between the early suburban neighborhoods and the present-day suburban neighborhoods, while both emphasize automobile ownership through the prominent inclusion of garages and driveways that dissect sidewalks, the emphasis on automobile ownership is considerably more prevalent in today's suburban developments. Early developments, such as Levittown, featured homes with a single-stall garage (if there was one) that was set even with the front of the home or was slightly offset back from the front of the home while today's developments commonly feature a three-stall garage with a driveway that is nearly equal in width and which may protrude several feet in

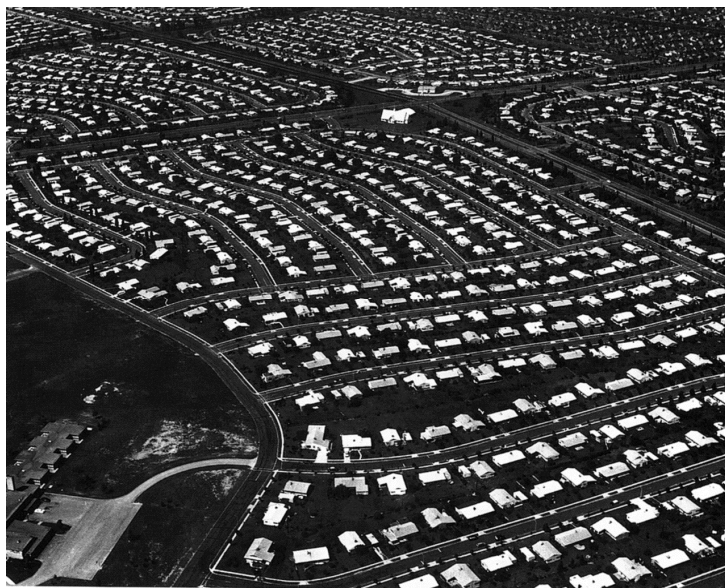


Fig. 1. Levittown, Pennsylvania. Available from:
<<http://www.theurban.com/2010/09/levittown-urban-revitalization>>

front of the home's front door. The expanded widths of garages and driveways may lead to an appearance of shorter expanses of sidewalk that are uninterrupted which may give the perception of an unfriendly-pedestrian environment.

A third type of development in the United States is that promoted by the New Urbanist movement which is a response to the sprawl associated with suburban developments. Beginning in the 1980s, a renewed interest in center city living occurred with the regentrification of older inner city neighborhoods. The attraction of the inner city neighborhoods often is the proximity to work, shopping, entertainment, and/or transportation options. In addition to regentrification, the 1980s brought a renewed interest in the creation of neighborhood developments that would incorporate the perceived physical and social dynamics of the pre-suburban neighborhoods which is the basis behind New Urbanism. The New Urbanist developments work to create compatible mixed land uses that do not require segregation of residential spaces from all working and shopping and which encourages walking as a mode of transportation.

Other names associated with New Urbanism are Neo-traditional Neighborhoods or Traditional Neighborhood Developments which are a modern take on the older inner city neighborhoods of mixed uses and increase land development density and Transit-oriented Developments which strive to create communities that are centered on public transportation with the ability to walk to the transit stations. Unlike the early twentieth century mixed-use neighborhoods and the suburbs of post World War II, the focus of New Urbanism's traditional neighborhood development is not primarily on functionality or housing types but is a shift to a more balanced view that neighborhood functionality and housing can be brought together to create a sustainable, livable community.

To create the desired built environment New Urbanism's design principles includes the use of a grid or undulating street system to maximize pedestrian connectivity, incorporates a mix of compatible land uses that includes housing, retail, and public facilities, and works to create a streetscape that encourages human interaction through the incorporation of design elements such as street furniture and architectural details (front porches on residential units) that extend the living space outside (Rohe, 2009) which is different from conventional suburban neighborhoods that are zoned for a single land use and separation of neighbors.

With its design departure from the standard suburban neighborhood development within the United States, New Urbanism has been a catalyst for reexamining how neighborhoods should function and the impact of design on functionality; the result is a push for and an ongoing discussion of what makes a neighborhood that is economically, socially, and environmentally sustainable. One of the ways that New Urbanism promotes sustainability is through the incorporation of a pedestrian-friendly environment which allows residences to be able to choose walking as an alternative mode of transportation when moving about within the development. This is done by offering a variety of destinations to walk to and incorporates streetscapes that encourage walking, in part, through the reduction in sidewalk breaks by placing the garage and driveway behind the house which is accessible by an alley. By removing the garage and driveway from the front of the house it creates a longer continuous span of sidewalk which made lead to the perception that it is safer to walk.



Fig. 2. Suburban Development (left picture) and Traditional Neighborhood Development (right picture) of Lincoln, Nebraska. Left picture shows suburban neighborhood with garages that protrude beyond the front of the house with driveways that intersect sidewalks. Right picture shows a New Urbanist neighborhood with garage access to the rear of the home and unobstructed sidewalks.

While New Urbanism is a fairly recent concept it is not the first attempt at creating sustainable, equitable neighborhoods that work to balance social and environmental equity. A well-known development attempt at creating a sustainable neighborhood was introduced in 1929 by Clarence Arthur Perry who introduced his plans for the Neighborhood Unit. The features of the Neighborhood Unit had at its core public space that included schools, churches, and open space for recreation. The distance each resident had to travel to reach the core or perimeter commercial space was important and was to be no longer than a quarter-mile walk. The types of streets used within the development were also regulated so that the main arterial streets were along the perimeter which allowed for residents to walk with less fear of traffic (Lawhon, 2009).

Another pre-New Urbanist design was that conceived by Ebenezer Howard. In the late 1800s Ebenezer Howard's vision was the Garden City which was intended to be a system of self-sufficient satellite cities connected to each other via a rail line (Daniels, 2009). The intent of the Garden City (located in the United Kingdom) was to alleviate some of the problems of social injustice found in the neighborhoods of the city through the inclusion of employment opportunities, political participation opportunities, and access to a close-in agricultural ring (located around the perimeter of the Garden City). The problem with the Garden City is that while it may have been viewed as a sustainable community it was not able to maintain the goal of social equity. The community was intended to house a range of social classes but due to financial pressures it was difficult to include lower income households. An example of the financial issues could be found in the increased land prices due to housing demand.

Similar to Clarence Perry and Ebenezer Howard, New Urbanists believe that communities should be walkable with a variety of destinations to which a resident can walk to and should incorporate a mix of housing to accommodate a range of incomes, lifestyles, and ages. Allowing for a mix of housing types that can accommodate a range of incomes and ages groups should allow a diversity of individuals the opportunity to choose walking as a mode of transportation however it appears that some New Urbanist communities may have problems similar to Howard's Garden City in that self-selection into the community can mean that housing prices become unaffordable to lower income households. Since the 1980s New Urbanism has been working to change the perception of pedestrian planning through the implementation of physical elements and design that allow walking to be an acceptable form of transportation.

3. Neighborhood design and walkability

One of the many ways that sustainability can be achieved is through the advancement of walkable neighborhoods which is a topic gaining in importance in both the planning and health fields as the activity of walking and the creation of walkable communities can have positive impacts on human health and the physical environment. While the planning and health fields may have initially emphasized walking for different reasons (for health professionals the emphasis was on health improvement and for planning it was for environmental improvement) the goals of the two research fields are ultimately complementary which is to improve quality of life.

To begin this discussion on walkability and its link to sustainable communities it is important to define the terminology used in related research. The three common terms used in planning and health related literature are walking, walkable, and walkability and while they may imply similar meanings there are differences between the terms walking and walkable/walkability. Walking refers to a physical activity done either for leisure or as a mode of transportation and the terms walkable and walkability are used to describe the degree to which the physical environment allows walking to take place. The portion of the physical environment often referred to when studying walkability is the space that is created by the streets, streetscapes, and building that are present in a specific location. A walkability audit is a tool for the assessment of the built environment to determine how it accommodates walking either by all of its residents or a specific target group such as the elderly.

In addition to the above terminology there are also two common assumptions about walking behavior; 1) that most people, when walking as a mode of transportation, will not

walk farther than $\frac{1}{4}$ mile or five to ten minutes from their origination location, 2) when walking for transportation the route from the origination location to the destination should be as direct as possible. The two assumptions of route directness and length may not apply to both types of walking discussed in the planning and health related literature. As mentioned earlier walking may be for leisure purposes or as a mode of transportation. If done for leisure then route directness and length may not have as much influence on the decision of where and how long a person chooses to walk rather the physical environment may be the primary concern for leisure walkers. For those persons choosing to walk as a mode of transportation then route directness and length may be as important as the environment in which the walking takes place.

Beyond understanding what walkability there is another key element that is fundamental to the creation of neighborhoods that can positively influence a person's decision to walk. That key element is location-efficiency which refers to "...areas near transit, employment centers, or other essential services that allow families to reduce the number and extent of necessary car trips" (Haughey & Sherriff, 2010, p.2). The current suburban development pattern of exclusionary land-use is often far from being location-efficient particularly those developments that occur on the urban fringe. Access to public transportation may be non-existent and places to walk may be limited to other residential units or a nearby public open space when developments occur far from the city center. This lack of location-efficiency is demonstrated through the use of a GIS map (Figure 3) of Lincoln Nebraska showing the placement of grocery stores within a ½ mile radius of residential areas (orange parcels). The older pre-suburban sections of Lincoln which include the south central area of the city have grocery stores that are embedded within the residential areas. The newer section of the city, the bottom and lower right corner of the map, shows that grocery stores are now being located toward the edge of the residential developments. The changes in the location of grocery stores have made a difference in the amount of residential parcels that are within a



Fig. 3. Grocery store locations in relation to residential development in Lincoln, Nebraska, 2011. Created by Theresa Glanz.

walkable distance. It's important to note that while this map does not indicate there is a lack of grocery stores it does show that there are gaps in the ability to be able to reach a store via walking. This may be particularly troublesome for elderly people that can no longer drive.

Beyond the terminology and assumptions mentioned above there is also concern within the research on walkable communities regarding the ability to identify the influence of the physical environment on human behavior. Two repeatedly mentioned research concerns are centered on physical determinism and self-selection and whether these are valid concerns. Physical determinism is the theory that the physical environment is responsible for the behaviors that occur within a given culture within a specific geographical location. Self-selection is the theory that an individual selects a location based on personal needs which may be financial, physical, and/or emotional. Both of these theories are mentioned in the research on walkable communities but their influence may be difficult to detect due to the inability to significantly separate observed behavior from personal preferences and from the presence or absence of environmental features.

Physical determinism is often a criticism of New Urbanist communities that make claim to creating environments that promote social community through the incorporation of walkable neighborhoods as there is not a consensus that design alone affects walkability. Self-selection is the ability of a person to select a specific location to live because it meets his/her needs. For example, a person may choose to live in a New Urbanist community because the physical environment is designed in a manner that allows a person to walk with greater freedom than in a conventional neighborhood. The importance of these research concerns are two-fold in that it is difficult to claim with absolute certainty the extent to which the physical environment influences human behavior while at the same time trying to determine the extent that self-selection plays in determining how a human behaves in a particular environment.

Additional criticism of New Urbanism focuses on whether the planners of these developments have actually created an environment that lives up to their claims of decreasing car-dependence, increasing pedestrian friendliness, and increasing the sense of community. Several studies have questioned whether new urbanism "...is too concerned with appearances...while ignoring social concerns..." (Southworth, 1997, p.28). The claim for decreasing car dependency seems to have some merit (Rohe, 2009), however, the claims of increasing socializing and sense of community seem to be harder to prove (du Toit et al., 2007; Hanna, 2009; Lawhon, 2009; Marrow-Jones et. al., 2004; Rohe, 2009; Southworth, 1997).

4. Assessing elements of neighborhood walkability

Measuring walkability is done either through the assessment of the physical environment (objectively) and/or through the gathering of personal perceptions (subjectively) of a specific location. The predominate method of gathering information for determining degree of walkability is done through the auditing of the physical environment which commonly includes features such as "building height, block length, and street and sidewalk width (Ewing, 2009)". These types of audits may also include observations regarding availability of street furniture, landscaping, physical condition of buildings, and cleanliness of area.

A second method of measuring for walkability is done through the gathering of perceptual information. This type of measurement examines a range of perceptual qualities held by the

residents or users of the physical environment. The importance of completing a perceptual survey is that the researcher is able to gather information that is not readily available through the auditing of stationary objects. This allows the researcher to understand how perceptions affect the experience of walking and to gain an understanding of the relationship between perceptions and the physical environment (Ewing, 2009; Wood et al, 2010).

While there are two common ways of gathering information on walkability there are a number of physical criteria that can be or should be examined. First, research regarding walkable neighborhood design is more than just the presence of sidewalks and destinations to walk to it also includes macro and micro-scale features that affect the design of a neighborhood which in turn can affect the desire for physical activities, such as walking, by the residents (Alfonzo et al., 2008; Rodriguez et al, 2006). Macro-scale features include block length and number of intersections while the micro-scale features include street amenities, sidewalks, and conditions of the buildings in the neighborhood (Alfonzo et al, 2008). Together the macro-scale and micro-scale features can affect how the residents perceive the neighborhood environment (safety, pleasantness, accessibility etc) and these features may be found throughout the different neighborhood development patterns in the United States. While conventional suburban neighborhoods can be assessed easily for the above mentioned micro and macro features New Urbanism tries to incorporate physical features that go beyond those typical features by incorporating the following elements (Rohe, 2009):

- A street system that uses a grid or undulating design to maximize connectivity
- A mix of compatible land uses that includes housing, retail, and public facilities
- Single family homes set close to the street, with front porches, and garages set to the rear
- Pedestrian amenities and public open spaces

These features are incorporated into New Urbanism with the assumption that they (features) will encourage walking by the residents and socializing between neighbors. While New Urbanism, particularly at the neighborhood and street level, works to incorporate many of the design features that are thought to increase the desire for walking; within the literature on New Urbanism there is not a consensus that design alone affects walkability rather there is agreement that New Urbanism has created a lively debate about what makes a neighborhood/community sustainable, livable, and pedestrian-friendly (Morrow-Jones et al, 2004).

In addition to assessing the presence of sidewalks and building types available in a neighborhood Reid Ewing and Susan Handy (2009) have described five qualities that have particular importance when researching environmental perceptions; imageability, enclosure, human scale, transparency, and complexity. The quality of imageability refers to those features which help create an image of a particular place. This is highly personalized as individuals internalize perceptions differently; however, the social-cultural environment in which a person lives can create perceptual similarities when viewing an environment. Enclosure refers to the space created by the physical environment. Buildings, streets and sidewalks, and greenery such as trees can all provide definition of space. Ewing and Handy (2009) found that human scale was much more difficult to define than the previously two

mentioned (imageability and enclosure) qualities. In part this is due to the differing opinions about what creates “human scale”. Eventually Ewing and Handy (2009) list one of the definitions of human scale as “The size or proportion of a building element or space relative to the structural or functional dimensions of the human body. Used generally to refer to the building elements that are smaller in scale, more proportional to the human body, rather than monumental (or larger scale).”

The quality of transparency is the ability of the outdoor environment to project life within the indoor environment. It is a perceptual quality that allows a person to imagine what activities are taking place outside the direct line of sight. For instance, “courtyards, signs and buildings convey specifics uses (schools and churches) add to transparency” (Ewing and Handy, 2009, p.78).

Complexity is another quality that adds to the perception of the physical environment. This quality relates to the variation found within the environment and the ability of a person to internalize the information. Too little information creates boredom and too much creates information overload. Complexity is created by variations in the development pattern through varied setbacks, building orientations, and constructed buildings. Street furniture, signage, and the presence of and the activity of people all help to create complexity (Ewing and Handy, 2009).

In the book “Inclusive Urban Design: Streets for Life” by E. Burton and L. Mitchell (2006), there are six components discussed that promote walkability in a community. These components build on and expand the qualities mentioned by Ewing and Handy and they (components) are a mix of the physical as well as the perceptual. The following is a list of the components:

- Familiarity – refers to the extent that streets are understandable and recognizable.
- Legibility – refers to the ability of streets to help persons understand where they are at and which way they need to go.
- Safety – refers to the extent to which streets enable people to use, enjoy, and move around without fear of tripping or falling, being run-over or attacked. Safe streets have buildings facing onto them, separate bicycle lanes and wide, well-lit, plain, smooth surfaces.
- Comfort – refers to the extent to which streets enable people to visit places of their choice. Comfortable streets are calm, welcoming and pedestrian friendly.
- Accessibility – refers to the extent that streets enable a person to reach, enter, use and walk around places they need or wish to visit.
- Distinctiveness – refers to streets that give a clear image of where the person is, what are the streets uses and where they lead. (Overlapping similarities with imageability and complexity.)

In addition to the physical elements and perceptual qualities that affect the walkability of an area there are lesser discussed, but no less important, qualities that could be considered when studying walkability. Those qualities are the destination distance – how far does a person need to travel before they reach their intended destination; visit-ability – is the intended destination accessible by persons with varying physical abilities and weather – is the weather conducive to walking – year round, a portion of the year, or rarely.

5. Case Study: Neighborhood design and social interaction

In this section, we present a case study to show the relationship of walkable neighborhood design and social interactions. Sustainability of a neighborhood clearly contains the collective attributes of social interactions among residents. As shown (Cuthill, 2009; Dempsey et.al, 2009; Lehtonen, 2004), social sustainability is an important dimension of 'sustainable development', and is closely linked with environmental and economic sustainability.

In the Fall of 2010 a survey was undertaken in Lincoln, Nebraska to answer questions about the relationship between the specific variables of social interaction and walkability when the development design differed. Specifically the study sought to answer questions regarding 1) the amount of social interaction that occurs in two different types of neighborhoods, 2) whether walking by the residents occurs more frequently when the neighborhood design is based on New Urbanism principles, and 3) if a relationship between social interaction, walking, and urban design can be detected. The neighborhoods chosen were located in Lincoln, Nebraska and were comparable in age of development and housing prices. Sixty-three surveys were mailed out to households in the Village Gardens and the Wilderness Hills neighborhoods and of those 44.4% were returned.

Two neighborhoods were chosen for this case study; Village Gardens and Wilderness Hills which are located along the southeastern and southwestern edges of Lincoln Nebraska. Village Gardens is considered a Traditional Neighborhood Development which began construction in 2006 is located on the site of a former nursery. In addition to housing, Village Gardens has several specialty shops and a hotel that has been constructed and are now open for business; these are located in the northwestern corner of the development. Presently, the homes in Village Gardens consist of single-family homes and townhomes. The promotional website does indicate that apartments will be built however these will be restricted to the area designated as the Village Center (business center). The mix of housing is intended as a way of integrating a mix of incomes and lifestyles as well as being able to accommodate the changing needs of different life stages (Village Gardens, n.d.).

The second neighborhood used in this study is Wilderness Hills, a conventional suburban neighborhood, which is located along the southwestern edge of Lincoln Nebraska and is situated on former crop land. Construction in this development began in 2007 with the original phase nearly built-out and with subsequent development phases in the construction phase. Commercial development has occurred in the northwest corner of Wilderness Hills. Presently there is a big box retailer, a bank, and several constructed but unoccupied shops. The majority of homes built in this area are single-family homes with a few town homes present. Several of the lots in the second phase of development that had been designated for town homes have since been converted to allow for the construction of patio homes (these are homes that do not have to meet the minimum square footage requirements established for the single family homes within the development).

Four types of research methods were used to gather information for the case study; literature review, surveys, a walkability audit, and field observations of the two neighborhoods (Glanz, 2011). For data on social interaction a written survey was mailed to households in the Village Gardens and the Wilderness Hills neighborhoods. The survey was divided into three sections which included questions regarding interaction with neighbors,

frequency of walking in the neighborhood, neighborhood satisfaction, and demographics. Participants are not identified in the results, however, in order to know which neighborhood the survey came from an identifier number was used on each survey; SE1 meant the survey came from Village Gardens and SW3 meant the survey came for Wilderness Hills.

To obtain information on the walkability of each neighborhood a walkability audit was completed for several streets in each of the two neighborhoods as well as photographs were taken of the areas. The walkability audit instrument was developed and was used to create an inventory of items as they related to sidewalk availability, location of house from street, handicap accessibility from the street, and presence or absence of people. This audit focused on elements and conditions that were readily observable which have the potential to influence a person's decision to walk. The following is a list of the conditions and elements that the walkability audit focused on:

- Surface conditions of the paved walking surface
- Path obstructions that would interfere with the ability to walk on the paved surface referenced above
- Segment features that may add to or detract from a person's desire to walk such as bus stops, street trees, street lights, and on-street parking
- Presence of litter, graffiti, or deterioration present in the observed area (condition of surroundings)
- The type of litter and disorder that may be present
- Whether people were visible and/or active in the observed area
- What, if any, crossing aids exist for aiding in the crossing of streets in the observed area
- The types of buildings and land uses that were observable
- The walking/cycling environment of the street segment which includes observing whether there were neighborhood watch signs, if there are bicycle lanes present, density of street trees, visibility of items such as trash cans or benches, and the depth of the building setbacks from the sidewalk
- Rating the overall attractiveness of the street segment which ranged from not attractive to very attractive

The features and conditions mentioned above work together to create an environment that a person may or may not find attractive to walk in and more importantly these can create an environment that a person would not feel safe in which in turn may deter a person from being outside.

The survey results revealed that there is a not a huge difference in the amount of social interaction among residents even when the neighborhood design differs. However, it does need to be noted that while the survey indicated that the respondents from both neighborhoods were comparable in knowing the same number of people and the amount of socializing that occurred; the respondents from the Traditional Neighborhood Development were generally more satisfied with the number of the acquaintances and friends they had within the neighborhood. (Glanz, 2011)

Two other points revealed by the survey were that the respondents in the conventional neighborhood ranked it higher as a good place to raise children (72.2%) then the TND (50%) however at the same time the respondents in the TND were generally more satisfied (80%) with their safety from threat of crime then those in the conventional neighborhood (61.1%).

It could be speculated that a higher satisfaction rate with the safety from crime in the TND could be due to having a higher satisfaction rate with their social relationships. As far as the difference in viewing the neighborhoods as a good place to raise children it may be attributed to the residents of the TND being older and as the survey revealed there are no children in the households in the TND that responded to the survey.

In addition to having greater satisfaction with social relationships this research showed a definite increase in the amount of walking that occurs in the TND over the conventional suburban neighborhood. Of the respondents, 80% of the TND respondents walked seven days a week while 61% of the conventional neighborhood respondents walked one to two days a week. The survey also revealed that the residents within the TND (80%) seen a greater frequency of people walking daily in the neighborhood than the conventional neighborhood (55.6%). This does confirm what is revealed in other published articles about walking and TNDs (Rohe, 2009). While this research does show that walking occurs with greater frequency within a Traditional Neighborhood Development it does not show if the design of the neighborhood has influenced the decision to walk or if the respondents are inclined to walk more than the residents in the conventional suburban neighborhood.

The physical audit of the two neighborhoods has revealed differences in the connectivity of the existing sidewalks. The sidewalk connection within the Wilderness Hills neighborhood was more complete and there was greater handicapped accessibility from the street as driveways could be used to reach the sidewalks. At the same time the resident survey showed a higher amount of walking in Village Gardens while having a lower amount of sidewalk connectivity. This does raise the question of the importance of the existence of sidewalks in residential neighborhoods.

Both of the neighborhoods in this study have a business center connected to them. Retail is a primary business category of both centers but there are important differences. The Wilderness Hills business center has several completed but empty buildings and does have the appearance that it is set up for predominately retail use with limited room for other types of business. This type of business restriction may limit the number of residents from the adjoining neighborhood who would walk to it. Village Gardens does have retail as a predominate business use but as indicated by the signs posted in the undeveloped areas of the business center there is the potential to create businesses that may encourage residents of this neighborhood to walk to them. A few of the empty lots are designated as areas that could be restaurants and one is marked for a specialty grocery store. Village Gardens has even been designed so that the distinction between residential and business uses is not as clear as in a conventional suburban neighborhood. This is done by incorporating housing units into the business center through the use of apartments above some of the stores and by having an alley instead of a street separate some of the residential units from the businesses and parking. This area of Village Gardens is more reflective of what Jane Jacobs liked about the inner city urban life – a mix of uses that includes residential. By mixing residential and businesses Jacobs coined the term “eyes on the street” which to her helped create a sense of security and was a factor in creating a sense of community.

If the presence or absence of sidewalks cannot explain the difference in the amount of walking that occurs than other factors such as the social aspects of the neighborhood should

be examined with greater detail. This study does indicate that social factors such as satisfaction of neighbor relationships and safety from threat of crime may help explain why walking occur more often in different types of neighborhoods. As noted in an article written by Alfonzo et al. (2008, p.31) "It is unlikely that the built environment affects decisions to walk...rather...the built environment may support decisions to walk through the accumulation of several discrete features that together create a particular character or quality (safety, pleasantness, etc.)."

6. Conclusion

The past twenty years have seen only a handful of federal policies designed to help communities increase walking and biking opportunities within the United States. The Intermodal Surface Transportation Efficiency Act (ISTEA), the Transportation Equity Act for the 21st Century (TEA-21) and the Safe, Accountable, Flexible Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Handy and McCann, 2011) are all policies designed to enhance alternate transportation design. These policies however do not require communities to develop walkable surfaces rather they are funding sources which communities can use to help create walkable surfaces.

There are also no policies at the federal or state levels of government that require planners and developers to create compact, mixed-use, pedestrian neighborhoods nor are there policies that require the redevelopment of inner city areas over expanding cities onto greenfields. Currently the primary sources of support for New Urbanist communities are planners and developers that are willing to push for a form of neighborhood development that has not been common for several decades.

In addition to the limited federal policies on walking and biking there is also the issue of the public's response to compact, mixed-use developments. Information on public opinion towards compact development is not as readily available as the literature that expresses planners' opinions of this type of development. If a development is to succeed especially when the design does not fit the norm of a sprawling subdivision then planners need to understand who is most attracted to these types of developments, why are they attracted to them, and who is actually living in these developments.

With a lack of policies that mandate compact, mixed-use, pedestrian friendly neighborhoods there are two tools that are especially important for planners – education and marketing. With fuel prices rising now may be an especially important time for planners to educate the public about New Urbanism principles and how these principles, if implemented, can positively impact a person's life particularly in health and financial matters. The second tool, marketing, is important in helping to sell the concept of compact, mixed-use neighborhoods to people who may be interested in these types of developments but may not know of their existence.

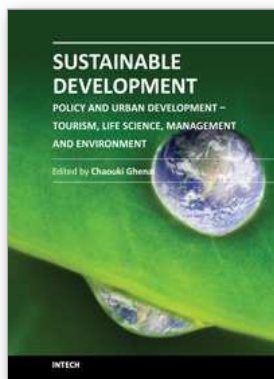
This does leave the question as to whether the incorporating of New Urbanism principles should be required by public policy or whether it should be left to the free market to determine its usage. Presently these principles should be left to the free market but through

better education of the public these principles may be more readily accepted by the general public as a means of helping them achieve a healthy and a less car-dependent lifestyle.

7. References

- Alfonzo, M., Marlon, G.B., Day, K., McMillan, T., & Anderson, C. (2008). The Relationship of Neighbourhood Built Environment Features and Adult Parents' Walking. *Journal of Urban Design*, Vol.13, No.1, pp.29-51
- Bureau of Labor Statistics. (2010). *Consumer Expenditure Survey*, June 2011, Available from <<http://www.bls.gov/cex/#tables>>
- Burton, E. & Mitchell, L. (2006). *Inclusive Urban Design: Streets for Life*. Elsevier Science & Technology Books
- Cuthill, M. (2009). Strengthening the 'social' in sustainable development: Developing a conceptual framework for social sustainability in a rapid urban growth region in Australia. *Sustainable Development*. Early View. Online published. DOI: 10.1002/sd.397.
- Daniels, T.J. (2009). A Trail Across Time. *Journal of American Planning Association*, Vol.75, No.2, pp.178-192
- Dempsey, N., Bramley, G., Power, S. & Brown, C. (2009). The Social Dimension of Sustainable Development: Defining Urban Social Sustainability. *Sustainable Development*. Early View. Online published. DOI: 10.1002/sd.417.
- du Toit, L., Cerin, E., Leslie, E., & Owen, N. (2007). Does Walking in the Neighbourhood Enhance Local Sociability? *Urban Studies*. Vol.44, No.9, pp.1677-1695
- Ewing, R. & Handy, S. (2009). Measuring the Unmeasurable: Urban Design Qualities Related to Walkability. *Journal of Urban Design*. Vol.14, No.1, pp.65-84
- Glanz, T. (2011). *Walkability, Social Interaction, and Neighborhood Design*. Master Thesis. University of Nebraska, Lincoln, NE.
- Hanna, K. S., Dale, A. & Ling, C. (2009). Social Capital and Quality of Place: Reflections on Growth and Change in a Small Town. *Local Environment*. Vol.14, No.1, pp.31-44
- Haughey, R. & Sherriff, R. (2010). Challenges and Policy Options for Creating and Preserving Affordable Housing Near Transit and in Other Location-Efficient Areas, In: *National Housing Conference + Center for Housing Policy*, June 2011, Available from <http://www.nhc.org/media/files/chp_affordablehousing_TOD_challenges_andoptions1.pdf>
- Lawhon, L. L. (2009). The Neighborhood Unit: Physical Design or Physical Determinism? *Journal of Planning History*. Vol.8, No.2, pp.111-132
- Lehtonen, M. (2004). The environmental-social interface of sustainable development: capabilities, social capital, institutions. *Ecological Economies*. Vol.49, No.2. pp.199-214.
- Levittown Historical Society. (n.d.). Levittown history. June 2011. Available from <<http://www.levittownhistoricalsociety.org>>
- Morrow-Jones, H. A., Irwin, E. G., & Roe, B. (2004). Consumer Preference for Neotraditional Neighborhood Characteristics. *Housing Policy Debate*. Vol.15, No.1, pp.171-202
- Rodriguez, D.A., Khattak, A.J., & Evenson, K.R (2006). Can New Urbanism Encourage Physical Activity? *Journal of the American Planning Association*, Vol.72, No.1, pp.43-54

- Rohe, W. M. (2009). From Local to Global: One Hundred Years of Neighborhood Planning. *Journal of the American Planning Association*, Vol.75, No.2, pp.209-230
- Southworth, M. (1997). Walkable Suburbs? An Evaluation of Neotraditional Communities at the Urban Edge. *Journal of the American Planning Association*, Vol.63, No.1, pp.28-44
- U.S. Energy Information Administration, Petroleum & Other Liquids, June 2011, Available from <<http://www.eia.gov/state/seds/index.cfm>>
- Village Gardens. (n.d.). Village Garden Master Site Plan and Neighborhood Zones. In *The Plan*. March 2011. Available from <http://www.vglincoln.com/the_plan.htm>
- Wood, L., Frank, L. D., & Giles-Corti, B. (2010). Sense of Community and Its Relationship With Walking and Neighborhood Design. *Social Science & Medicine*, Vol.70, pp.1381-1390



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Theresa Glanz, Yunwoo Nam and Zhenghong Tang (2012). Sustainable Urban Design and Walkable Neighborhoods, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainable-urban-design-and-walkable-neighborhoods>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Sustainable Tourism of Destination, Imperative Triangle Among: Competitiveness, Effective Management and Proper Financing

Mirela Mazilu

*University of Craiova, Department of Geography
Romania*

1. Introduction

Destination, or the terminus of tourists' holidays, is a complex element linking geography (with all the resources – anthropic and natural – made available to tourists) and tourism (with all the activities that they can carry out and services that they can consume during their stay). The complexity of the destination is that it represents a product and more products at the same time. Services forming the tourist product / products offered in a destination, and that must be differentiated from those offered by competitors, are brand “formative”.

A tourist destination can mean a country, a region within a country, a city, village or resort. Whatever type of destination, the marketing tasks are the same: creating a favorable image of the destination at to the target segments of visitors, the design of instruments to support and disseminate the image and, last but not least, promoting the destination image in areas of origin. These topics will be covered in this article, focusing on the elements that define a tourist destination, the features of a destination, but also the elements that we insist upon in defining a destination image and its competitiveness, which confers a durability surplus.

Tourist destinations with limited financial resources for marketing activities are facing serious difficulties in producing an impact on the tourist market. It is therefore vital for the destination study to adopt a marketing policy such as “want it, get it”, thus directing efforts towards clearly defined targets and using the most effective marketing tools.

2. Defining elements of tourist destination (destination image, destination competitiveness as tourism product, destination value-creating elements, destination identity)

2.1 Destination image

Attitudes, perceptions and images have an important role in the decision to choose a tourist destination. The image is the sum of perceptions and beliefs that people have in relation to

that destination (Stăncioiu et al., 2009). The image of a destination is not necessarily based on prior experience, i.e. a visit to that destination. All tourist destinations have a self-image and the marketer's interest is to clearly distinguish it from other destinations, by defining components, by searching for key elements (Mazilu, 2010a, 2010b, 2010c) to transform it over time into a destination of a sustainable magnitude.

The ability to identify and promote value is the main factor of competitiveness of the society on a long-term. It requires identifying accurately and realistically the areas where there are performance premises and boosting quality development in relation to these areas, to identify individuals who are valued and their areas of excellence followed by channeling towards an education and training in line with their natural inclinations as to harmonize their interests with those of the society.

In conclusion, the competitiveness of a destination (Câdea et al., 2009) is given by the rate at which it manages to exploit the valuable human heritage with which it is naturally equipped. This has two major components: mass education and training and predisposition channeling, creating the conditions for the individual to manifest in that area.

Although economically speaking the concept of competitiveness in tourism defined as "the ability to cope with competition in an effective and profitable manner on the tourist market" incorporates that used in the literature, tourism specific content makes necessary a complex and multidimensional approach of this concept. This is necessary considering some particular aspects of the tourist product.

Firstly, we must emphasize that the multitude of components involved in designing and marketing a tourist product have made the achievement of its competitiveness to be a complex process in whose ensuring contribute: both the competitiveness of destination / resort, and the one made at each type tourist business: direct provider of tourist services: transport, accommodation, food, recreation, treatment, or intermediary: tour operator, travel agency, etc.

To this is added the fact that, from the tourist's point of view, the product covers the complete experience of leaving home and up to the return (Stăncioiu, 2003), being sufficient that weaknesses manifest in a single component for the overall level of competitiveness to be affected. In this context, too, the first step of destination brand is to investigate and analyze the market and to formulate strategic recommendations related to situational factors, purpose and objectives established (Morgan & Pritchard, 2004). Of the factors of "success" on the strategic orientation of a destination, we can mention, among others, adopting a strategic vision, identifying key competitors, awareness / recognition of international competition, prioritizing infrastructure improvements, including the tourism development plan in the national development plan, taking into account the attitude / attitudes, cultural values and lifestyle of residents and, then of non-residents on their (own) city, etc.

This latter factor requires the marketer to carefully and constantly study visitors (including residents) and potential tourists (non-residents) on the image seen by them through the prism of cultural / tourist heritage of the destination as "the easiest and most effective promotion is self-promotion [...] which includes the strengthening of civic consciousness and self-confidence" (Ashworth, 2001: p. 58-70).

The image of a place is mainly "represented by its cultural heritage" (MacKay & Fesenmaier, 2000: p. 417-23) and formed by what is called "the mind or knowledge space" (Go & Van Fenema, 2006: p. 64-78). The cultural identity of a place is represented by its material and immaterial cultural heritage and, since the concepts of "culture" and "identity" cannot be separated, just as the concepts of "society" and "culture" cannot be divided – results the concept of "sociocultural" (Sorokin, 1967), the sociocultural identity of a people constituting, in fact, "its psychology or soul" (adapted from Luca, 2007: pp. 159-171).

Cultural identity of a place is an important part of its identity and therefore in its essence it must not change! In this context, the marketer's main problem is that, while identity remains and must remain the same over time, its image usually suffers changes. Therefore, the projected image must be realistic (Govers & Go, 2009: p. 190). In some situations, however, the image of a destination can be changed by "forming agents", such as news and popular culture (Gartner, 2009: p. 191-215) and may give rise to what is called the "a priori" image, one which, stable for a longer period of time, can change / distort even its sociocultural identity.

In general, the image of a destination can be built on a broad set of consumer functional and psychological expectations, on basic or holistic attributes, on common or unique aspects (Govers & Go, 2009, p.191), or on a combination of them. *If that place is wanted to become a successful tourist destination, no matter of the model of tourist development and the proposed timeframe, destination marketing plays a central place, the starting point being represented exactly by the inventory / perception mode of its "tourist heritage", in the smallest details, marketing audit constituting in this case an integral part of urban marketing.* 1

Value creating elements - from the perspective of the supplier / provider, transformed throughout the consumption of "a tourist product, viewed from the perspective of the buyer, in elements determined for satisfaction, compose inter alia **the image of a destination**.

The image of a destination is the sum of information and impressions submitted to potential consumers about the population, infrastructure, climate, history, attractions, personal safety, etc." (Echtner and Brent, 1991) and is formed by perceptions and experiences.

Since the sense of sight is predominant in forming a positive image, the visual perception of a destination can be decomposed, for a deeper understanding of the attributes / variables of differentiation that form the atmosphere / ambience, in an *artistic image* and a *psychological image*. Thus, intangible factors such as good weather, nature / scene, accessibility, turned into tangible elements, that is pleasant environment, relaxing ambience, infrastructure, can create an artistic image favorable to the tourist choosing the destination. Intangible elements such as local culture, the diversity of sports activities, restaurants, cafes, etc., which can increase the value of a destination, turned into tangible elements, namely historical sites, events (cultural events, festivals, etc.) form an environment in which there are "lots of things to do", and may create a favorable psychological image for the tourist returning to the destination. Transforming these attributes into benefits for the tourist, by which a destination can be differentiated, is held in a positioning strategy.

¹ This paper is an extension of a research made at the level of the tourist destination Romania (for the 8 regions), whose results are presented in the journal „Economie teoretică și aplicată”, starting with volume 2 / 2011.

Besides the differentiating variables “product” and “image”, for a tourist destination other variables are also used (e.g., staff, a variable which can increase or decrease the value of the tourist product offered)².

The destination identity is “the principal means of identification, but also the source of associations made by the consumer, which represent the links between values and brand” (Lindstrom, 2009). In the case of tourist destination, the identity elements are those which are constituted most of the times in attractiveness elements (which add value and / or uniqueness to the destination) and, at the same time, in main motivation for choosing it. The main feature of the selected destinations is their involvement in promoting social, cultural and environmentally sustainable models. The winners of this award are emerging European destinations, little known in the 27 Member States and candidate countries. The EDEN project helps to spread in the Union applied sustainable practices in the chosen destinations and to turn them into successful tourist destinations.

This project is supported by the European Commission, which launched it in 2006 and still plays the central role of coordination. The Commission’s tasks consist in encouraging dialogue between stakeholders, co-financing selection procedures, organizing the awards ceremony (in the first two years, in the European Tourism Forum) and coordinating a comprehensive communication campaign. We have also benefitted from this support, and here I am referring to the area in which I work as President of the Association for the Promotion of Mehedinți County, occupying based on the international selection the fourth place, at a tie score (94) with three of the 32 participants.

Our major gain is outrunning greatly renowned tourist destinations, traditional not only for Romanian tourism, such as: the seaside, Braşov area, the area of Bucovina monasteries, etc. As a direct benefit of this gain is the free promotion at the European level of the European tourist destination: Drobeta-Ponoare-Clisura Dunării in European tourism fairs and other events, in this regard also being visited by foreign journalists who have contributed to the promotion of the above mentioned destination in reviving tourism in the area. The tourist destination is also accompanied by a brief bilingual description and a presentation CD.

A particularly favorable impact on our entire area, considered as an “open door” for future funding, the area enjoying a heavy promotion also at the European Union level, becoming one of the main destinations of foreign tourists coming to Romania. We also had facilitated the participation to three tourism fairs abroad with a customized stand and the participation at the Tourism Fair of Romania in autumn 2008. (economie.hotnews.ro/stiri-eurofonduri-4437193-depresiunea-horezu-premiata-comisia-europeana-destinatie-excele...)

We must also highlight that often a tourist destination overlaps or is near a local community: a city or rural settlement whose economic, social, cultural life influences more or less tourist activity, being in turn influenced by it.

² Adapted after Stăncioiu A.-F., Părgaru I., Teodorescu N., Talpaş J., Răducan D. (2008) - „Imaginea și identitatea - instrumente de poziționare în marketingul destinației”, paper presented at the Scientific Communications Session „Cercetare interdisciplinară în turismul românesc în contextul integrării europene”, by the National Institute for Research and Development in Tourism, Ighiu, 2008;

**DROBETA TURNU SEVERIN
CLISURA DUNARII**

SETTING
The area is set in the south-east of Romania, being part of the historical province of Oltenia. The most important city is Drobeta Turnu Severin at about 350 km west of Bucharest.

CULTURAL AND RELIGIOUS PATRIMONY SPECIFIC FOR THE AREA
The region is covered by the Dacian and Roman historical sites (especially the ruins of the bridge that Apolodor built and the Roman castrum) and by medieval sites (ruins of the citadel of Severin – XIII century) Monuments of folk architecture and technique: wooden churches (XVIII and XIX century), wooden houses that kept the traditional rural architecture, water mills still working today.
Several cult sites can be added, famous for eldness (the ruins of Vodita) or for cultural importance (St Ana, Orsova). All these are harmoniously blending together with the carstic relief, with unique phenomena through their aspect (the Natural Bridge from Ponoare, the Izverna cave) or size (the Topolnita cave).

HOUSING AND EATING
There is a great variety of housing possibilities (from hotels to motels and guest houses) with different confort levels (up to 4 star). The region surprises also through its multicultural culinary variety.



LEISURE
Active tourism in the natural and national parks of the region (Portile de Fier, Domogled-Valea Cernei) or in the geopark of Mehedinti Mountains.
Cruises on the Danube, mostly in the area of Cazane.
Participating in the traditional events of the region: the Danube Villages Festival, the Minorities Festival etc.

INFO
Mehedinti Tourism Promotion Association
Tel: +4-0252.316.966
Fax: +4-0252.317.219
E-mail: eco_urbisdrobeta.ro
Web: www.dctourism.ro



11

Fig. 1. Drobeta Turnu Severin-Clisura Dunării-European Destination of Excellence

2.2 The competitiveness of a destination as tourism product

Competitiveness in tourism should be treated in the new conditions of globalization of economic life by highlighting the crucial elements that can influence and can become competitive advantages for Romanian tourism. The competitiveness horizon in Romanian tourism is inextricably bound to the elements of strategy adopted by the government through the National Tourism Authority, local administrations, each economic agent, elements which must combine organically with the sustainable development objectives.

All these aspects highlight the large number of determinants that influence the competitiveness of the tourist product.

Therefore, out of theoretical considerations, tackling the competitiveness of the tourist destination and tourist business will be made distinctly, although between the two there is mutual interdependence and interconditioning. A tourist destination cannot be competitive in the absence of competitive tourist businesses, while a tourist business cannot be competitive in an unattractive tourist destination. The crucial elements in ensuring competitiveness of the tourist destination would be schematically represented according to those in figure 2.

The model includes six determiners: the attractions and the tourist resources that the respective destination has; the support factors and other resources; the situational

conditions/determiners; qualifiers; amplifiers; the conditions of the demand; the policy; the planning and the development of the destination; the inventory/the management of the tourist destination.

The attractions and the tourist resources existent at the level of a tourist destination include: the geographic position, the natural and anthropic tourist resources, the organization of some events, the relaxation and animation activities, the tourist equipments, and the commercial network dedicated to the tourists.

The success of a tourist destination is determined by the way in which this one manages to guarantee and at the same time to ensure its visitors, through its entire offer, an experience that can equal or exceed the multiple alternative destinations.

Building a cult for quality in tourism is a difficult process that needs the professional qualification of the personnel and an ethic education for the change of mentalities.

In order to achieve this, an education and motivation program of the staff is necessary divided on groups of professions and especially for the managerial levels, differentiated for those who will directly take part in the creation of a proper quality climate within the team, as well as showing attention, the desire to satisfy the needs, to answer to these needs as well as possible. This means among others: to apply the quality management, to completely involve the personnel of the unit regardless of the job and the qualification, to implement systems of evaluation and rewards, to elaborate rules and to educate the personnel etc.

The success of a tourist company, the effect of its competitiveness (see picture 2) are determined by the process of attraction, winning, satisfaction of the clients' needs, and especially by gaining their loyalty, offering good quality services and products. Following this pattern, the company will record the expected profit, following the effects of cooperation for the achievement of the competitiveness of a tourist.

As a result, ensuring competitiveness of tourist products and services must be based on *quality management*, it being a way to ensure competitiveness and hence business market credibility.

Starting from such an approach, we defined and outlined two concepts that those involved in tourism industry must learn and apply to come to produce market competitive services such as: competitiveness management and marketing in tourism.

Competitiveness in tourism suggests safety, efficiency, quality, high productivity, adaptability, success, modern management, superior products, low costs. A firm's competitive strength lies in competitive advantages and in distinctive competencies they possess relative to other competitors.

The success and more of a travel agency is determined by the process of attracting, gaining, satisfying customer needs, and also by their loyalty, the key to them being the quality of services / products offered; only in this way the company will be able to obtain the expected profit.

The essential objective of quality management is to achieve efficiently and effectively at a maximum level of only those **products that: fully satisfy customer requirements, comply with the society requirements, comply with standards and specifications applied, take**

into account all aspects of consumer and environment protection, are offered to the customers at the price and time agreed with them.

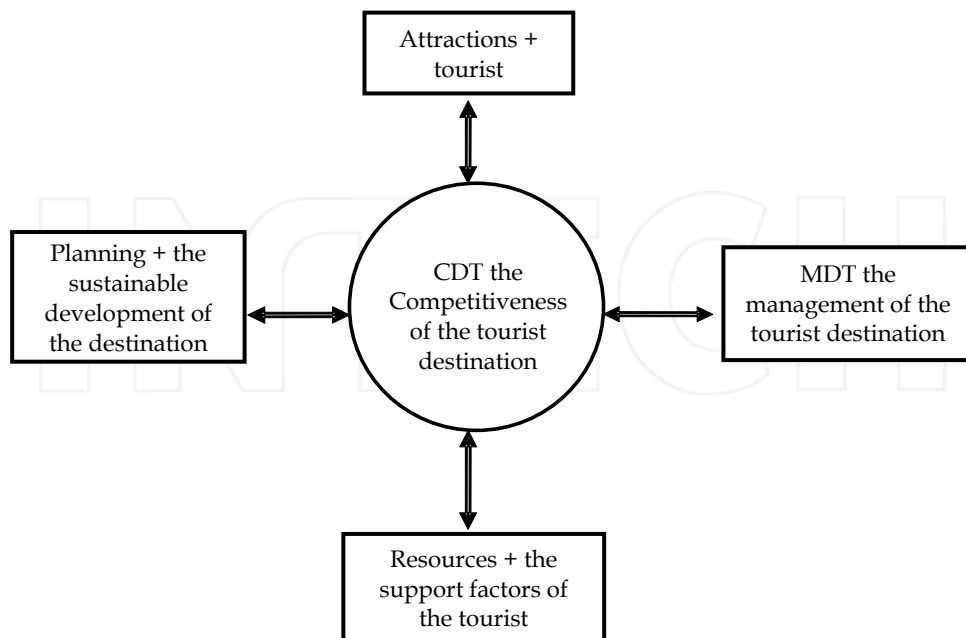


Fig. 2. Determiners in the competitiveness of the tourist destination

Introducing a quality system to benefit all parties involved: the country as a destination, entrepreneurs, consumers and intermediaries.

This includes ensuring a constant level of quality. Therefore quality implementation is achieved by a set of requirements called *standards*, and grouped by type, depending on the area in which they operate: performance standards, service standards, professional reference standards, standards including specifications, standards with operating procedures (operational).

Achieving quality involves not only developing standards and ensuring compliance with them, but quality performance must lead to meeting customer requirements and expectations of quality management.

In this context, the systematic analysis of tourist services / products quality and taking the necessary measures is a priority of utmost importance at the present stage.

Ensuring the competitiveness of tourist products is **the quintessence of the process of achieving competitiveness in tourism**. This is both the result of the competitiveness of providers directly involved in the production of tourism services included in the package, as well as of other determinants that have a bearing on the competitiveness of the tourist destination.

In this sense, marketers have defined the concept of “**product universe**” which summarizes very well these influences. Thus, the tourist product universe is represented by the sum of perceptions that the tourist has concerning the product: visual images: colors, ambience, geographical and physical environment, atmosphere, smells, musical sensations, human relations (with the personnel, other tourists, people), comfort level, etc. (Ambiehl et al., 2002).

A **product / service is competitive** when it has the ability to impose itself on a particular market, to sell in large quantities comparable perhaps with those of similar products or services produced and sold by competitors (Rondelli and Cojocaru, 2005).

As a result, the tourism product design is not confined to the combination of multiple variants of the two categories of elements: tourist resources and services, but also requires a **certain concept about the product**.

The ever-growing demands that tourists have to travel products have imposed a series of attributes that a tourist product must meet for it to be competitive: **satisfaction, accessibility, legitimacy, security and safety, authenticity, transparency, harmony with nature**, in their achievement bringing their contribution alike both competitiveness of each tourist service provider to the tourist destination and other competitiveness determinants of tourist destination (Cândeia et al., 2009).

The differentiation firstly results from the value chain of the destination as tourist business (Fig. 3). As with any product, also in terms of tourist product, the value chain must be analyzed from two perspectives, namely: the business' value chain and the buyer's value chain.

From the business' perspective, the value chain includes the margin value and the value activities, each of which being a potential source of uniqueness. In turn, value activities (classified into primary and support activities) are divided into direct, indirect and quality assurance activities.

The evolution of the concept of quality, from quality assurance to total quality management, has required the use of working methods and procedures in all departments and at all the levels of the tourist product, with the establishment of indicators for all factors “creating satisfaction” (from quality ingredients for making food, respectively the quality of the linen cloth, up to the “quality of the destination”, this also including service provider staff quality).

In other words, the concept of quality, approached from the perspective of the supplier / provider, found in all value-creating elements, is found in the form of the element of satisfaction for the buyer (e.g., degree of comfort - for accommodation, nutrition / taste value - for food, equipment degree, competence, etc. - for the destination as a whole). These, combined with the attractive natural resources, not necessarily unique, and constantly referring to the needs and desires of the market / markets that they wish to aim, lead to the differentiation of the destination with sustainable competitive advantages.

The new concepts on tourism development and a sustainable pattern of destination (Mazilu, 2010a, 2010b, 2010c) must take into account not only the varied and complex relationships between tourism and other regional economic and social phenomena, but must also refer to the phenomenon of tourism itself, as how it will shape in the future.

For Romania, this concept aims to take into account the evolution of social phenomena in the country, the financial crisis effects which under the terms of the market economy will generate the formation of new categories of potential tourists, of new motivations for leisure and consequently the occurrence and development of new tourist demands, new tourist destinations, which assume, under the global economic crisis, new tasks (see table 1)

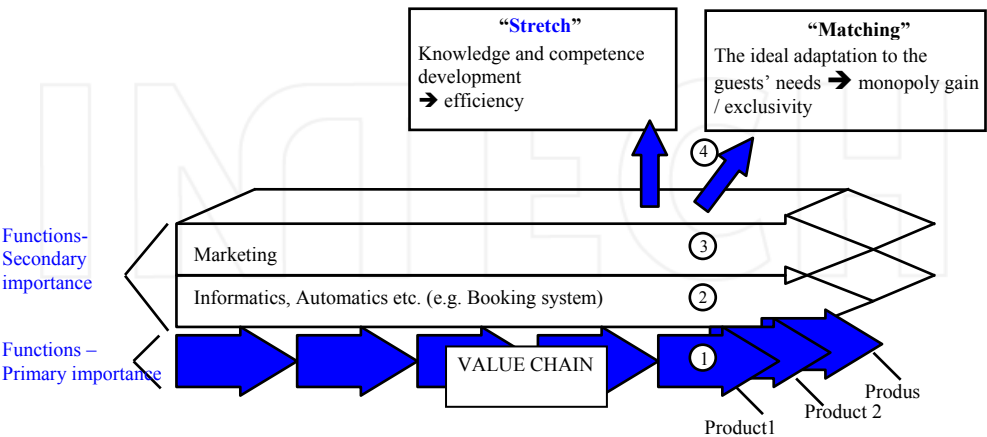


Fig. 3. Destination value chain as tourist business

Planning	Information	Establishment of tourist offer
- mission statement - organization	- information for guests - information for local people - support for journalists	- concern for guests - amusement for guests - coordination of tourism infrastructure - operation of amusement facilities - control and improvement of product quality
Marketing and communications	Sales	Lobby
- promotion - sales promotion - PR - brand management - market research	- information and reservation system - packages	- tourism awareness among the population - understanding of tourism at the level of political authorities - collaboration in “cooperative” organizations

Table 1. Tasks of a Sustainable Tourism Destination in the context of competitiveness

Romania's participation in the international tourism competition, on the continent and in the world, where there is very valuable tourist heritage at the level of European and world markets' requirements, remains a strong action issue of the government.

The systemic vision of the sustainable development strategy of Romanian tourism in the context of structural adjustment of the entire national economy enforces that tourism has become a priority economic sector in the organic interdependence with other branches and economic and social sectors.

The decisive element in the scientific and decision-making plan is to define a firm, realistic concept on capitalizing heritage and tourism sustainable development objectives. Romanian tourism alignment to these requirements is necessary both because of its characteristic mobility and because of the importance of this sector in Romania's economic recovery.

3. The destination management (DMO – Destination Management Organization)

The destination management is the coordinated management of all the elements which create a destination.

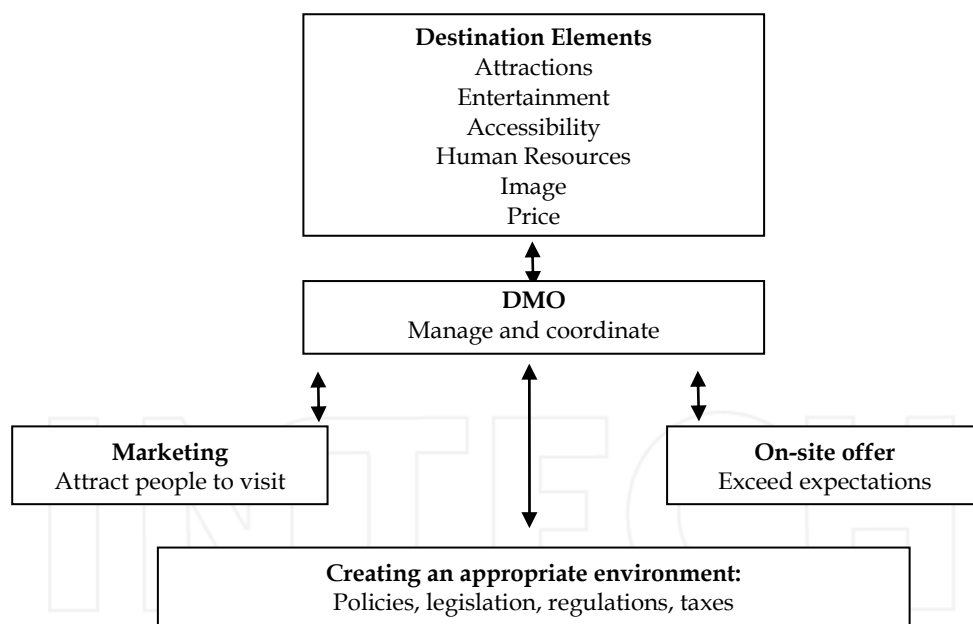


Fig. 4. The organization of the destination management – Stage I

The destination management approaches strategically these entities, sometime very separate, for a better result.

The coordinated management can help to avoid the doubling of the efforts regarding the promotion, the services offered to the visitors, the training, the support for business and the

identification and the management of the problems which have not been solved, complying with the following stages:

The organization of the destination management – Stage I

Synthesizing the models proposed in the studies, a possible model of competitiveness of the tourist destination is presented in picture 5.

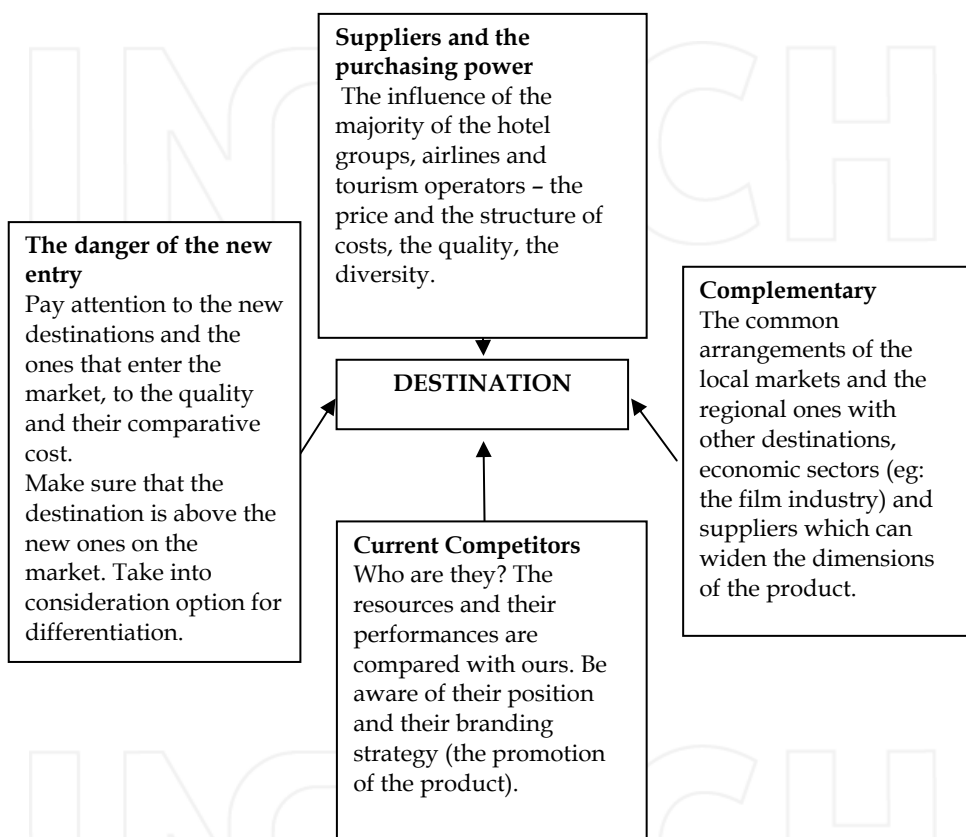


Fig. 5. The effects of the Competitiveness of the Destination

The quality management is defined according to ISO 9000 as being “the assembly of activities of the general function of management which determines the policy in the field of quality, the objectives and the responsibilities, in order to implement them within the system of quality through specific means like: the planning of quality, the control of quality, ensuring the quality and the improvement of quality”.

The essential objective of quality management is the achievement in conditions of maximum efficiency of those products which: entirely satisfy the client’s requests, are in conformity with the requests of the society, with the standards and the applied specifications, take into

account all the aspects regarding the protection of the consumer and of the environment, are offered to the client at the price and the deadline agreed together.

In 2010, Romania has recorded a success: it has climbed up 4 places in the top of the destinations preferred by the tourists from the EU in 2009.

Romania is currently on the 26th place in the ranking of destinations preferred by the tourists from the European Union, according to a recent report Euro-barometer, drawn up by the Gallup polling agency. Last year, Romania was the 30th destination in the preferences of the tourists from the European Union.

According to the statistics drawn up by Gallup in the 27 countries of the European Union, half of the 27000 respondents said that they would leave for holiday in their native country or in another EU country.

Criteria for choosing a destination depend on how it is perceived, namely the image that the consumer has established about it; at the same time, evaluation criteria of the quality of destination are also considered.

4. Sustainable destination management

It is essential for tourism development, especially through the efficient use of space and land planning, as well as through development control and the decisions to invest in infrastructure and services. Ensuring that new tourism development is, in scale and type, appropriate to the needs of the local community and environment, sustainable management can enhance on the long-term the economic performance and competitive positioning of a destination. It requires a supportive framework involving all stakeholders at regional and local levels, and an efficient structure to facilitate partnership and effective leadership.

A basic requirement for the existence and quality continuity of tourist destinations in Romania is to remain competitive. Actions to achieve this should be considered as part of the creation process of a lasting nature, which is one of the most important competitive advantages. Therefore, in order to ensure long-term competitiveness, viability and prosperity, tourist destinations should put more emphasis on full integration of concerns on sustainability in decision-making and in their management practices and tools.

Finally, to achieve a tangible progress, the demand from both leisure market and tourist businesses should send stronger and more consistent signals. Tourists need to be sensitized to be able to develop and strengthen their ability to make choices for sustainable development. Raising awareness with regard to sustainability and ethics can facilitate the emergence of tourist individual responsible attitudes and practices. The growing understanding of consumers in terms of durability could affect tourist destinations to show an interest in this direction and act accordingly, thus increasing their attractiveness, as in Romania's case.

4.1 Tourism development under sustainability

$$\text{Tourism} + \text{sustainable development} = \text{sustainable tourism}$$

At the beginning of this century and millennium, travel and tourism industry worldwide is the most dynamic sector of activity and, at the same time, the most important generator of

jobs. Economically, tourism is at the same time also serving as a source of recovery of national economies of those countries that have significant tourism resources and exploit them properly.

In this context, the main reasons causing the need for tourism development under sustainability, the following aspects are resulting (Mazilu, 2008a, 2008b, 2008c):

- a. Tourist resources being practically inexhaustible, tourism is one of the economic sectors with real prospects of long-term development;
- b. The complex exploitation and utilization of tourist resources accompanied by an effective external market promotion can be a source of increasing foreign exchange earnings, thereby contributing to the balance of external payments;
- c. Tourism is a secure labor market and of redeployment of the dismissed one from other sectors heavily restructured;
- d. Tourism is a means of promoting the image of a country, thus participating in the promotion of exports of goods and services on the world market, both implicitly and explicitly;
- e. Tourism, through its multiplier effect, acts as a dynamic element of the global economic system, generating a specific request for goods and services that involve an increase in their production area, thus contributing to the diversification of the structure of national economy sectors.

One possible response to these challenges would be to apply the concept of **mosaic eco-development** (Mazilu, 2007a, 2007b, 2007c, 2007d), which proposes the implementation of sustainable development principles to smaller areas, following that they be gradually expanded so that, on the long term, to cover the entire national territory. In this view, environmental space should look in its ideal form like a chessboard, in which large pieces of agricultural land should merge with smaller areas allocated to industry, various categories of infrastructure and parks and natural reserves. This complex alternation arises from uneven spatial distribution of natural resources and the application of economic, social and environmental criteria. In this framework, ecology and bio-economy can provide original solutions to territory arrangement so that appropriate environmental areas are allocated to each branch, resulting in a territorially sectoral complementarity.

The resulting complementarity should be addressed not only functionally but also by the rational use of land, by the increasing of employment level and income, by the actual participation in inter-regional exchanges and integration into European structures and flows, by the complementarity with environmental restrictions (Constantin D.L., 2000).

Application of sustainable tourism development projects starts from the design and construction of the material and technical base in order to harmonize with the environment, local community or other sectors of the economy, continuing in the state of tourist activities course.

Seeking a sustainable development model appropriate to each territory, not universally valid and applicable in any territory, we observe analyzing the etymological game but with a lot of sense: Tourism + Sustainable Development = Sustainable Tourism, the insertion of constraints, similarities, differences, which requires an even closer analysis. It is known that each area has its history, its identity, its resources, according to which a form or other of

tourism can develop, imperatively respecting its economic, social and environmental specificities.

In this perspective, the different players “employed” in such an approach are called to establish, in a first phase, a careful diagnosis of the territory, aiming even a decoding of the influences of sustainable development according to the opportunities and threats of each territory. A second phase is the drafting of a sustainable tourism development project of that territory continuously adapted to the local context, the project being “embraced” by as many people living in that territory possible. Last but not least, certain “clauses” of territorial development will have to be respected, progressively putting in place actions aimed at improving public offer, the local tourist product, removing the parasitizing of this sustainable action of other illogical ones (power games, interest games among stakeholders, etc.).

This article, open itself to major scientific reflections, has tried to explain the role and importance of the analytical approach of sustainable development in tourism, in the territory, having the function of restructuring it, rebuilding it and even redeveloping it into a better direction, because sustainable development respects the direction of history being directed towards the future.

There is no single model universally applicable for the sustainable development of tourist destinations (Mazilu, 2010a, 2010b, 2010c). In this perspective, the different players involved in this inseparable binomial: Sustainable Development - Tourism, are required to build in these territories **a specific tourist offer** to meet on the one hand individual or multiple demands, and on the other hand to meet local crisis (economic, political, social, etc.).

Tourism can contribute to sustainable development of territories because the territories themselves are part of an interactive, integrated and responsible relationship with the economic, social and natural environment on which they depend. Certainly, more remains to be done, because the unbalanced and destabilizing effects (see fig. 6) and the resistance to change, unfortunately, still persist, despite the massive involvement of the local community towards sustainable development.

In sustainable development, tourism plays a key role in contributing with a high percentage to Romania’s economic revival and recovery. Raising tourist product from established values to those corresponding to quality standards and preferences (Mazilu et al., 2010) of foreign tourists involves initiating and promoting actions to include, on the one hand, the development of education and training processes of mindsets appropriate to the current type of development, and, on the other hand, increasing sustainable development in tourist reception regions.

4.2 Stabilizing (+) and de-stabilizing (-) effects of tourism on the sustainable development

In global world you must live globally. Or integration is impossible without learning the rules of world tourism, without also learning to follow the code of conduct. One is especially not allowed to ignore that the effect of tourism regards only the future. The present’s sensations are sublimated, memories become past: a past that will determine future actions. Tourism is not only a school about others, but determines how we will live with others, how

we will behave. Our world, one created by tourism producers is a global one, a single ethnic group: the human race in its specificity, item by item for diversity. With a past, a present and hopes. Any mistake can lead to incurable trauma (ARA)³. And this on a mass of people called tourists.

The concept of sustainable development is today environmental. On the other hand it forces us to ask ourselves of the social purpose of our acts and of the future of the planet, taking into account permanently the economic system affected. It, as sustainable development, appears to us as a pioneer to new reflections, new actions, thus dedicating a mindset, even of government, unusual, based on cooperation and negotiation with all stakeholders in the implementation of sustainability in the territory (see fig. 7).

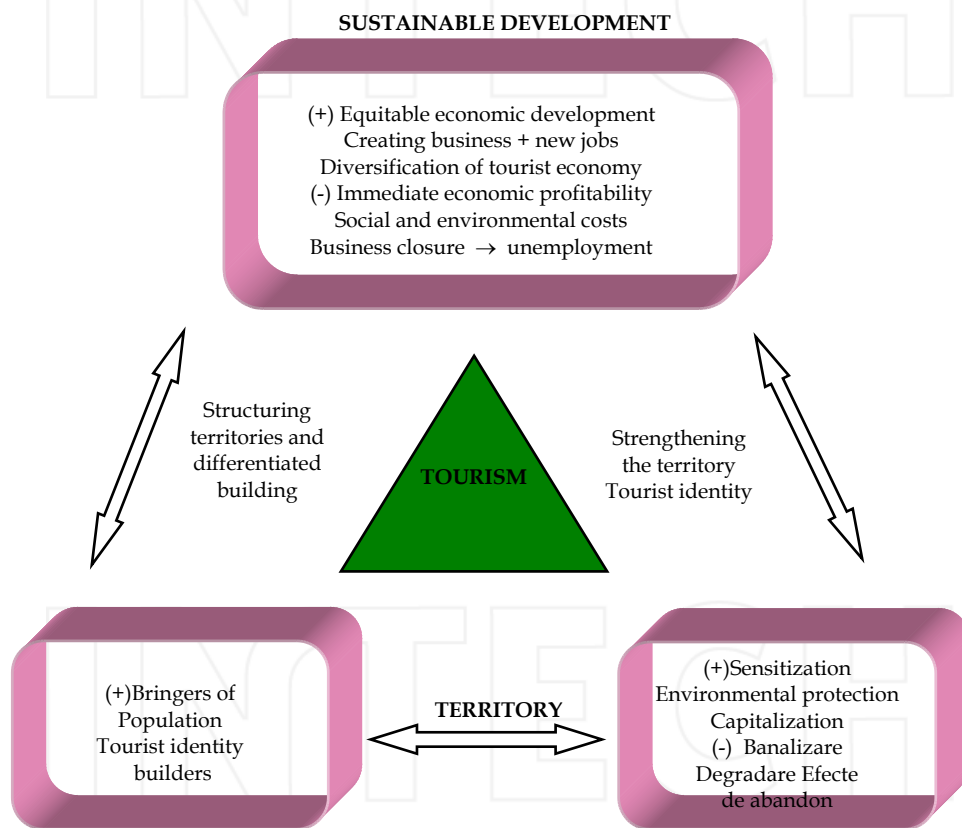


Fig. 6. Stabilizing (+) and destabilizing (-) effects of tourism on sustainable development (Author's adapting after Oliver Bessy – Sport, Loisir, Tourisme et développement durable des territoires, PUS, 2008, Cedex, p. 44)

³ ARA

On the other hand, sustainable development can be revealed to us as an alibi, even a utopia maintained voluntarily by political and economic players, anxious to legitimize and prove their economic logic but also to preserve the economic strength already acquired. We believe that to resolve this situation it would be enough to adapt socio-economic and ecological systems of this globalization “given”: **Sustainable development**.

In fact, this ambivalence reflects perfectly the state of our society harassed back and forth between a dominant liberal model organized around “tourist market” (Cândea et al., 2009) but also to a welcome closeness, regulating in the environmental and human level.

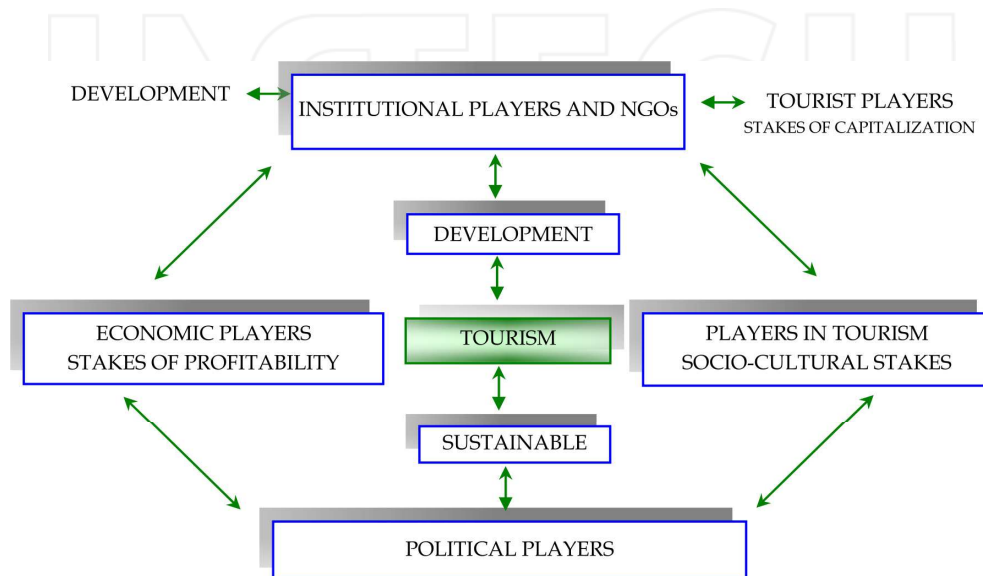


Fig. 7. Foreground stakes of the different local players in the action for sustainable development of tourism (Pârgaru et al., 2009)

Sustainability for tourism as for other industries has three independent aspects: economic, sociocultural and environmental. Sustainable development implies permanence, which means that sustainable tourism requires the optimal use of resources (including biological diversity), minimizing the negative economic, sociocultural and ecological impact, maximizing benefits of local communities, national economies and conservation of nature. As a consequence, sustainability also refers to the management structures needed to meet these goals.

The goal of achieving sustainable tourism should be subordinated to national and regional plans of economic and social development. Actions may cover for economic goals (income growth, diversification and integration of activities, control, development potentiation and zoning), social goals (poverty and income distribution inequality improvement, indigenous sociocultural heritage protection, participation and involvement of local communities) or environmental goals (protection of ecotourisms functions, conservation and sustainable use

of biodiversity). Some experts prefer to speak about sustainable tourism development rather than sustainable tourism, the first referring to all aspects of development, and the second to some aspects and components of tourism – such as long distance air transport that may easily not be sustainable under current technologies, even using the best practices.

We also wish to recall which are **the goals of sustainable tourism**, as they were mentioned by the WTO, in 2005 (acc. to *Making tourism more sustainable, A guide for policy makers*, UNWTO / UNEP, in the Sustainable Tourism Group report, “Action for more sustainable European tourism”, published in February 2007 – Annex 2 of the document cited includes the **12 objectives** to be met by development of sustainable tourism activities in a tourism destination with a protected area title):

- **Economic viability**

To ensure viability and competitiveness of tourism destinations and enterprises so that they are able to continually prosper and provide long term benefits.

- **Local prosperity**

To maximize the contribution of tourism to the prosperity of the host destination, including the proportion of visitor spending which is due to locals.

- **Jobs quality**

To increase the number and quality of jobs created and supported by tourism locally, including salary, working conditions and their availability to all persons without discrimination of gender, race, disability or otherwise.

- **Social equity**

To reach a broad distribution of economic and social benefits in tourism to the recipient community, including opportunities, income and services growth of those less wealthy.

- **Visitor satisfaction**

To provide a safe, satisfactory and complete experience for visitors, which is available to all without discrimination of gender, race, disability, etc.

- **Local control**

Local communities to be involved and empowered in planning and decision making on the management and future development of tourism in their area, in consultation with all stakeholders.

- **Community welfare**

To maintain and enhance quality of life in local communities, including social structures and access to resources, attractions and life support systems, avoiding any form of social degradation or exploitation.

- **Cultural richness**

To respected and put forward historical heritage, authentic culture , local traditions and specificity of host communities.

- **Physical integrity**

To maintain and put forward quality of landscape, both of the urban and rural ones, and to avoid physical and visual degradation of the environment.

- **Biological diversity**

To support preservation of natural areas, habitats and wildlife and to minimize their damaging effects.

- **Resource efficiency**

To minimize the use of scarce resources and non-renewable resources in the development and operation of tourism facilities and services.

- **Environmental purity**

To minimize the effects of air, water and soil pollution and waste production by tourism enterprises and visitors

To be mentioned that, for such requirements, a responsible, judicial tourist is also imperative for their compliance, to observe them, to manage them: better said – a sustainable tourist.

However, sustainable tourists are people taking into account sustainable development pillars when defining the trip's tourist package – i.e. accommodation, transport and activities – and are respectful towards nature, culture, people and destinations.

The traveler must behave respectfully during holidays, as well as in the case of an event related to his profession or at a congress, both for residential tourism and one-day travel.

The stereotypical image of the sustainable traveler is often associated with backpackers. However, this picture is not correct and complete, having nothing to do with the travel manner (individual or group), travel organization (individual organization or organizing by specialized intermediate agents), type of accommodation, type of vehicles and even with the destination itself. The condition is to make conscious choices, taking into account the said principles of sustainability. However, these conscious choices must be visible through the nature of the destination.

To behave respectfully towards other people, culture and environment involves, for example, taking an ethical behavioral conduct, using facilities enjoyed by locals, taking into account local customs, adapting attire where necessary, refusing to buy certain souvenirs that could harm the place. It also means paying a fair price for services. Such behavior could, for example, inspire tour operators to include in their offer sustainable tourism products.

A sustainable traveler is aware that during his trip his conduct has effects in the destination country.

Social implications of a sustainable travel to avoid oversaturated tourist traffic are important especially in areas where cultures substantially differs from the external environment of the area visited.

- Proposals:

Countries with natural and human tourism potential similar in richness and variety with Romania – sometimes not so diversified and focused – have managed to make tourism industry an important factor, in some cases even the most important, of economic growth and general development.

To achieve this target it is necessary to act in the following ways:

- make the institutional reform and create the legal framework for decentralization of management;
- harmonize tourist legislation similar to the EU one;
- support the establishment of professional associations and other NGOs in tourism, open and organize the National Authority for Tourism partnership with them;
- raising the quality of tourist promotion actions by using PHARE funds, supplementing the insufficient budgetary funds (compared to European Union countries) for this area.

Tourist policy on the medium and long term will have to aim the following priority objectives:

- reduce taxation;
- continuing to maintain international tourism as an export activity;
- tax exemption on reinvested profit on a certain period;
- further improvement of the legal and institutional framework for the harmonization with the rules of the World Tourism Organization and the European Union;
- state involvement in financially sustaining investment in tourism, particularly those of public interest (infrastructure), as well as international and domestic tourist promotion;
- development of the specialist professional training system and professional reconversion for dismissed labor force in other economic sectors; setting up a network of tourist education establishments integrated in the European network of hotels and tourist education;
- correlation of programs and tourism development projects with regional development programs (transport, telecommunications, landscaping etc.).
- increased attention to polls – useful tool for hotel managers working to maintain and increase the quality of services rendered.
- imposing quality marks in order to increase competitiveness on the tourism market and tourism service quality recognition.

Sustainable tourism represents tourism that meets the needs of present tourist and host regions while protecting and enhancing opportunities for the future (<http://www.ecotourism.org>). On the other hand, sustainable tourism is a necessity to apply the principles of sustainable tourism development. The concept of sustainable tourism has become a key ingredient in the nation's tourism strategy (Connel et al, 2009, p.867). First, Sustainable tourism is the ability of a tourist destination to remain competitive (Mazilu et al., 2009), while maintaining environmental quality, despite all problems, to attract visitors for the first time, then following that loyalty to him, to remain unique in terms of cultural and be in a permanent equilibrium with the environment (Nistoreanu, 2009). It is based on the consideration that development must meet the present needs without jeopardizing those of future generations (Nistoreanu, 2005, p.42).

Sustainable development and its derivative sustainable tourism, although intuitively appealing, widely adopted by international organizations and many governments, and enshrined in legislation, are concepts that have been much criticized because of their lack of precision and because of the difficulties that have been experienced with their implementation (Tao & Wall, 2009, p.90).

Sustainable tourism develops the idea of meeting the needs of current tourists and tourism industry while protecting the environment and opportunities for the future needs to achieve the entire economic, social, aesthetic, etc., actors in tourism, while maintaining cultural integrity, environmental, biological diversity and all systems that support life (Stănciulescu, 2004, p.23). Sustainable development plans cover at least three (Ionescu, 2000, p.137):

- Economically, by increasing service and resource recovery;
- Environmentally, by recycling, avoiding environmental degradation, reduction of land removed from agricultural use;
- Social, by increasing employment, practicing traditional population to attract tourism, as measures of physical and political regeneration (Figure 8).

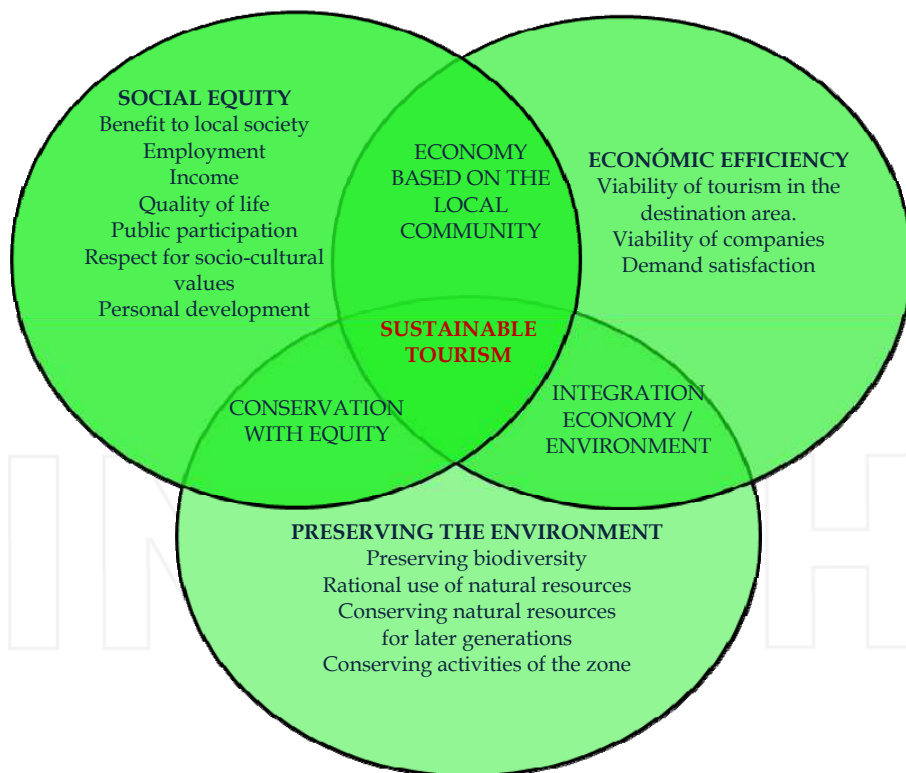


Fig. 8. Sustainable Tourism Model (Source: Sanagustín Fons M.V. Moseñe Fierro J.A., Gómez y Patiño M. - "Rural tourism: A sustainable alternative", 2011, p. 552)

Since **sustainable tourism is an end**, one must understand that any type of development including tourism development gives rise to certain changes in an area. However, these changes should be kept within acceptable limits, so that sustainability is achieved. Sustainable tourism can be best achieved by careful planning, by development and proper management of the tourism sector based on some principles (see Principles of sustainable tourism in World Tourism Organization, WTTC, The Earth Council – Agenda 21, 1995).

Thus, by 2050 the world population today estimated to over 6.5 billion people shall be between 7.7 billion and 11.2 billion. However, the latest average projection is of 9.37 billion people.

Population growth is the main pressure on the environment and it is inexorable.

Tourism industry is seen by its specificity as environmentally tied more than other industries, but its size and presence have created negative physical and social impacts on the environment.

Tourism, like any human activity, participates in degradation and environmental pollution, either by direct pressure of tourists on the landscape or on other tourist attractions, or by the misconception of capitalization of tourist points and attractions. The impact of tourism on the environment is determined by:

- uncontrolled tourist traffic, chaotic in areas or tourist objectives outside marked trails, leading to destruction of vegetation, flora and fauna;
- non-systematized development of settlements reaching up to an excessive urbanization of resorts (Baile Herculane, Baile Felix, Sovata, Bran, etc.), over-sizing of resorts in terms of reception and treatment capacity (Baile Felix, Sovata, Buziaș, Vatra Dornei, Sinaia, Poiana Brasov, etc.)
- changing the physical and chemical parameters of therapeutic resources (Vatra Dornei, Buziaș, Călimănești, Sovata, Ocna Sibiului, etc.) and treatment muds (Techirghiol, Negru and Ursu lakes in Sovata and Săcelu – Gorj);
- lack of rural wastewater treatment plants, ecologic landfills for waste and flood protections;
- strong influence on the aquatic environment in tourist resorts areas on the Romanian coast and the Danube Delta;
- total or partial damage of caves due to their arrangement for visiting, made without complying with scientific techniques of such works Muierii Cave (Parang Mountains), Ialomita Cave (Bucegi Mountains) and Peștera lui Ionel (Bihor Mountains);
- automobile tourism entering tourist resorts (Călimănești-Căciulata, Tusnad, Vatra Dornei, Sinaia, Busteni, Predeal, etc.).

Or, to avoid such “disasters”, which happened in destination areas, I frankly think that we need tourism to integrate the natural, cultural and human environment and respect the fragile balance, characteristic to many tourist destinations.

Consequently, the need for new and professional tourism leadership emerged, to attract more the governments and the private and public sector partners based on **principles** of sustainable development, namely:

- environment has an intrinsic value that is especially large for tourism, that the next generation should benefit from, too;
- tourism must be considered a positive activity with several beneficiaries:
 - environment
 - local communities
 - visitors;
- the relation between environment and tourism can be developed so that environment supports tourist activity in the long run; in turns, tourism is “forced” not to cause due its performance the degradation of the environment;
- the development of the tourism activity must comply with the ecologic, social, economic, cultural features of the geographic space where it is performed;
- the purpose of the tourism development must always be to counterbalance the needs of tourists and the ones of destinations and of their hosts;
- the tourist industry, the governments, the authorities responsible for the environment protection and the international bodies should comply with these principles and work together to implement them.

Polyvalence is quite necessary for the environment and tourism specialists, especially for the ecotourism specialists, due to the fact that futurologists have been using lately the following syntagm: “too much tourism kills tourism”, highlighting the fact that there are “limits” in the process of tourism.

If we do not want tourism to turn from a chance for economy into a risk for the whole community, we should “pace” ourselves.

We can notice the following phases of the development of a sustainable tourism (WTO, 1998):

- the first phase represents the decision to include in the tourist circuit a certain area and to erect the tourist constructions required for those tourist facilities;
- the second phase represents the progressive development of the tourist activity (along the responsibility for the environment protection and the compliance with the sustainable tourism);

During the first phase, if the tourist activities are carefully planned and performed, the environment problems can be solved since the same phase. For this, the selection of the area (of the ecotouristic management) is decisive to avoid the ulterior conflicts in the relation with the environment, such as:

- limitation of the damages brought to the landscape by: position of the resort, organization of transport, architecture, methods used to provide the facilities, etc.
- compliance with the responsibilities of the: local authorities, economic agents, local population (which must be consulted regarding the opportunity of the touristic project; it can oppose to it if it considers that its interest have been neglected.
- assessment of the impact over environment (according to the directives of the European Union), each member state having to introduce in its national legislation provisions regarding the impact of large tourist (or other) projects on the environment.

It is difficult to make a clear distinction between what is positive and negative in tourism development because often the short term impact is positive and the long-term is negative.

Let us consider a very attractive natural area (Iron Gates Natural Park). Tourists come attracted by the natural beauty, the richness of ecosystems, the uniqueness of endemism, but if this wealth is not “really” protected, the environment will degrade and lose its tourist destination attractiveness.

We must not forget that if the natural heritage of an area (even a protected area) attracts tourists, once it is degraded, tourists will leave as quickly, leaving behind a population that must bear the consequences due to the degradation of life environment, natural resources and tourism revenue decline.

An example of sustainable-environmental development of a valued tourist area in the Mehedinți county identity is (and hopefully will remain) **the Iron Gates Natural Park**, which reunites in its geographical area a series of “superlatives” among which:

- The Danube Gorge – the longest gorge in Europe (134 km);
- The largest Natural Park in Romania (115,655 ha);
- The largest hydroenergetic facility in Romania (the Hydropower and Navigation System Iron Gates I)
- The protected area with the greatest ethnic diversity in Romania
- Special geological and geomorphological diversity which may confer the status of outdoor geological museum;
- A high biological diversity – more than 1600 plant taxa (higher plants) and over 5200 fauna taxa;
- High diversity of plant associations, in this area being identified **171 associations**, of which **26 are endemic to Romania** and **21 are of community interest**;
- Presence of wetlands which are important habitats for protected bird species worldwide;
- Traces of human settlements from the Paleolithic, Mesolithic, Neolithic – evidence proving the area’s living history: cities, monasteries, churches;
- Historical and architectural buildings, water mills unique as operating system;

A **National Park** is a protected area whose main purpose is the protection and preservation of landscapes created by the harmonious interaction of human activities and nature over time (Law no. 462/2001).

Iron Gates Natural Park objectives are: conservation of landscape features, biodiversity, ethnic and folk traditions and cultural values, development of harmonious relations between nature and society by promoting activities without impact on the environment and international cooperation in biological conserving of the Danube river basin.

Iron Gates Natural Park covers an area of **115,655 ha**. Located in the south-west of Romania, its space belongs to the counties of Caras-Severin and Mehedinți. The Natural Park’ limits are the fairway of the Danube to the south, the river Nera in the west, the watershed directly tributary to the river Danube in the north (partially) and a sinuous line that starts downstream from Gura Văii to Motărăț peak the east. This nature reserve, adjoining the Ecological Serbian National Park, on the Belgrade-Timoc segment – based on a joint program of cooperation with Serbia – would make in the region an ecological area on a large expanse, with major interest for the three neighboring countries and with economic and social implications very favorable for the Balkans, in the perspective of sustainable development (including tourism) in the EU.

Among the ecotourism activities to be held in the Iron Gates Natural Park the following can be mentioned:

- *mountain tourism* (marked tourist routes - Pemilor route, linking all the villages inhabited by the Czechs in the Iron Gates Park);
- *cruises on the Danube* (departing from Orsova);
- *scientific tourism* (for habitats and species of protected plants and animals);
- *speleology* (in the limestone areas of the Park: Cazanele Dunării, Coronini-Moldova Nouă-Gârnice, Sirinia)
- *birdwatching* (in the wetlands in the west of the Iron Gates Natural Park)
- *sport fishing* (on the Danube – catfish, carp, perch, starlet, etc., and on inner rivers – trout, barbel etc.);
- *traditional festivities and celebrations* (Neda, celebrations of minorities);
- *cuisine* (fish dishes, goat meat, dairy products, vegetables, sweets);
- *Danube water sports* (rowing, canoeing, jet ski);
- *race cycling and mountain biking*;
- *skiing* (on forest roads);
- *cultural sightseeing* (archaeological, religious);
- *visiting water mills* in the valleys Elișeva, Povalina, Camenita;
- *visiting museums and collections* (museums and ethnographic and religious collections)
- *visiting villages populated by Czech and Serbian ethnics*.

The progress of the touristic activities, the second phase of the development of a sustainable tourism represents the active implication of all interested parties (local suppliers of tourist services and local authorities, together with the local population) in actions meant to solve the environment problems using the economic or juridical means to force economic agents to use the environment protection equipment.

Finally, the contribution of tourism to sustainable development is part of a social and political process in progress. It also clearly shows us, on the one hand, the growing importance that tourism registers today, despite the global financial crisis (Mazilu, 2010a, 2010b, 2010c) and, on the other hand, the major stake represented and offered by this form of development – sustainable development – on all territories worldwide.

Given this complexity, but also to give a pragmatic sense to their intervention, communities, especially those at the regional level, have – perforce – entered in a specific process of territorialization of their policies. Each declines, globally or by specific sectoral policies, the priorities over a territory, whose functional area fluctuates from one community to another.

Harmonious development of tourism throughout the territory contributes to economic and social growth and to alleviate imbalances between different areas, constituting an important source of household income increase.

Tourism is a means of developing rural areas, by extending the area of the specific offer and creating jobs in rural areas, other than traditional ones, improving living conditions and increasing income of local people. With respecting and promoting the principles of sustainable development, tourism is a means of protection, conservation and capitalization of the cultural, historical, architectural and folklore potential of countries. By adopting a strategy of sustainable tourism development and enforcing environmental protection

measures, fundamental values of human existence (water, air, flora, fauna, ecosystems, etc.), tourism has at the same time an ecological vocation.

Global trends and priorities change: more than ever, the great challenge for the tourism sector is to remain competitive and sustainable by recognizing that, on the long term, competitiveness depends on sustainability.

It is in the interest of tourism to be active in the issue of sustainable development (Mazilu, 2007a, 2007b, 2007c, 2007d) and to cooperate with other industries in providing resource base quality and its survival.

We must not forget that it is essential that tourism be politically accepted as a priority, without compromising durability. Without support and political commitment to sustainable tourism, tourist programs based on the principles of sustainable development will not be implemented.

After a useful and necessary previous reflection on notional interpretations of the new type of tourism, and clarifying the multi-expressional use "for another type of tourism", which we use in various names such as: sustainable tourism, responsible tourism, social tourism, joint tourism, integrated tourism, fair tourism, community tourism, etc., the article analyzes the compatibility between tourism and the concept so addressed in literature, that of sustainable development and environment, the various constraints posed by financial return, the requirements of tourist market, gaps in the management of tourism resources and best practices to be established for tourism to become sustainable (Mazilu, 2006).

Since **sustainable tourism represents a goal**, one must understand that any type of development which includes development of tourism gives rise to certain changes in an area. However, these changes should be maintained within acceptable limits, so that sustainability to be achieved. Sustainable tourism can be best achieved through careful planning, development and proper management of the tourism sector based on some principles.

Consequently, there was the need for a new, professional leadership of tourism that attracts governments and private and public sector partners more, based on **principles** of sustainable development, namely:

- the environment has an intrinsic value which is especially great for tourism, which should be enjoyed by future generations;
- tourism must be seen as a positive activity that will benefit:
 - the environment
 - local communities
 - visitors;
- the relationship between environment and tourism can be developed so that the environment sustains long-term tourist activity, tourism, in turn, being "obliged" not to cause environmental degradation through its unfolding.
- development of tourist activity must comply with environmental, social, economic, cultural features of the geographical space it takes place in;
- the goal of tourism development must always be the balance of the needs of tourists with their destinations and hosts;

- tourist industry, governments, authorities responsible for environmental protection and international bodies must respect these principles and work to implement them.

Avoiding the trap of “preconceived ideas” (which often seem to be false) like sustainable development is strictly the “business” of industries that process. Why fake? Because global warming and pollution directly relate to the tourist phenomenon: climate change, for example, have an impact in season changes, so have a direct incidence in the seasonality of the tourist phenomenon, the freeze-thaw phenomena damage, they damage infrastructure, the recent, highly publicized floods in exotic areas of high tourist attraction simply alter tourist experiences in this environment.

- **Sustainable tourism is not and should not be just a “panacea” of governors.** Sustainable tourism concerns everyone from:
 - **various governmental levels:** regulations, landscape protection, legislation, etc.
 - **associations and NGOs in the field of tourism:** sustaining the tourism phenomenon, examples of good practice, environmental protection animation, etc.
 - **industrial objectives** - to adopt new non-polluting practices and environmental protection;
 - **tourists** to know and apply the ethical code of tourists, to be responsible towards the environment and tourist destinations, to highlight their value;
 - **local population:** the need to show hospitality, knowledge of the tourist code, it being involved itself in activities that safeguard and enhance the environment;
 - **up to all components of tourist industry:** from tourist destination, regardless of size, to the types of tourism.
- **Sustainable tourism** seeks not only environmental protection. When we say sustainable development we mean impacts (either environmental or socio-cultural, etc.), and sustainable development requires sustainable management of these impacts. It is a matter of achieving balance and harmony in a spirit of sustainability (even thrive) on the long term.
- **Sustainable tourism is a tourist product** that can be sold to tourists. Sustainable tourism is a way to design, plan and manage sustainably tourism activities. At the same time it requires a change in the style of management, behavior, attitudes and habits.

There are no success “recipes” in the development of a sustainable tourism, but we can take into account several “tracks” of intervention (Baker, M. J. (2008):

- promoting an action plan in partnership with the “key” players in the development of the tourist phenomenon, including the involvement of industry leaders;
- demystifying the meaning of sustainable development;
- communication in sustainable development;
- integration of sustainable development as a factor in the capitalization of the tourist industry and betting on the strong links between quality and sustainable tourism;
- integration of sustainable development into the training of future “managers” of the tourist phenomenon;
- recognition and promotion of successful cases of sustainable development;
- tourism education in the spirit of sustainable development to make the best choices in the development of the tourist act.

4.3 Fields of action of players in sustainable tourism

Based on the principles of the sustainability triangle and on the related fields of action, against which interested players respond, the discussion on sustainable tourism is emerging. The themes belonging to the main domain of sustainable tourism or “sustainable tourism development” can be actually divided into subdomains.

We present a non-exhaustive list of fields of action in figure 8.

All players must complete a specific task to give the force required for sustainable tourism development and for each of them to obtain benefits by keeping an attractive tourist environment that protects at the same time the environment (Pârgaru, 2009).

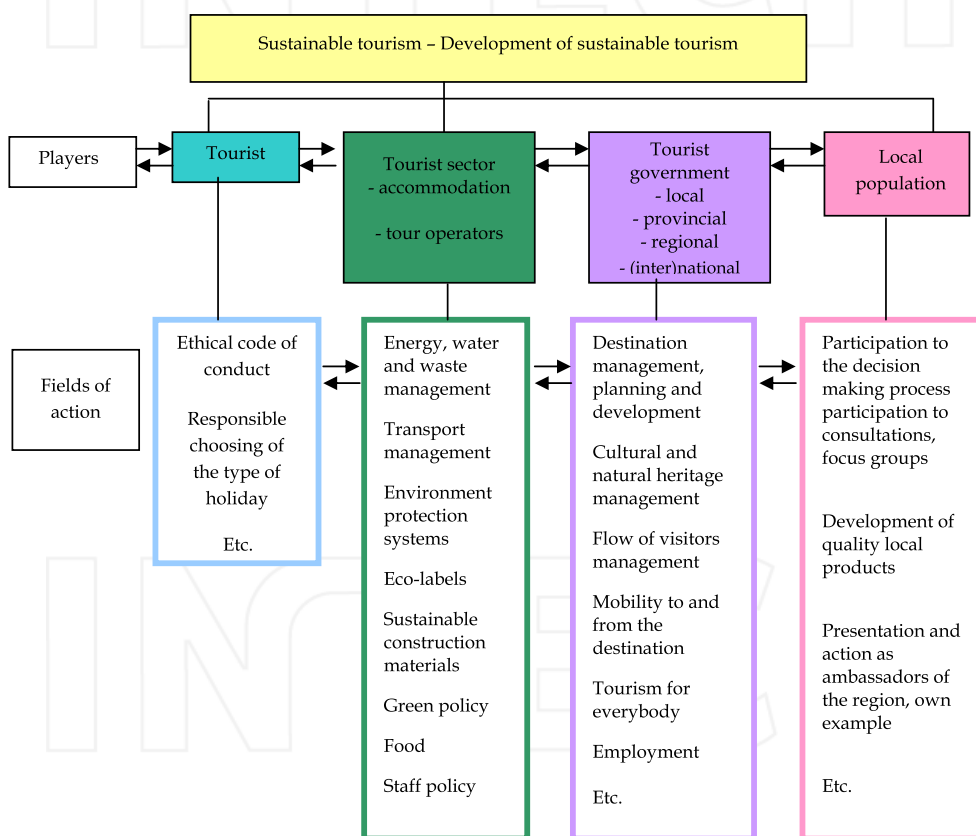


Fig. 9. Fields of action of players in sustainable tourism

Sustainable tourism development requires more and more knowing participation and involvement of all players involved, and a strong political support to ensure broader participation and creating a general consensus in the field of tourism development policy.

Sustainable tourism is the fruit of continuous efforts and requires constant control of desired or undesired effects of this activity, which includes the adoption, whenever appropriate, of preventive measures or that correct certain imbalances.

Tourism experts have decided, therefore, to lean on quality, sustainability and modernization of tourist services. Concretely, they will study the links between competitiveness, skills and information technology in this field, developing suggestions to improve regulation in this sector, focusing on the famous “services” directive. Finally, they will even try to put into place a sustainable development strategy in this so exposed area to polemics.

Local people, tourists, authorities responsible with tourism management and the private sector are the key players. The manner in which they can provide the necessary dynamics to this process depends on their own goals and vision of the outcome, the structure of ownership, their financial means and the influence they exert. We refer to the following activities to ensure sustainable tourism:

- in relation to the implementation of sustainable tourism, tourists pay increased attention to contact with the local population and show a more respectful attitude towards nature, environment and the surrounding areas;
- the tourist sector invests especially in its economic capital, accomplishing in this way especially technical improvements of the natural environment; however, this does not mean little attention paid to human capital (e.g., staff);
- authorities managing tourism have a central, very important role in the management of tourist destination and thus the development of tourist related products, while having the responsibility to promote proportionally the environment, population and economic significance that tourism offers to the region, they must share these resources in all fields;

On the other hand, sustainable development can be revealed to us as an alibi, even a utopia maintained voluntarily by political and economic players, anxious to legitimize and to prove their economic logic but also to preserve the economic strengths already acquired. We believe that to resolve this situation it would be enough to adapt socio-economic and ecological systems of the “given” of globalization: **Sustainable Development.**

4.4 The support capacity of a destination

Support capacity is used in the context of sustainable tourism. It is often proposed as a method for assessing the intensity of tourism development that can be supported by a tourist destination taking into account the economic, environmental and social characteristics of that destination.

- In literature, an interesting definition of this concept was formulated:

- „The maximum number of visitors that can be found in the same time in a tourist destination, without causing adverse effects on the physical, economic and sociocultural aspects of the society / community and without causing a (significant) decrease in the level of visitor satisfaction (Clivaz et al., 2004).
- The last part of the definition, in particular, provides a unique tool for measuring and monitoring the support capacity as visitor satisfaction, among others, is closely linked to the quality of service provided and quality can be measured in a simple way.
- In destination management, the simple question “how much is too much?” cannot be answered easily. A destination is a dynamic identity that the public sector must constantly adapt according to the possibilities it has and the impulses it reacts to. Choices must be made together with local players, but during this process of choice of responses and reactions to external elements the previous limit of the support capacity may be exceed. For example, a destination can receive more visitors and, at the same time, provide better living conditions than an appropriate traffic management plan has designed. This traffic plan can be useful both for tourists and locals.
- Due to the complexity of the development and management policy, the support capacity must evolve from a unique concept (limit of the maximum number of visitors an area can receive at a given time) to information/monitoring system that supports decision making.

Using methods that belong to the spatial sciences and geography, tourism economy, the reception capacity of a territory can be determined, respectively its ecological support capacity in relation to natural and human resources and the space on which it materializes. This renders the number of tourists that can be received, at a given time, on a territory or in a resort, without this tourist flow and related facilities (reception equipment or tourist production) to harm the environment through its degradation or of tourist resources.

Following the development of environmental science, of the increase of the amount of information on economic and social sciences, of the deepening of research in these fields, their connections with the tourist industry have led to the delineation of the following types-support capacity for tourism:

Ecological capacity refers to the establishment of that level of development of structures and tourist activities without strongly affecting the environment through the degradation of its components. This also applies to natural components (air, water, soil, vegetation, and fauna) and the production process and economic recovery, that do not involve special investment costs caused by the degradation of a tourist destination;

Physical capacity has an essential role in determining the saturation level that tourist activities can reach, beyond which environmental issues begin to emerge. The ascending development of tourism, manifested in recent decades raises the question of the emergence of many forms of pollution (coastal, of mountain areas, etc.). Protecting the physical components of the territory is made through investment in technology and by providing high quality level of tourist services;

Social-responsive capacity aims the importance of preserving good relations between hosts (indigenous population) and visitors (tourists). Since the moment that local population finds

that tourist activities also contribute to environmental and cultural degradation, hostile, rejection reactions may arise, also a reduction of the threshold of tolerance being recorded. To avoid such situations, the development of tourist areas or places should take into account the traditional life of the inhabitants, their customs, etc.

Economic capacity highlights the capitalization of all resources present by tourist activities and it represents the capacity to maintain the tourist function of a given area. Operating efficiency is measured by the ratio of costs and benefits, and the share of benefits can be increased by using new technologies. The level of costs is also given by the “qualitative and quantitative value of resources (natural, cultural, labor, general infrastructure, etc.);

Psychological capacity is related to the negative perception of tourists towards the tourist destination, following environmental degradation or poor attitude of the local population.

This concept is attached to supporting tourist motivations for a particular destination and maintaining their own personal satisfaction. Its application is also conditioned by the quality of management activity that can lead, ultimately, to the loyalty of demand.

All these different types of support capacities, in close relation with tourist activities, determine the tangible or intangible limit, measurable or immeasurable, of an area which has or which may be assigned a tourist function.

Although these capacity indicators do not provide a standard formula, due to the fact that some components of the natural or cultural area are difficult to quantify by series of statistical and mathematical data, however, these support concepts give us the measure of the sustainable development of tourism. At the same time, the types of support capacities also indicate the extent to which the impact of level of tourism may have on the environment, allowing the possibility to identify ways to reduce the degradation caused by the movement and tourist activities.

5. Conclusion

Imperative mutations that must be reflected in the policies of post-economic crisis revival in the tourism industry are:

- **The focus should move on general economic development**, rather than uncoordinated and inconsistent measures targeted for tourism industry
- **Promotion of a policy in favor of the tourist**, instead of the priority that is granted today to tour operators and - to a lesser extent - the local tourist accommodation industry
- **Improved communication through more intelligent branding actions and advertising**
- **A networking industry par excellence, Romanian tourism can achieve even more than other areas of a country's economy.**
- **Tourism has been defined as a system in which interdependence is essential and collaboration and cooperation between different organizations within a tourist destination creates the tourist product** (Mazilu, 2009).
- **Under the impact of globalization**, the development of tourism in each country of the world becomes possible only under the conditions of an optimal public-private partnership;

- **There is no real public-private partnership** in the field, and the institutions empowered to create a certain education and behavior to support the sustainable development of the Romanian tourism do not make the necessary efforts;

Basically, in this crisis, Romanian tourism should maintain its accommodation capacity and improve services (Mazilu M.E, 2011). The real benefits will be obtained later. The financial and economic crisis effects are felt globally by all players in the market, regardless of the operating field.

6. References

- Ambiehl, C. ; Aujaleu, C. ; Galiennie, G. (2002). *Le marché du bien-être et de la remise en forme avec l'eau Agence française de l'ingénierie touristique*, Consulting, Agence, p.18
- Ashworth, G. (2001). The Communication of the Brand Images of Cities, paper presented at the *Universidad Internacional Menedez Pelay Conference: The Construction and Communication of the Brand Images of Cities*, Valencia Spain and *From City Marketing to City Branding: Towards a theoretical framework for developing city brands*, Place Branding, Vol. 1, No.1, pp. 58-70.
- Baker, M. J. (2008). Critical success factors in destination marketing, in *Tourism and Hospitality Research*, Vol. 8, No. 2, Palgrave Macmillan, pp.79-97.
- Bessy, O. (2008). *Sport, Loisir, Tourisme et développement durable des territoires*, PUS, Cedex, p. 44
- Câdea, M.; Stăncioiu, F.A; Mazilu M.E; Marinescu R.C. (2009). The Competitiveness of the Tourist destination on the the future Tourism Market, in *WSEAS Transactions On Business And Economics*, VOL.6, Issue 7, August,2009, ISSN: 1109-9526 pag.374-384
- Clivaz; Hausse; Michelet (2004). *Tourism monitoring system based on the concept of carrying capacity-The case of the regional natural park Pfyn-Finges (Switzerland)*, document of the Research Institute Finnish Forest, 2004
- Connell, J.; Page, S.; Bentley, T.(2009). *Towards Sustainable Tourism Planning in New Zealand: Monitoring Local Government Planning under the Resource Management Act*, ElsevierJTMA-D-08-00172R1
- Constantin, D.L. (2000). *Introducere în teoria și practica dezvoltării regionale*, Editura Economică, Bucuresti, România
- Echtner, C.; Brent Ritchie J.R. (1991). *The meaning and measurement of destination image*, Journal of Tourism Studies
- Gartner, W.C (2009). Image Formation Process, in *Journal of Travel and Tourism Marketing*, 2(2/3), pp.191-215.
- Go, F.M.; Van Fenema P.C. (2006). Moving Bodies and Connecting Minds in Space: It is a Matter of Mind over Matter Advances in Organization Studies 17, pp. 64-78,
- Govers, R.; Go, F. (2009). *Place Branding. Local, Virtual and Physical Identities, Constructed, Imagined and Experienced*, Palgrave Macmillan, London.
- Gowers, R.; Go, F. (2009). *Place branding, local, virtual and physical identities, constructed, imagined and experienced*, Palgrave Publishing House.

- Ionescu, I. (2000). Turism, fenomen social-economic si cultural, Editura Oscar Print, București.
- Lindstrom, M. (2009). *Branduri senzoriale. Construiți branduri puternice folosind toate cele 5 simțuri*, Editura Publica, București
- Low no. 462/2001 on Protected Natural Areas, natural habitats, flora and fauna, http://www.cdep.ro/pls/legis/legis_pck.http_act?ida=30639
- Luca, C. (2007). The relationship between social dominance orientation and gender: The mediating role of social values. *Sex Roles*, 57, 159-171.
- MacKay, K.J.; Fesenmaier, D.R. (2000). An Exploration of Cross – Cultural Destination Image Assessment, in *Journal of Travel Research*, 38(4) May, pp. 417-23.
- Mazilu, M. E. (2006). *The Touristic management from an ecological perspective*, publicat în *Analele Universității din Craiova, Seria Științe Economice*, Anul XXXIV, Nr.34, Vol.1
- Mazilu, M. (2007). *Le tourisme roumain dans le contexte du tourisme europeen*, Universitaria Publishing House, Craiova, p.82.
- Mazilu, M. (2007). *Tourist Geography*, Didactical and Pedagogical Publishing House, Bucharest, , p. 234.
- Mazilu, M. E. (2007). The ecological component of the lasting development, Conferința Internațională B.EN.A: *Sustainable Development in Balkan Area: Vision and Reality*, Alba Iulia, 18-20 iulie 2007, publicat în *Journal of Environmental Protection and Ecology JEPE*, Book 1, vol. 10, ISSN:1311-5065, pag.131-136,2009.
- Mazilu, M. E. (2007). Turismul - o relație privilegiată cu dezvoltarea durabilă, articol publicat în *Revista de Marketing On-line*, Nr.4, volumul1, Editura Uranus, București , ISSN:1843-0678, pag.64-70
- Mazilu, M. (2008). Un Tourisme fait pour durer, in Vol. and the program Colloque international: *Services, innovation et développement durable*, Poitiers, France file:///F:/Colloque SIDD – Poitiers/ Communication/Mazilu Mirela.pdf. ,p.33.
- Mazilu, M.E. (2008). *Competitivité et excellence dans l'aménagement touristique durable du territoire*, Les Annales de l'Université Valahia de Targoviste section: Sciences Economique, anul XIV, nr. 26
- Mazilu, M., Marinescu, R. (2008). Sustainable Tourism in Protected Areas – Case Study of the Iron Gates Natural Park, *Rural Futures Conference*, organized by University of Plymouth and School of Geography, Plymouth, the Great Britain, ISBN: 978-1-84102-185-0, p. 1-7.
- Mazilu, M.E. (2009). *Actorii implicați în turismul durabil al unei destinații*, publicat în *Proceedings of The 2-nd INTERNATIONAL TOURISM CONFERENCE: "Sustainable mountain tourism - local responses for global changes"*, Drobeta Turnu Severin, Editura Universitaria, Craiova, ISBN: 978-606-510-622-2, pag.215-221
- Mazilu, M. E. (2010). Key elements of a Model for Sustainable Tourism, in *International Journal of Energy and Environment*, Issue 2, Volume 4, ISSN:1109-9577, p45-54.
- Mazilu, M. E. (2010). Opportunities and Threats for Romania as a Tourist Destination after the World Economic Crisis, in *Proceedings ISI of 5-th WSEAS International Conference on Economy and Management Transformation(EMT'10)*, ISSN: 1792-5983, ISBN:978-960-474-240-0, West Timisoara University, pag.66-72.

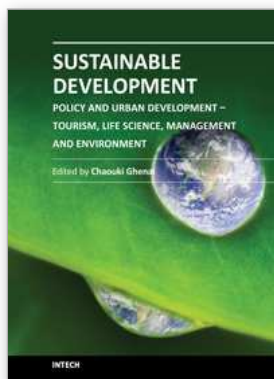
- Mazilu, M. E. (2010). Towards a model of an optimal-sustainable tourist destination, in *ISI Proceedings of International Conference: Cultural, Urban and Tourism Heritage, CUHT2010, Corfu, Greece, 24-26, Iulie, 2010*, ISBN:978-960-474-205-9, ISSN:1792-4308, pag.28-35.
- Mazilu, M.E.; Marinescu R.; Sperdea N. (2010). The Quality of Tourism Services under the sign of sustainability, *publicat în Analele Universității din Oradea, Științe Economice, Tom XIX, Issue 2*, ISSN:122569, p.992-999
- Mazilu, M. E. (2011). Romania – an Attractive Tourist Market after the World economic Crisis, in *International Journal of Energy and Environment*, Issue 2, Volume 5, p.212-221,
- Morgan, N.; Pritchard, A. (2004). Meeting, A.; Pride, R. (eds), (2004). *Destination Branding: Creating the unique destination proposition*, 2nd Edition, Oxford: Butterworth-Heinemann.
- Nistoreanu (2005). The trilateral relationship ecotourism - sustainable tourism - slow travel among nature in the line with authentic tourism lovers, *Journal of Tourism*, No.11, p35
- Părgaru I.; Mazilu, M.; Stăncioiu, A.F. (2009). Tourism – „Energy Source” for the Sustainable Development, *publicat în Metalurgia International*, vol. XIV, no, 8, Special Issue , Editura FMR ISSN 1582-2214, pag.64-68
- Rondelli, V.; Cojocaru, S. (2005). *Managementul calității serviciilor din turism și industria ospitalității*, Editura THR-CG, București, p.165.
- Sanagustín Fons, M.V.; Moseñe Fierro, J.A.; Gómez y Patiño M. (2011). *Rural tourism: A sustainable alternative*, p. 552
- Sorokin, P. A. (1967). *The sociology of revolution*. New York, NY: Howard Fêting, Inc.
- Stăncioiu, F.A. (2003). *Marketing turistic*, Editura SITECH, p 104
- Stăncioiu, A.F.; Părgaru, I.; Teodorescu, N.; Talpaș, J.; Răducan, D. (2008). Imaginea și identitatea - instrumente de poziționare în marketingul destinației, lucrare susținută la Sesiunea de comunicări științifice „Cercetare interdisciplinară în turismul românesc în contextul integrării europene”, organizată de Institutul Național de Cercetare și Dezvoltare în Turism, Ighiu
- Stăncioiu, A.F.; Părgaru, I.; Mazilu, M.E. (2009). Brandul destinației, câteva repere conceptual metodologice în marketingul destinației, in *Proceedings of The 2-nd International Tourism Conference: "Sustainable mountain tourism-local responses for global changes"*, Drobeta Turnu Severin, Editura Universitaria, Craiova, ISBN: 978-606-510-622-2, pag.283-289
- Stănculescu, G. (2004). *The Sustainable Tourism Management in the Urban Centres*, The Economic Publishing House, Bucharest, p. 23.
- Tao T.C.H.; Wall, G. (2009). Tourism as a sustainable livelihood strategy. *Tourism Management*, Volume 30, Issue 1, February 2009, Pages 90-98
- World Tourism Organisation, WTTC, The Earth Council. (1995). *Agenda 21 – for the Travel and Tourism Industry: Towards Environmentally Sustainable Development*
- World Tourism Organisation (1998). *Guide for Local Authorities on Developing Sustainable Tourism*

World Tourism Organisation / UNEP. (2007). Making tourism more sustainable, A guide for policy makers, in the *Sustainable Tourism Group report*, “Action for more sustainable European tourism”

www.ecotourism.org

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Mirela Mazilu (2012). Sustainable Tourism of Destination, Imperative Triangle Among: Competitiveness, Effective Management and Proper Financing, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainable-tourism-of-destination-imperative-triangle-among-competitiveness-effective-management-an>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Croatian Tourism Development Model – Anatomy of an Un/Sustainability

Lidija Petrić
*University of Split
Croatia*

1. Introduction

Four identifiable development paradigms have, at one time or another, dominated development thinking, i. e. modernization, dependency, neoliberalism and the alternative development paradigm (Southgate & Sharpley, 2002; Sofield, 2003; Sharpley, 2009). The last emerged in response to the apparent failure of mainstream, economic-growth based models to deliver development (Sharpley, 2009). Opposite to the other three it has been focused on the content rather than the form of development. Nerfin (as cited in Sofield, 2003; 63) has specified the following premises constituting the alternative development paradigm:

- It is needs-oriented (being geared to meeting human needs both material and non-material);
- It is endogenous (stemming from the heart of each society, which defines in sovereignty its values and the vision of its future);
- It is self-reliant (that is, each society relies primarily on its own resources, its members' energies and its natural and cultural environment);
- It is ecologically sound (utilizing rationally the resources of the biosphere in full awareness of the potential of local ecosystems as well as the global and local outer limits imposed on present and future generations);
- It is based on self-management and participation in decision-making by all those affected by it, from the rural or urban community to the world as a whole, without which the goals above could not be achieved.

With development being increasingly linked with environmental sustainability, from the late 1980s alternative development effectively became synonymous with sustainable development. However some authors suggest that alternative development model is more focused upon specific societal contexts at specific times while sustainable development adopts a much broader focus, in terms of space and time (it is a global phenomenon and seeks for fair and equitable development for all people both within and between generations) (Sharpley, 2009; 45).

However, despite possible dissimilarities regarding the scope and extent between the notions of alternative and sustainable development, the latter has overwhelmed literature and attracted debate and analysis from virtually all academic standpoints. Many authors have striven (though unsuccessfully) to find a single all-purpose definition of sustainable

development. Yet at the time when Steer and Wade-Gery wrote their article (1993, as cited in Sharpley & Telfer, 2002) over 70 different definitions were proposed and today they are probably even more numerous. Although the origins of the concept can be traced to the 1960s and the coincidence of the perceived environmental crisis and a global institutional response the most widely cited definition of the concept is given in the so called Bruntland's report stating that "development is sustainable if the present satisfaction of needs does not question the ability of the future generations to satisfy their needs" (World Commission on Environment and Development's [WCED], 1987; 4).

Till today no universally acceptable practical definition of sustainable development has been adopted. However the intention of this chapter is not to add to the already substantial literature on what are regarded as useful approaches to theoretical concepts of sustainability. It accepts that there are many differing approaches to sustainable development and that different policies and practices may be appropriate in different circumstances (Sharpley, 2009). Its main objective is to investigate, through an analysis of the specific case study, whether tourism development model effective in the Republic of Croatia, a well known tourist destination promoted as the "Mediterranean as it once was", is based on the principles of sustainability. The author has analyzed this model by scanning it from all the three aspects of sustainability, i.e. economic, environmental and the social one. For the purpose of a deeper investigation into this matter a desk research has been conducted consulting a substantial amount of sources, such as books, papers, and research studies of which quite a few are based on questionnaires, strategic documents, newspaper articles as well as web posts. The author of the chapter has participated herself in several studies referenced here.

The chapter is structured as follows: after a brief overview of the three main sustainable development aspects, an explanation is provided of the costs tourism development poses globally and locally. Then the concept of sustainable tourism development is introduced expounding in which way tourism has to be developed if the crucial resources are to be preserved in the long term and benefits equally spread among all the stakeholders. The main part of the study endeavours to draw the three main aspects of sustainability together blending the theoretical issues with the practical experience from the case study. The final section, i. e. conclusion, briefly considers the future mechanisms for managing tourism in Croatia in order to make it more sustainable.

2. The aspects of sustainable development

Although there is no universally acceptable practical definition of sustainable development, the concept has evolved to encompass three major aspects of sustainability: economic, social and environmental (Figure 1).

The *environmental sustainability* focuses on the overall *viability and health of ecological systems*. Natural resource degradation, pollution, and loss of biodiversity are detrimental because they increase vulnerability, undermine system health, and reduce resilience. This aspect of sustainability has been the most often discussed through the literature by numerous authors such as Hall, C. M. & Lew A. A. (1998), Hall, D. (2000), Weaver (2006), and many others.

Social sustainability seeks to reduce vulnerability and maintain the health of social and cultural systems by strengthening *social capital* through *empowerment* (Simmons, 1994; Sofield, 2003; Petrić, 2007; Petrić & Pranić, 2010). Preserving cultural diversity and cultural

capital, strengthening social cohesion, partnership and networks of relationships are integral elements of this approach (Munasinghe, 2003).

The *economic sustainability* is geared mainly towards improving human welfare, primarily through *growth* in the consumption of goods and services. Economic *efficiency* plays a key role in ensuring both efficient allocations of resources in production, and efficient consumption choices that maximize utility. Problems arise in the valuation of non-market outputs (especially social and ecological services), while issues like *uncertainty*, *irreversibility* and *catastrophic collapse* pose additional difficulties (Pearce & Turner 1990, as cited in Munasinghe, 2003).

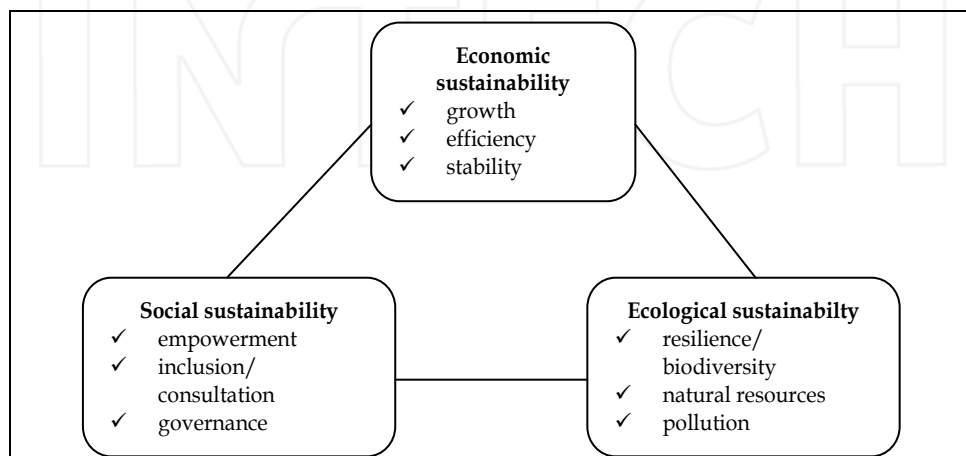


Fig. 1. Sustainable development triangle¹

3. Could tourism become sustainable?

In parallel with the evolution of sustainable development discourse, concerns about the environmental and social impacts of tourism have escalated in recent years. The main causes for such a rise of concern may be listed as follows:

- International tourist arrivals reached 880 million in 2009 with the projections of reaching 1.5 bill arrivals worldwide until 2020 (United Nations World Tourist Organisation [UNWTO], 2010).
- Such a huge number of people travelling around the world, using the most valuable resources generate not only positive but also a lot of negative effects especially when it comes to the environmental issues. Among them the ones that ought to be specially addressed are:
 - Deterioration of natural resources (fresh water, land and landscape, marine resources, atmosphere and local resources), which may be resilient, but can deteriorate rapidly if impact exceeds tolerable limits (carrying capacities);

¹ Adapted from: Munasinghe, M. (2003). Analyzing the nexus of sustainable development and climate change, an overview, Organisation for Economic Co-operation and Development [OECD], 4.03.2011, Available from: <http://www.oecd.org/dataoecd/32/54/2510070.pdf>

- Disruption of wildlife and habitats, including vegetation, endangered species, use of forest resources, intrusion into fragile areas with sensitive ecosystems;
 - Creation of pollution and waste contaminating the land, fresh water sources, marine resources, as well as causing air and noise pollution. Thus, international and domestic tourism emissions from three main sub-sectors (transport, accommodation and activities) are estimated to represent between 3.9% and 6.0% of global emissions in 2005, with approximately 40% of the total being caused by air transport alone (United Nations Environmental Programme [UNEP] & UNWTO, 2008; 33). Environmental problems caused by tourism appear to be even harder since environment, especially the natural one, is a basic resource that tourism industry needs in order to thrive and grow.
- There is still an uneven distribution of tourist flows in terms of their dominant regional concentration. Thus despite the negative effects of the world financial crisis, Europe, as the most popular macro-destination accounted for 52% of international tourist arrivals and 48% of international tourism receipts in 2009 (decrease by 6% in terms of arrivals and 7% in terms of receipts in real terms). As already mentioned, World Tourism Organisation (2010) forecasts that international arrivals are expected to reach over 1.56 billion by the year 2020 out of which 717 million arrivals only in Europe. Of these worldwide arrivals in 2020, 1.18 billion will be intraregional and 377 million will be long-haul travellers. After the tragic happenings of September 11th, securities concern and tighter visa policy over travel to Europe and USA have led to change in the travel behaviour of tourists. This has forced tourists to take their holidays in their own countries, or the region, thereby providing much-needed impetus to regional tourism development but at the same time producing higher pressures on the destinations' natural and social capacities.
 - Tourism still shows high seasonal concentration hence posing additional pressure on destinations' capacity to cope with tourists and their numerous activities in relatively short a period of time. In 2009, most of the European residents took holidays in the third quarter of the year, with more than one in three holiday trips made in July, August or September. When taking into account the duration of the trips, the seasonal pattern was even more pronounced, with EU residents spending 46 % of all nights away on holiday in the third quarter of 2009. Short holiday trips, domestic holidays, and business trips tended to smoothen the seasonality of tourism demand. The increasing popularity of short trips slightly reduced the seasonal bias in the period 2004-2009 (Demunter, 2010).
 - Tourism is a global phenomenon but locally generated; as such it has to be deeply embedded into a local community. Moreover, local community itself is not only a physical space within which tourism occurs but also a highly complex tourism product. Murphy (1985:153) argues that tourism development "relies on the goodwill and cooperation of local people because they are part of its product." Hence, tourism, being a local community job and strongly affecting community life, requires proactive approaches based on broad participation by stakeholders, which would contribute to more effective policies and plans. This would increase the opportunities to realize the full social and economic potential of the tourism industry.

Due to the elaborated features of tourism industry leading to possible deviations during the process of its development, numerous authors such as Haywood (1988), Bramwell and Lane

(1993), Hall C. M. and Lew (1998), Timothy (1998), Butler (1999), and many others recommend a number of principles that ought to be followed in order to achieve sustainable tourism development. These principles are summarized by Southgate and Sharpley (2002: 243) in the following way:

- The conservation and sustainable use of natural, social and cultural resources is crucial. Therefore, tourism should be planned and managed within environmental limits and with due regard for the long-term appropriate use of natural and human resources. Many studies have been done and implemented so far in order to bring conservation ideals into tourism. Good example is, for instance The World Wildlife Fund for Nature Arctic Tourism Project whose goal was to enable communities, tourists and operators to work together towards a more sustainable tourism (Mason et al., 2000). Many destinations from around the world witness implementation of different hard and/or soft measures aimed at conservation and sustainable use of resources. They include dispersal strategies that 'dilute' tourism related activity and help in distributing employment and revenue benefits more equitably, such as in the case of Maldives, then strategy of spatial and temporal concentration which could contribute to the attainment of sustainable tourism within the destination as a whole (the Gold Coast of Australia illustrates this phenomenon, wherein the vast majority of tourism activity occurs along a narrow coastal strip occupying less than 2 % of the City Council area) (Weaver, 2006). Visitation caps facilitate strategies based on fixed or flexible carrying capacities, depending on whether they apply to absolute numbers or rates of growth. Quotas most commonly used in high order protected areas as well as in a small number of countries are the most formal type of visitation cap and are often used to abet the objectives of zoning system. User fee increases, also commonly employed in protected areas, provide an informal capping effect by reducing the number of potential tourists who can afford to visit the affected site (Weaver, 2006).
- Tourism planning, development, and operation should be integrated into national and local sustainable development strategies. In particular, consideration should be given to different types of tourism development and the ways in which they link with existing land and resource uses and social-cultural factors. A good example of the above is the model of rural tourism which produces multiple benefits for rural population in terms of producing additional income by renting their accommodation, by selling home produced food and drinks and by using local culture as a part of a tourism product. Examples of successful development of rural tourism could be seen everywhere, especially through Europe (Austria, Switzerland, Germany, Belgium, Italy, UK, etc.), particularly in the light of the efforts European Commission has done to this end so far (Veer & Tuunter, 2005; as cited in Petrić, 2006).
- Tourism should support a wide range of local economic activities, taking environmental costs and benefits into account, but it should not be permitted to become an activity which dominates the economic base of an area.
- Local communities should be encouraged and expected to participate in the planning, development and control of tourism with the support of government and the industry. Particular interest should be paid to involvement (empowerment) of indigenous people, women and minority groups to ensure equitable distribution of the benefits of tourism. Good examples of such community involvement in tourism that provides exposure of tourists to local life styles and generates benefits directly to local population might be

the cases of village tourism in Senegal and Sri Lanka (Inskeep, 2006), but can also be found elsewhere, in developed as well as underdeveloped countries. However it is important to stress that in most of the developed countries community consultative arrangements are normative parts of development while in developing countries such a concept may be opposed by the elites running such countries due to the element of power sharing (Tosun, 2000).

- All organizations and individuals should respect the culture, the economy, and the way of life, the environment and political structures in the destination area.
- All stakeholders within tourism should be educated about the need to develop more sustainable forms of tourism. This includes staff training and raising awareness, through education and marketing tourism responsibly, or sustainability issues amongst host communities and tourists themselves.
- All agencies, organizations, businesses and individuals should operate and work together to avoid potential conflict and optimize the benefits to all involved in the development and management of tourism. A number of examples and cases of cooperation among different stakeholders (in Canada, USA, Brazil, Eastern Europe) have been presented in the book "Tourism Collaboration and Partnerships" edited by Bramwell and Lane (2000).
- In addition, a principle underlying fair distribution of tourism benefits among the members of the local community and internalization of costs produced by tourism stakeholders has to be stressed too.

As seen from the above, sustainability refers to the capacity for continuance of any destination and is, therefore, a function of complex inter-relationships between society and natural resources, a myriad of socioeconomic and political structures and local-scale management decisions². It depends above all on recognition and utilisation of local social and institutional capital (Southgate & Sharpley, 2002: 255-256).

4. Case study: Tourism development in Croatia

After having elaborated the theoretical framework of the notion, principles and aspects of sustainability and the reasons for their implementation into any model of tourism development, there follows the empirical research based on Croatian tourism development model as a specific case study. It must be noted that this case study draws on a more detailed studies and analyses in which the author has participated so far. In line with the study's goal the main research hypothesis has been shaped:

- Principles of sustainable development, though institutionally recognized are not implemented into Croatian tourism development model in any of the elaborated areas/aspects of sustainability. Hence, it is not only that the achieved results do not correspond to the real abilities but also resources have been seriously endangered by tourism development so far.

² Very useful source of information regarding sustainable tourism development with a number of case studies and good practices is the "Sustainable Tourism Gateway" web site. It was set up on 27 September 2008 - the World Tourism Day, by The Global Development Research Centre in order to develop awareness and educate on issues related to sustainable tourism, to assist in policy and programme development, and to facilitate monitoring and evaluation. 4.09.2011, Available from: <http://www.gdrc.org/uem/eco-tour/st-about.html>

In order to prove the above hypothesis, a conceptual model has been introduced. It reveals the main factors featuring the three main aspects of sustainability and links them with the issues that ought to be considered in order to achieve sustainability.

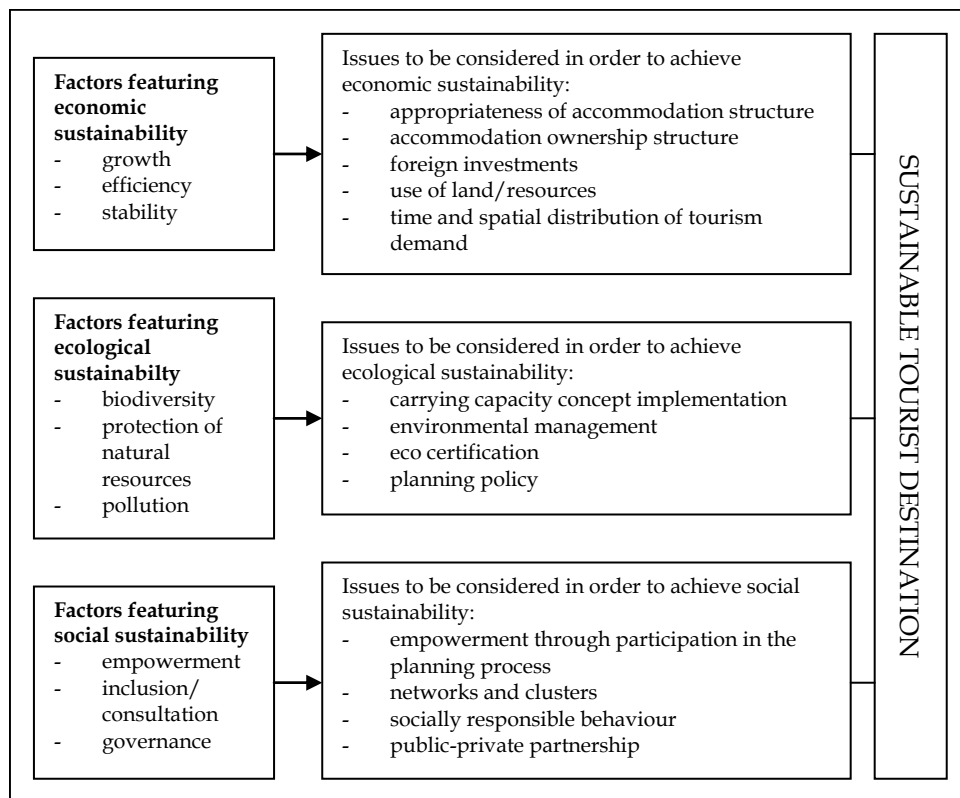


Fig. 2. Conceptual model presenting relations between factors and issues related to different aspects of sustainability

4.1 Croatian tourism - is it economically sustainable at all?

To answer this question it is necessary to reassess the development model of Croatian tourism so far. It started to develop in the late sixties, at a time when the country's competitiveness was largely defined by its inherited, comparative advantages which got aligned with the long-dominant developmental paradigm of the so-called "sun-sea-sand" or mass tourism. Exclusive reliance on natural comparative advantages led to stagnation in the development of higher value-added products. Consequently, the growing influx of tourists did not result in proportionally higher foreign exchange earnings from their spending, and Croatia was on its way to becoming a "low-cost" destination. Today however, it is neither low cost anymore nor necessarily good value for money. According to the results from the latest "TOMAS" research on attitudes and consumption of the foreign tourist in Croatia (Marušić et al., 2010), in comparison with some Mediterranean countries, elements such as

entertainment, cultural manifestations, shopping opportunities, sport and recreation facilities, local transportation quality, beach facilities, etc. are still the “Achilles’ heel” of the Croatian tourism offer. Hence the average tourist consumption per day is only 58 €, out of which only 7.12 € is spent on sport, recreation and cultural activities.

What caused such a situation? A considerable part of the “blame” lies in the political and macroeconomic circumstances (command economy in the first place) to which the Croatian tourism industry was subject at earlier times. This, however, does not provide a satisfactory explanation for the actual situation. Namely, in the period after gaining its independence (1991), Croatia has unfortunately witnessed merely pale and cosmetic attempts to change the tourism development paradigm, meaning the shift from valorisation of comparative advantages (predominantly based on exquisite natural resources) to building and promoting its competitive advantages. The competitive advantages of a nation, according to Porter (1990), are based on the advanced resource preconditions founded on knowledge, developed infrastructure, high technology and innovation. Competitiveness is therefore a multidimensional phenomenon that must be achieved not only at the level of a firm, but also at the level of an individual, a sector, and a state in general which, in the case of Croatia has still not been recognized to the full extent.

Apart from the misunderstanding of the concept of competitiveness, there has often been a lack of understanding of the true meaning of tourism and its effects and significance for the Croatian national economy. Namely, tourism is frequently discussed as if it were constituted solely by the hotel sector which in turn gives a wholly inaccurate image of the diverse economic effects of the tourist industry. At the same time even the hotel sector operation shows an unfavourable picture. According to the Ministry of Tourism (2010) its share within global accommodation capacities in 2009 accounts for as little as 12.5 % and tourist resorts represent 3.2 % of the total share. Besides, the share of the high-quality hotel and resort facilities is extremely low, i. e. the five star hotels account for 3.9 % while the four star hotels represent 24 % of the total hotel beds; over 54 % are the three star hotels.

Such an unsatisfying picture of the hotels with the domination of the lower category capacities, results in lower occupancy³, high seasonality of operation⁴ and consequently poor performance of the entire sector (Ministry of Tourism, 2010). To prove these statements some results of the hotel sector performance research are presented:

- In 2009 the average revenue per room (REVPAR) of the Croatian hotels is only 17.6 € as compared to the European and the world’s hotels’ average REVPAR which is 57.89 € and 54.5 € respectively;
- Out of 344 hotels analyzed in the study (which is more than 60% of the total), 38.7 % of them are producing loss;

³ Thus the hotel accommodation capacities prove to be used for only 118 days in 2009, or 32.3 % on an annual scale. The use of other forms of accommodation capacities remains even lower; tourist resorts 31.8 %, 16.4 % for camping sites, 11.8 % for private accommodation. The use of hotel accommodation is far below the limits of profitability.

⁴ 51.6 per cent of arrivals and 63 per cent of overnights have been realized only in July and August; in the period from May till September over 91 per cent of overnights and 83 % of arrivals have been realized.

- The sector's indebtedness, though already high, has the rising tendency (Horwath Consulting, 2010);
- Croatia is perceived as a country with pricey labour. Hence an average share of the labour costs within the Croatian five and four star hotels' revenue is 5% higher than in the same category hotels of several competitive countries (Spain, Austria, Bulgaria and Monte Negro) (Ivandić et. al., 2010);
- Croatian hotels are on average 45 years old and the period since their last renovations is on average more than 5.7 years (Horwath consulting, 2010);
- Due to the problems Croatian hotel sector is evidently faced with, there are quite a number of hotels that are still to a higher or lesser extent owned by the Croatian state through Croatian Privatization Fund. Namely, according to the latest data presented at the Croatian Privatization Fund's web site, there are 9 hotels in which the state's property share is above 50% and in 44 hotels the state's property share is below 50 %⁵.

It is obvious that development problems of the Croatian hotel industry can be solved only by considerable investments aimed at repositioning the entire hotel industry, along with the changes in the development strategy and the completion of market infrastructure in the country. Unfortunately, investments into new assets in the Hotel and Restaurant (HR) sector in the period from 2000 to 2009 make up only 5% of the total investments into Croatian economy while direct foreign investments into the HR sector participate with only 2.5 % in the total direct foreign investments in the country (Croatian Bureau for Statistics, 2010). However, it is to be noted that with the imminent Croatian accession to the EU the investment conditions have been gradually improving and the number of foreign investors in Croatian hotels has gradually been rising reaching total of 107⁶ in 2010 (Novak et al., 2011). Among them 65 are owned by companies from the neighbouring countries (Austria, Italy, Hungary, and Bosnia and Herzegovina), which may be explained by geographical proximity, the size of potential market, and cultural similarity. Most of the foreign owned hotels are located in the Istria County (36), then in the Split-Dalmatia County (25), the Primorje-Gorski Kotar County (22), the Zadar County (10), the Dubrovnik-Neretva County (8), the Šibenik-Knin County (3), the City of Zagreb (2), and the Krapina-Zagorje County (1). With the exception of the latter two, all other counties are coastal. Such uneven distribution of hotels results from the fact that most arrivals and room-nights are realized along the Adriatic coast where most foreign-owned hotels are located. Namely, out of 56 million room-nights and 10.6 million guests who visited Croatia in 2010, over 90 % were realized along the coast⁷. Since distribution of demand has been the same since the earlier time of Croatian tourism development, it gives an impression that thus far, increasing number of tourist arrivals, without any spatial or time consideration, is the centrepiece of Croatia's tourism developmental strategy. Attempting to attract as many investors (above all the foreign ones) as possible, with no cost considerations, coastal cities' and municipalities' authorities supported by different profit seeking lobbying groups and individuals have been adjusting spatial plans to the needs of the potential investors in terms of changing the purpose of the land zones from agricultural into the building ones.

⁵ 26.05. 2011, Available from:

http://www.hfp.hr/UserDocsImages/portfelji/portfelj_hr_100.xls, Croatian Privatization Fund

⁶ Foreign hotel is here defined as a hotel present in Croatia by share of ownership above 10%.

⁷ 20.06.2011, Available from;

<http://www.mint.hr/UserDocsImages/t-promet-2010.pdf>, Ministry of tourism

Apart from the unsatisfying structure, quality and territorial distribution of hotels, their high seasonality and unsatisfying business results, high level of the state's intervention in the hotel sector's portfolio, etc. there are also few other problems that deserve attention as they are showing economic inefficiency of the entire tourism industry, not just the hotel sector.

First of all, Croatia has been experiencing the booming development of the households renting accommodation, the so called 'private accommodation'! In 2009, out of 969,726 beds, 435,295 (or 45% of the total) belong to this type of accommodation.⁸ According to the state authorities dealing with the tourism inspections, 'private accommodation' accounts for 80 % of the total accommodation capacities on the Croatian coast. There are approximately 52,000 families registered to rent the accommodation, with, according to some estimation, as much as 10 % of that number renting rooms illegally (which brings us to the number of almost one million of unregistered arrivals and six million overnights) (Kljenak, 2011). Due to the fact that Croatia has in recent years faced a complete breakdown of the traditional industrial production which forced people to turn to tourism as an alternative, Croatian authorities have tolerated such huge and still growing private accommodation capacities. By this they have been buying social peace. The problem of private accommodation capacities has yet another dimension, the one referring to their illegal building or adaptation/renovation⁹ thus damaging the aesthetic and historical image of the coastline and lowering the quality of the overall supply. How is that possible? On one side the reason lies in the fact that the administrative procedure of getting building permission is long and complicated and hence forces people to choose shortcuts hoping that they will be spared the penalties (due to the poor inspections). On the other hand, local communities highly tolerate illegal building due to the lack of knowledge and awareness of the environmental consequences of such deeds. Furthermore, as an answer to the earlier regime suppressions people strongly support all the profit oriented activities regardless of the costs. Although this situation is gradually changing as Croatia is adjusting its legal framework to the European Union's laws and behaviour standards, the government still does not have a strategy regarding the expected growth of this kind of accommodation, its spatial distribution, the level of desired quality, its relations to the other types of accommodation, etc.

Another important aspect of economic sustainability is the way Croatia is treating its resources used by tourism, especially the public ones. Although this has partially been explained by the example of illegal building of the houses for rental purposes, the following example gives us another perspective into the problem. Namely, the Croatian government has passed the Law on Golf Courses (Narodne novine, No 152/08) thus giving them status of the strategically most important tourist projects. By this Law a potential golf investor can get as much as 30% of the total surface of public land directly negotiating with the local authorities without bidding. Besides, such investor can obtain additional 20 % of the land surface by means of land expropriation from the owners. At the same time agricultural land owned by the state, in spite of being declared country's strategic resource by the Law on

⁸ This is 40% more than in the pre-war period.

⁹ According to the Croatian Association of Urban Planners there are over 150,000 houses built illegally in Croatia; Perica, S. (2011) U Hrvatskoj 150.000 bespravnih objekata, 26.06.2011, Available from: <http://www.vecernji.hr/vijesti/u-hrvatskoj-150-000-bespravnih-objekata-clanak-295867>

Agricultural Land (Narodne novine, No. 125/08), can be expropriated and turned into a golf course with no compensation for the change of its purpose. Thus the Law on Golf Courses is in contradiction with the Law on Agricultural Land as it prioritises golf course projects over food production, i. e. over agricultural land which is the most important country's resource. As the counties' spatial plans provide for 89 golf courses¹⁰ throughout Croatia, this has provoked numerous debates over the necessity of building so many of them, having in mind potential water pollution and biodiversity threats especially on ecologically sensitive islands and coastal zones consisting of porous limestone. At the same time critics suggest that these laws could encourage land speculators whose only intention is to build as many apartments and villas as possible with the purpose of selling them on the real estate market instead of developing tourist resorts that might work throughout the year and employ local people. Such a scenario related to the golf course project on the top of the hill above the city of Dubrovnik has been recently disclosed becoming an object of intense public disputes (Šutalo, 2009).

Finally, to conclude the session dealing with the economic (un)sustainability of Croatian tourism, the review on its financial results has to be given. In the financial year 2010, revenues from tourism reached € 6.24 billion¹¹, representing a slight decrease of 1% over the previous year, but a decrease of 8.4% over 2008 (Hrvatska Narodna Banka, 2010). Even such a relatively small amount of tourism receipts as compared to some other European countries of similar size such as Austria, Denmark, Greece, Netherlands, Portugal, etc. (UNWTO, 2011), makes up an extremely important contribution to the Croatian economy, as these receipts are used to cover 55-70 per cent of the foreign trade deficit in the recent years (Blažević, 2007). Another significant indicator of the importance of tourism for the Croatian national economy is its impact on GDP. According to the Ministry of Tourism¹² the share of direct tourism receipts in the country's GDP ranged from 19.4 % in 2005 to 14 % in 2010¹³. However, such a high share of tourism receipts in the national GDP, especially in the earlier years indicates high dependency of Croatian economy on tourism which is in collision with the basic principles of economic sustainability. At the same time tourism leakages are not negligible. Thus, the Tourism Satellite Account for 2006 (World Travel and Tourism Council, as cited in Petrić, 2006) estimated that direct leakages of the overall tourist economy for Croatia account for about \$4.5 billion or 36.5 % of its total GDP. The older analysis carried out by Jurčić (2000) who, lacking the updated intersectoral tables of the Croatian economy, adjusted those from 1987 and estimated that in 2000 the share of total import content in tourism economy amounted to 32 % of its GDP. Evidently, the situation with the tourism leakages in Croatia is getting even worse.

¹⁰ 26.06.2011, Available from: <http://www.business.hr/hr/Naslovnica/Politika/VIDEO-Hrvatska-mala-zemlja-za-velika-golf-igralista>

¹¹ 26.06.2011, Available from: <http://limun.hr/main.aspx?id=694037>

¹² 26.06.2011, Available from: <http://www.mint.hr/default.aspx?id=5778>

¹³ On the other hand Tourism Satellite Account for Croatia (World Travel and Tourism Council; 2011) estimates that direct contribution of Croatian tourism to its GDP in 2010 is 11% and total contribution is 26.3 %. Retrieved from: [http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool/\(24.06.2011\)](http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool/(24.06.2011)). Such diverse information on the effects of tourism on Croatian economy (due to the inadequate statistics) is also a proof that so called "strategic sector of economy" is often misunderstood and its real effects are never estimated precisely.

The above analysis of the economic performance of the Croatian tourism industry has shown that the main requirements of sustainability, i. e. *growth, efficiency and stability*, expressed and elaborated through issues such as appropriateness of accommodation quality and quantity, the role of government in the hotel sector ownership structure, attractiveness of tourism industry to foreign investments, the way of using resources for the purpose of tourism development, time and spatial distribution of tourism demand etc., have not been fulfilled in a satisfactory manner. From what has been shown it could be concluded that Croatian tourism has been developing with hardly any strategy. Measures have been put into operation with no respect to the wider context of development and consequences of the bad decisions have never been penalized.

4.2 What about ecological sustainability?

Many of the issues related to the economic aspects of the Croatian tourism sustainability discussed so far are closely connected to its ecological sustainability, these two being the two sides of the same coin. This is especially true when it comes to the matter of resources and land use. Spatial and seasonal concentration of tourists and tourism facilities, illegal building on the coastal zone, land misuse and speculations, are notably ecological problems but they also create considerable environmental costs and in the long term reduce potential economic benefits.

Concentration of too many tourists in a short period of season (from June to September) creates problems with water and electricity supply (especially on islands), different types of pollution (water, land and air pollution) and the consequent change or loss of biodiversity, damage on cultural heritage etc. (Petric, 2005). Most of the Croatian coast is seasonally highly saturated by tourists and their activities meaning that carrying capacities¹⁴ of the space are not respected thus leading to environmental, socio-cultural and economic changes and the loss of a destination's attractiveness. As an illustration the case of the island of Hvar, one of the most popular tourist destinations, may be used. Hvar is one of the 66 inhabited islands and occupies an area of 299.66 km². According to the 2001 Census (Croatian Bureau of Statistics, 2001), the whole of the island had 11,103 inhabitants with population density of only 37 inhabitants per km². Although the results of the 2011 Census have not been published yet, the trend of depopulation was evidenced a long time ago. In the season of 2010 the number of tourists who visited island was 172,554 realizing 1,132,982 overnights. From these numbers it is easy to count some tourist density indicators, such as:

- The number of tourists per km² = 575.83 (as compared to 37 inhabitants per km²);
- The number of tourist overnights per km² = 3.780;
- The number of tourists per inhabitant = 15.54;
- The number of tourist overnights per inhabitant = 102.04.

When these indicators are counted at the level of a single settlement, such as the popular town of Hvar, one can get the idea on the level of saturation such island destinations suffer from. Namely the town of Hvar covers only 75.35 km², including the town itself and five

¹⁴ Carrying capacity refers to the number of individuals who can be supported in a given area within natural resource limits, and without degrading the natural, social, cultural and economic environment for present and future generations.

settlements in the hinterland. It has only 4,138 inhabitants and realizes 86,216 tourist arrivals and 439,909 overnights, meaning that the number of tourists per one inhabitant is 20.8, the number of tourist overnights per inhabitant is 106.3, the number of tourists per km² is 1,144.2, etc. There has been an attempt to count carrying capacities of the city of Hvar, resulting in a proposal of an eco charge introduction at the city level (Taylor et al., 2005). Unfortunately the proposal has failed due to the strong opposition of the local stakeholders, predominantly people from tourism business who thought that this would push up the prices and consequently reduce demand.

Even before this case, there was a Carrying Capacity Assessment Study done for the island of Vis in early 1990-ties (Dragičević et al., 1997), but although the study had been completed, none of the measures suggested by it has been implemented so far.

The problems arising from the overuse or wrong use of resources in the process of tourism development in Croatia can be seen almost everywhere in its coastal area and in all the types of tourism. However, apart from the residential tourism, nautical tourism has been producing most of the ecological problems so far. Why is that so? Adriatic is a shallow sea rich with different endemic species of sea flora and fauna as compared to the rest of the Mediterranean Sea to which it belongs. They are threatened by an ever rising number of sea vessels that destroy their habitats by draining ballast waters and importing invasive species such as algae *Caulerpa taxifolia* and *Caulerpa racemosa* that have already invaded those parts of the Adriatic that are attractive to nautical tourists (such as the Kornati Archipelago National Park, the bay of Stari Grad on the island of Hvar, the surroundings of the Mljet Island National Park, etc.) (Fredotović et al., 2003; Petrić, 2003; Petrić et al., 2004; Petrić, 2005). Besides, for the purpose of nautical tourism development, new marinas are being constantly built, rapidly changing the coastal landscape and threatening biodiversity. As for an illustration, the coastal counties' spatial plans provide for 300 new locations aimed at building new marinas with 33,655 new berths (out of which 25,755 in the sea). Hence, together with the existing ones the total number of berths will be 54,675 (Ministry of Sea, Transport and Infrastructure & Ministry of Tourism, 2008). Apart from this, due to the poor control, there are an enormous number of yachts dropping their anchors illegally in hundreds of wild coves scattered along the coast. Illegal anchoring causes not only the loss of economic benefits in terms of unpaid port charges but also produces environmental costs that are to be paid by society and not the polluter. Similar situation is also with big cruisers that pay daily visits to Croatian ports such as Dubrovnik, Split and Zadar. These ports mostly do not have enough capacities to host so many cruisers in terms of inconvenient infrastructure, insufficient system of monitoring and insufficient material and human capacities to cope with possible pollutions. Not less important to mention is that too many cruise tourists visiting destinations like Dubrovnik may cause discontent of the tourists who reside in the city hotels. According to the results of a research on cruising tourism in Croatia (Horak et. al., 2007), there were almost 600,000 cruise passengers who visited Dubrovnik in 2006 (82% of the total number of cruise passengers in Croatia). In the peak days more than 19,000 cruise tourists happen to visit the old city at the same moment, which together with the numerous excursionists, residential tourists and local population poses tremendous pressure on the city's carrying capacities. The study reveals that almost every fourth tourist (23% of the interviewed) residing in the city hotels thinks that such a huge number of cruise tourists affect negatively the attractiveness of the city.

Environmental problems are caused not only by huge number of tourists but also by tourist enterprises and organisations which intentionally or unintentionally (due to negligence) damage the environment. Unfortunately, although the ecological awareness among them has an ever rising trend, implementation of the concepts of environmental management and eco certification in the tourism business sector is still a rare case. Why is that so? First, it is to be noted that no Croatian law, regardless of their number and variety, deals in particular with the issue of resource usage in the tourist sector (Petrić & Pranić, 2009). The issue is defined in a number of environmental and industry laws. Environmental laws deal with the usage of environmental factors such as water, soil, sea, etc. Industry laws, unlike the environmental laws directed to the general issues, regulate the treatment of concrete natural resources in particular industries (such as agriculture, fishing, etc.). The operation of the tourist industry (and thus also of the hotel sector) is based on various natural and cultural resources and therefore it has to comply with the basic principles of environment protection declared by these laws, and particularly by the Law on Environment Protection (Narodne Novine No. 82/1994; 110/2007). According to this law (art. 150-158) all legal entities (including hotels), are liable for the damage incurred by pollution if caused by their operation or negligence. In a hotel this can be for instance emission of oil or excrements into water, emission of gas into atmosphere, dispersion of asbestos dust, etc. In such cases the hotel not only settles its own damage but also covers all the costs caused by measures taken to eliminate pollution (internalization of external costs). However it is not the hotel sector causing such pollutions so often but rather illegally built private accommodation that is leaning on poor communal infrastructure. Poor control of their behaviour is another reason why they easily transfer the environmental costs they produce to the society.

As for the measures potentially stimulating implementation of ecological initiatives and general environmental policy in companies (including hotels), the Law provides the possibility of regulating benefits, tax incentives, and exemption of tariffs for those entities that use less detrimental production procedures (for example use of alternative energy resources, use of environment friendly equipment and appliances) and those that organize disposal of used appliances or their parts, used products and their packaging or use other ways to reduce negative effects on the environment (Narodne Novine, No. 82/1994; 110/2007).

However, due to the already elaborated circumstances Croatian hotel companies are coping with, most of them are unwilling to implement ecological initiatives and general environmental policy in companies, especially through formal systems of environmental management, justifying their reasoning by high initial costs. The exceptions are the hotels operating within international chains whose ecologically oriented operation is the basic element of their competitive strategy. A few hotels in Croatia implement informal measures of environmental management directed primarily to rationalization of energy and water consumption. To promote necessity of acting in an environmentally friendly way, the Croatian Association of Small and Family Hotels provides training for its members in implementation of the environmental management measures and strives to establish environmental quality mark to be awarded to its members. It also collaborates with Croatian Centre for Clean Production that already in 2006 started a pilot project on possibilities of savings in Croatian hotels by implementation of environmental measures.

However, despite these efforts, the survey of the Croatian hotel sector run in 2009 (Petricić & Pranić) showed that only a third (33.3%) of the hotels in the sample¹⁵ had a written environmental policy, despite environment being Croatia's first and foremost tourism 'attraction' (Marušić et al., 2008, 2010). Moreover, given the implied underlying role of environmental protection in Croatia's official tourism slogan (i.e., "Croatia – The Mediterranean as It Once was"), it is interesting that the reported figure in this research is so low. While interesting, this finding does not come as a surprise as the Croatian lodging sector is still hampered with numerous viability issues – i.e. incomplete and/or poorly executed hotel privatization process, unresolved land ownership disputes, and pronouncedly high seasonality. Under these circumstances, it appears reasonable that the adoption and implementation of environmental standards by Croatian hoteliers is still at an early stage.

As for the eco certificates, except for the EU Blue Flag for beaches and marinas, Croatia has not been included in any international eco certification programme. According to the report by the nongovernmental organisation "Lijepa naša" for 2011 there were 116 beaches and 19 marinas with the Blue Flag certificate in Croatia.¹⁶ Despite the seemingly huge number of certified beaches, one has to remember that the Croatian state has a 1,778 km long coast and 4,057 km of the total coastal line and evidently thousands of beaches.

Apart from the Blue Flag eco certificate, some other instruments and tools (institutional, economic and/or management) aimed at implementation of the environmentally friendly behaviour have also been used but mostly sporadically. Thus, except for the zoning which is an institutional instrument commonly used in the spatial plans (Inskeep, 1991), instruments such as eco taxes, environmental management charge (EMC)¹⁷, visitor payback¹⁸, target marketing aimed at attracting visitors of a certain type and in a certain period of year¹⁹, demarketing²⁰, price policy aimed at tourist demand attraction or reduction, group size limitations, etc. are sporadically used or not used at all in most of the Croatian tourist destinations for the purpose of resolving problems of resource overuse.

¹⁵ The Croatia's Ministry of Tourism (MINT) list of 671 officially licensed and categorized facilities under the group HOTELS (hotels [562], apart hotels [11], tourist resorts [46] and tourist apartments [52]) in Croatia for January 2009 served as the sampling frame for this study. The actual study sample consisted of 310 facilities (46% of the sampling frame) belonging to the group HOTELS (210 hotels, 11 apart hotels, 46 tourist resorts and 52 tourist apartments). The 210 hotels in the sample were randomly selected among 562 hotels using Research Randomizer.

¹⁶ 16.06.2011, Available from: http://www.lijepa-nasa.hr/images/datoteke/popis_pz_2011.pdf

¹⁷ The environmental management charge (EMC) is an amount charged to visitors who visit protected areas or some exquisite locations and perform certain tourist activities.

¹⁸ Visitor Payback is the process of asking visitors to a destination to voluntarily support management and conservation of the area, by donating a 'nominal' sum towards its upkeep.

¹⁹ A target market is a group of customers that the business has decided to aim its marketing efforts and ultimately its merchandise. A well-defined target market is the first element of a marketing strategy. Once these distinct customers have been defined, a marketing mix strategy of product, distribution, promotion and price can be built by the business to satisfy the target market.

²⁰ Demarketing is a little known concept which aims at dissuading customers from consuming or buying some things either because it is harmful or simply because the demand is more than the supply, especially in case of tourist demand. This could be on a temporary or permanent basis.

To conclude: Croatian tourism is evidently not ecologically sustainable as often being declared. Though institutionally recognized, environmentally friendly behaviour of tourism stakeholders has not been widely adopted yet, which can be proved by the poor implementation of the carrying capacity assessment technique, environmental management concept, eco certification programmes, etc. Monitoring of the spatial plans implementation is rarely done consequently leading to voluntarism in the use of land and resources.

4.3 Croatian tourism social (un)sustainability – the cause or the consequence?

Finally, the third issue this chapter deals with is the one referring to the *social* aspect of Croatian tourism *sustainability*. Though some of the issues featuring social sustainability have already been touched to a certain extent, there is a need to get deeper into this area hoping that this would help us understanding reasons of failure in achieving sustainability in the other two areas. To achieve social sustainability is to empower community and its members to get involved in the process of decision making and planning tourism development. The notion of empowerment has entered literature as a generic term denoting a capacity by individuals or a group to determine their own affairs. Recently it has been used across a wide range of disciplines. The issue of empowerment in the non-management literature has largely been centred on women, minorities, education, and politics and viewed from the perspective of powerlessness and oppression. Simmons and Parsons have a summary definition of empowerment as „the process of enabling persons to master their environment and achieve self-determination through individual, interpersonal change, or change of social structures affecting the life and behaviour of an individual (as cited in Sofield, 2003; 81).

When located within the discourse of community development, it is connected to concepts of self-help, equity, cooperation, participation and networking. These concepts, particularly participation in the process of decision making, is a vital part of empowerment since it makes people more confident, strengthens their self-esteem, widens their knowledge and enables them to develop new skills. Murphy (1985:153) argues that tourism "relies on the goodwill and cooperation of local people because they are part of its product. Where development and planning does not fit in with local aspirations and capacity, resistance and hostility can...destroy the industry's potential altogether".

There are four "types" of empowerment, i. e. economic, psychological, social and political (according to Scheyvens 1999, as cited in Timothy, 2003; 152). Economic empowerment is important because it allows residents and entire communities to benefit financially from tourism. Psychological empowerment contributes to developing self-esteem and pride in local cultures and traditional knowledge. Social empowerment helps maintain a community's social equilibrium and has the power to lead to cooperation and networking. Political empowerment includes representational democracy wherein residents can voice opinions and raise concerns about development initiatives (Timothy, 2003).

To what extent should the community and its members be empowered, or how much empowerment would they experience depends on the level of the social capital development in the country and the community itself (Petrić, 2007). Social capital as a set of formal rules/institutions and informal norms of behaviour creates environment in which the process of empowerment is performed. Grootaert and Bastenier (as cited in Vehovec, 2002; 36) speak on three dimensions/levels of social capital, referring to micro, mezzo and macro levels.

Micro level refers to the networks of individuals and households that create positive externalities for the local community. *Mezzo level* is created by associations and networks. *Macro level* refers to social and political environment that shapes social structure and enables development of the norms of behaviour (laws and regulations).

Croatia generally speaking shows a low level of social capital development on all the three levels, which obstructs communities and their members to be fully empowered to master their future in the sustainable manner. According to Hall D. (2000; 449), such a situation in all the post communist countries such as Croatia, could be explained by considering the following issues:

- The legacy of almost half a century of centralised, top-down civil administration, affording local people little real opportunity to participate in meaningful local decision-making;
- The often pejorative equating of any form of collective action with the collectivised organisation of communist days; and
- The well recognised ambivalence of community as a concept, embracing notions of spatial contiguity, social cohesion and interaction, reflexivity, overlain with often misplaced assumptions of shared aspirations and values.

Apart from the legacies of the communist regime, Stubbs (2007) numbered some other interrelated *macro level* factors constraining 'progressive' community development and empowerment in contemporary Croatia:

- War consequences (physical destruction, mass population displacement, authoritarian nationalism);
- Economic and social crises and transition causing widening, regional gaps between the affluent, largely urban areas and many of the war-affected areas, now designated as 'areas of special state concern' marked by high unemployment, low human capital, an ageing population, and tensions between settler, returnee, and domicile groups;
- A strong impact of rapid urbanization, de-industrialisation and the shifting fortunes of tourism which consequently has never succeeded to get embedded within the local population and culture;
- The proliferation of numerous local government units (127 cities and 429 municipalities) causing appearance of many municipalities, understaffed and unable to raise revenues locally to be sustainable, meaning that decentralisation is increasingly spoken of rhetorically but rarely pursued in practice;
- Above all, perhaps the most important constraint on 'progressive' community development and empowerment in contemporary Croatia is not so much 'the new social stratification of Croatian society, accompanied by a significant redistribution of social wealth, social power and social esteem', as the deeper meta-level crisis in values and trust which can be seen as both a cause and effect of this redistribution (Malenica, 2003; as cited in Stubbs, 2007). To prove this statement the following information seems to be very convincing: namely, according to the Transparency International Corruption Perception Index 2010²¹, Croatia's rating is 4.1 (0 meaning full corruption, 10 meaning no corruption). Out of 178 countries included in this year's index, Croatia ranks 62nd.

²¹ 21.06.2011, Available from:

http://www.transparency.org/policy_research/surveys_indices/cpi/2010/results

In such a developmental context sustainability principles in tourism development (and development in general) at community level have never been really embedded. Some recent multidisciplinary researches on sustainable development on Croatian coast with the special stress on tourism development issues (Fredotović et al., 2003; Petrić, 2003; Petrić et al. 2004; Petrić, 2005; Vukonić, 2005; Petrić, 2007; Petrić, 2008; Petrić & Pranić, 2010), have shown the following:

- There is an enormous number of agencies, institutes, committees, and such like, all charged with developing and overseeing strategies and programmes in different areas with overlapping, competing and multiple mandates, thus causing difficulties to small understaffed and underfinanced communities to choose the right strategic direction.
- Environmental policies are usually not reflected enough in most of the tourism sector strategies, plans and programmes. There are no institutional, economic or management tools to implement environmentally friendly behaviour (as explained earlier in the text).
- Plans are technically competent, but often unrealistic and not responding to the local needs. The public is included in the planning process post festum and therefore has no faith in plans and does not make an effort to influence them. On the other hand, efforts to involve the public, if there are any, have most usually been ineffective. The key reason is the way that information is presented, largely in a technical and inaccessible form. Hence, although there is a policy to account for public interest and participation, no real attempts are made to achieve it (Fredotović et al., 2003).
- Specifically with regards to biodiversity protection and conservation, local inhabitants and/or enterprises do not recognize how they may gain from it. Protected areas are designed and managed to respond to national and international needs, not local concerns. The value of biodiversity, to the present and future generations, is not well or not properly understood. There is little faith that the benefits of conservation will flow to locals (Petrić, 2008). These findings correspond to the Hall's statement (2000; 449) that in post-communist countries "any ecologically inspired restriction of personal freedom, such as exclusion from environmentally sensitive areas or the banning of such pursuits as hunting, may be seen to echo the half-century of post-war communist imposition, and thereby meet resistance".
- As already mentioned local communities highly tolerate illegal building of houses/secondary residences or other types of construction though positive results of the Ministry for environmental protection, physical planning and construction most recent activities have reduced such behaviour to a certain extent. Unfortunately, this has not been the result of the rise of the ecological awareness within communities but more of the penalties imposed from above;
- A lack of local involvement in tourism development and decision making has also caused local culture being insufficiently valued as a resource for tourist products (Tomljenović et al, 2003);
- Generally speaking, though there is a commitment of the Croatian government to the principles of Agenda 21 (1992), explicit institutional response to the needs of Agenda at local and regional levels appeared not to be sufficient in the case of Croatia (Petrić, 2007).

In an attempt to counterbalance governmental (macro level) shortcomings, there has been an enormous growth of the number of Non Governmental Organisations (NGOs) in the country. In 2002 Croatia had over 20,000 registered associations of citizens, with 18,000 of

these registered at the local level, but only between 1,000 and 1,500 active ones (excluding sport clubs and cultural associations). Many of the NGOs in Croatia have seen multi-sectoral working as a panacea for many of the problems of Croatian society. The 'List of the non-governmental organisations', published by the Ministry of environmental protection, physical planning and construction in 2004 (as cited in Petrić, 2007) speak of 268 NGOs dealing with environmental issues, while the most recent data mention 710 registered environmental NGOs²². Most of these are focused on pure ecological problems while a few, such as ODRAZ²³, a Zagreb-based NGO, are focused on sustainable development of communities in Croatia. ODRAZ is, among other things, strongly committed to the revitalization of the Croatian islands through cross-sector cooperation, including local community organizations, entrepreneurs, and tourist associations.

In Croatia there is no legislative obligation for the cooperation of governmental and non-governmental organizations or for the participation of NGOs in decision-making. However with the imminent accession to the EU, Croatia is obliged to adopt the European Community *acquis* and a common practice proposing consultation with the NGO's in the process of development and decision making. In recent years an interesting trend of growth has been noticed of what have been termed 'meta-NGOs', whose primary purpose is to provide information and assistance to other NGOs. Hence these larger, more successful, but increasingly bureaucratized or meta-NGOs growingly suppress emerging, under-funded, localised initiatives which ought to be true sources of 'social energy' in Croatia, alongside informal community leaders and local activists (Stubbs, 2007).

Generally speaking, Croatia is gradually making progress when it comes to the civil society development. In 2006 National strategy and action plan for civil society development were adopted thus creating preconditions for the more efficient development of civil institutions at *micro level*.

When it comes to the activities oriented towards empowerment of the key stakeholders at the *mezzo level* through strengthening formal and informal *networks*, there are few examples of long-term, consistent, multi-sectoral partnerships for community development, between local governments, associations and NGOs, and particularly businesses (Franičević & Bartlet, 2001; Petrić & Mrnjavac, 2003; Pivčević & Petrić, 2011). They are usually formed at the national, not regional or a local level. It is mostly vertical type of networks that include different business entities whose aim is better use of resources or better placement of their products or services (good examples are the National Association of Small and Family Hotels and Split-Dalmatian County Association of Hotels, both of which gather hotels as well as tour operators, national air company, suppliers and other subjects creating tourism supply chain. Creation of different types of partnership and/or networks of the firms (horizontal and vertical ones) at a regional/community level, that Croatia still lacks, could help in developing and imposing service standards that will raise the competitiveness of the network and destination tourism brand. Such tourism partnerships and networks can substantially improve tourism business performance by transforming their sporadically scattered products into a one-stop-shop selling a wide variety of functionally interrelated tourism products (Mansfeld, 2002).

²² 24.06.2011, Available from: http://www.mzopu.hr/doc/Popis_nevladinih_udruga.pdf

²³ 24.06.2011, Available from: <http://www.odraz.hr/hr/home>

Apart from networks another type of partnerships that could be nourished at the local level is through *clusters*. “A cluster is a geographically proximate group of companies and associated institutions in a particular field, linked by commonalities and complementarities” (Porter 1998; 78). Unlike networks, clusters have an open membership, they are based on local values such as trust, empathy, cooperation and have a common vision. Operators within local (tourism) clusters can increase their collective markets and capacities by working together. Working through clusters can benefit all parties involved in terms of increased opportunities and revenues. However, many local tourist communities/destinations lack a system dimension and do not have shared vision or common goals. “And destinations that share little more than joint marketing can not be regarded as clusters” (Nordin, 2003; 18). This statement is proved to be true in the case of Croatian local communities oriented to tourism. Except for Istria, a south-western part of Croatia and Zagorje-Krapina county in the north-western part of the country, where some rudimentary efforts in tourism clustering arise, no other tourism region or a community shows any effort whatsoever to this matter.

The concept of the *socially responsible behaviour* of the firms, although being recognized elsewhere, in the tourism industry is still quite unfamiliar. Thus, a report on Corporate Social Responsibility for 2004 points out a number of positive examples of growing corporate social responsibility and business - NGO collaboration (Bagić et al., 2004, as cited in Petrić, 2007), but no examples from tourism industry were evidenced in either this report or the one made in 2007 (Škrabalo et al., 2007). However, an analysis of the particular web sites shows that the concept has been gradually adopted and implemented in the business strategy of a few hotels (in particular those that do business within international hotel chains) while tourist agencies do not show the change of their orientation towards socially more responsible behaviour (except for the Dubrovnik based Gulliver travel agency that is a part of the world's leading travel company, TUI Travel Plc.)

Finally, within the discourse of social sustainability, discussion on new trends of business performance in the partnership between public and private sector seems to be inevitable.

Public-private partnership (PPP) describes a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. Public-private partnership involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project. A private sector consortium forms a special company called to develop, build, maintain and operate the asset for the contracted period. The increase of the public-private partnership projects has been the result of the processes related to the change of the government's role in the process of development (new forms of governance). As far as tourism industry is concerned, this concept has already been widely used across the world due to the fact that tourism business uses a great deal of public goods and government's role is to protect them. Following are the areas of tourism business where public-private partnership most often occurs:

- The tourist destination attractiveness' enhancement (infrastructure, new attractions and accommodation facilities, etc.);
- Marketing efficiency enhancement (development of the new product, promotion, new information/distributive systems);

- Productivity rise-up (through education, quality management, implementation of the new management techniques and new technologies);
- Enhancement of the management models (through education of all tourism stakeholders, implementation of the new management tools and concepts etc.)

As far as Croatian experience regarding private-public partnership in tourism is concerned there are still very few such examples. One of them, Suncani Hvar – ORCO hotel company as the first partnership project between the national government, local municipality authorities and an international hotel company has failed, and the company is struggling to survive overburdened by many unsolved problems. The project of health tourism resort in the Krapina County is to be realized through public-private partnership, as well as Posedarje Rivijera, a greenfield project, aimed at development of a high quality tourist resort. In 2009, Ministry of Tourism entered into partnership with 12 hotels and four chambers of commerce with the aim to subsidize scholarship for 320 pupils and 20 students. After finishing school they will work for the hotels that have entered the partnership. Furthermore, the Split-Dalmatian County has entered into the partnership with the owners of the real estates in the abandoned or devastated villages in the Dalmatian hinterland with the purpose of creating so called „eco-ethno villages“. The County authorities are obliged to make infrastructural adjustments, development studies, management plans, etc. On the other side the real estate owners have to organize themselves into a non-governmental organisation which will represent their interests in the process of negotiating the terms under which they will put their real estates into function.

As could be seen, public-private partnership projects in Croatian tourism have gradually started to get introduced just recently and not much evidence on their presence has been recorded so far.

To conclude: Though positive changes have been recorded related to empowerment of individuals and communities to manage their own future, there is still much to do in terms of building social capital at all the three levels, i.e. macro, mezzo and micro level. When improvements in this area happen, changes in other areas of sustainability are expected to get realized more easily.

5. Conclusion

The nature of tourism is obviously ambivalent. On the one hand, it might be a valuable source of income and employment, potentially acting as a catalyst for wider socio-economic development or regeneration. On the other hand, the growth and expansion of tourism generates different environmental costs related to different types of degradation, misallocation or destruction of natural resources. These are usually accompanied by a variety of economic, social, cultural and political consequences. Hence it is obvious that in the absence of appropriate management techniques and tools, tourism has the ability to destroy the very resources upon which it depends. Without strategic approach to its development and the use of integral planning to this matter, fulfilment of sustainability principles is threatened. By researching the case of Croatian tourism model of development we have shown that despite being recognized institutionally, sustainability has not been achieved in any of the areas under study. By this the main hypothesis of the chapter has

been proved. Being qualitative by its nature this research is partially leaning on the author's subjective opinion. However, the author has tried to the best of her abilities to consult as many relevant sources of literature and information as possible. As compared to other similar case studies most of which are focused on a particular area or an aspect of sustainability, this one has tried to cover all the three of them thus getting a holistic dimension. Namely, the three aspects/areas of sustainability (i. e., economic, ecological and social) are all interlaced to such an extent that it is hard to say where one ends and the other one begins. However the social area sustainability seems to be a starting point for better understanding of the reasons for possible failures in achieving sustainability in two other areas (i.e. economic and environmental ones).

Though this research as any other one could have been done in a different manner, and including more relevant issues, we believe that even as such it has 'unmasked' the particular tourism development model that is very often named sustainable or at least 'nature friendly'. It would certainly be of more help if some additional, more concrete indicators could have been presented. However, since they are usually done for the level of a community or a region (not a country) it was not possible to do so. There have been mostly general trends that were analyzed.

Finally, in order to give this research a bit of pragmatism, few practical proposals are to be given, aiming at putting sustainability principles in life. First of all, we believe that the popular dilemma of whether mass tourism in Croatia is needed or not is quite out of place. It is clear that tourism will not lose its mass character, indeed quite the opposite. Therefore the real dilemma lies not in whether we need mass tourism or not, because it will remain a mass phenomenon according to all the indicators, but rather what kind of mass tourism do we actually need and want? If Croatia continues to focus only on boosting the number of tourists, then it is positioned for the continuation of the current development trend of mass and undifferentiated tourism. On the other hand, we could opt for modest growth in the number of tourists but focus on their seasonal and regional redistribution, as well as increased profitability within a sustainable environmental model. To this end Croatia has to create a spectrum of tourist services that can satisfy different kinds of guests, distinguished not just by their purchasing power, but by their different affinities and habits. It will also mean a trickling down of tourism industry benefits to many more businesses and Croatian residents. With this second option in mind, the following strategic measures ought to be adopted:

- The level of economic development in all Croatian regions should be increased, thus creating preconditions for development of economically more sustainable tourism. It is a quite common knowledge that tourism cannot be developed unless national economy is appropriately developed. Consequently, it has to be understood and accepted by the public that is not sole tourism that could solve the problem of underdevelopment, which is the idea quite often placed by Croatian authorities;
- Development of modern technologies (especially information and communication ones) should be promoted together with the new business methods based on knowledge;
- Domestic producers should be included in all the direct and indirect segments of tourism supply chain (agricultural production, fishery, construction etc.) in order to reduce the dependence of the overall tourism industry on imports. By this development

of the recognizable “Croatian brand” would be enhanced and well-being of Croatian citizens fostered;

- Incentives aimed at reduction of the grey economy in the small tourism business sector should be promoted;
- Awareness of the positive and negative effects of tourism should be raised among local population;
- Local communities should be empowered to affect and manage their future. To this end different models/methods of empowerment enhancement could be used. Hence, leaning on the examples of good practices from the UK, Timothy (2002) mentions Gill's idea published in 1996, known as 'living room meetings', which involves informal gatherings of small groups of community members in a moderated, yet relaxed situation throughout the community. He also explains benefits of the Fitton's 'planning for real' method which is a form of town meeting that involves bringing the community together before the planning process begins. Another method that has found considerable success is through household questionnaires, whose benefits were already explained in 1994 by Simmons. These methods help identifying issues that are important to an area, focus on the needs of the community and highlight opportunities for improvement. It gives everyone in the community an opportunity to participate and encourages them to think about tourism, local issues and the environment in depth (Timothy, 2002), or help spreading, as Porter said “social glue” (Porter, 1998).
- Local authorities should support promotion and implementation of a planning solution which ensures that the unique identity of the destination is maintained;
- The level of control over the behaviour of all the relevant stakeholders should be raised;
- Management efficiency of the tourism system in general has to be enhanced through education, partnership, networks and different other types of cooperation;
- Principles of responsible ecological behaviour on all levels should be promoted and implemented more intensely by introducing eco certificates, codes of conduct, Carrying Capacity Assessment and other tools and instruments aimed to this matter;
- Parallel with the increase in diversity and quality of tourist supply various tourist segments ought to be attracted and distributed more evenly throughout the country with the help of different economic and management instruments, such as price differentiation, marketing and demarketing techniques etc. Thus, saturated coastal areas could be relieved in favour of rural and inland destinations hence making the overall tourism more sustainable.

This list is not exhaustive and indicates a range of principles that underpin strategic and integrated planning for tourism areas. As the matter of sustainability is a very broad area of research, any of the elaborated principles could be an object of some future research.

To conclude: it is important to stress, yet again, that there are no institutional or practice models from elsewhere which can be transplanted in Croatia as a kind of panacea promoting sustainable tourism development. Rather, as Stubbs has pointed (as cited in Petrić, 2007), what is needed is the creation of networks, arenas and spaces, locally, nationally, and internationally, for exchanges of experiences and the elaboration of good practice, not in terms of set formulae, but in terms of attempting to grapple with the reason why certain initiatives appear to have had positive effects and others less so.

6. References

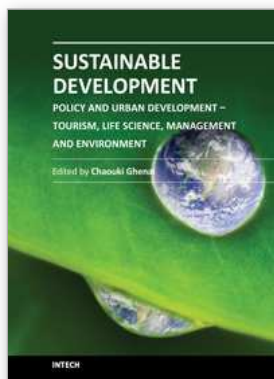
- Analiza turističke godine 2010, (April 2011). 26.06.2011, Available from:
<http://www.mint.hr/UserDocsImages/110530-analiza-2010-w.pdf>, Ministarstvo
turizma, Zagreb
- Blažević, B. (2007). *Turizam u gospodarskom sustavu*, Fakultet za turistički i hotelski
menadžment, ISBN 978-953-6198-96-2, Opatija
- Bramwell, B. & Lane, B. (1993). Sustainable Tourism; An Evolving Global Approach. *Journal
of Sustainable Tourism*, Vol. 1, No.1, (January, 1993), pp. 1-5, ISSN 0966-9582
- Bramwell, B. & Lane, B. (Eds). (2000). *Tourism Collaboration and Partnerships, Politics, Practice
and Sustainability*, Channel View Publications, ISBN 1-873150-79-2, Clevedon
- Butler, R. (1999). Sustainable Tourism: A State-of-the-Art Review. *Tourism Geographies*, Vol.
1, No. 1., (February 1999), pp. 7-25, ISSN: 1470-1340, Retrieved from
<http://dx.doi.org/10.1080/14616689908721291>
- Census 2001., 5.06.2011. Available from: http://www.dzs.hr/default_e.htm, Croatian
Bureau of Statistics
- Climate Change and Tourism – Responding to Global Challenges. (2008). 18.05.2011,
Available from:
<http://www.unwto.org/sdt/news/en/pdf/climate2008.pdf>, World Tourism
Organization and United Nations Environment Programme
- Coccossis, H., Mexa, A. & Collovini, A. (2002). *Material for a Document "Defining, Measuring
and Evaluating Carrying Capacities in European Tourism Destination"*. University of
Aegean, Department of Environmental Studies, Athens. 15.05.2011, Available from:
http://ec.europa.eu/environment/iczm/pdf/tcca_material.pdf
- Croatia-Travel and Tourism Climbing to the new Highlights, Travel & Tourism Economic
Research. (2006). World Travel and Tourism Council, London
- Demunter, C. (2010). Statistics in focus, *Eurostat*, No. 54 (November 2010), 16.05.2011,
Available from:
http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-10-054/EN/KS-SF-10-054-EN.PDF
- Dragičević, M., Klarić Z. & Kušen, E. (1997). *Guidelines for Carrying Capacity Assessment for
Tourism in Mediterranean Coastal Zones*, Priority Actions Programme, Regional
Activity Centre, Split, Retrieved from:
<http://www.pap-thecoastcentre.org/pdfs/Guidelines%20CCA%20Tourism.pdf>
- Dunn, B. (1995). Success Themes in Scottish Family Enterprises; Philosophies and Practices
Through the Generations, *Family Business Review*, Vol. 8, No 1, (March 1995), pp. 17-
28, ISSN: 0894-4865
- Franičević, V. & Bartlett W. (2001). Small Firms Networking and Economics in Transition; an
Overview of Theories, Issues and Policies. *Zagreb International Review of Economics
and Business*, Vol. 4, No.1, (November, 2001), pp. 63-89., ISSN 1331-5609
- Fredotović, M., Maroević M., Madiraca, M., Nikolić, T., Alegro, A., Kralj, J., Bakran-
Petricoli, T. & Biljaković, M. (2003). *Conservation and Sustainable Use of Biodiversity
in the Dalmatian Coast through Greening Coastal Development, Concept paper for a full
sized GEF project*. Ministry of Environmental Protection, Physical Planning and
Construction and the United Nations Development Programme/Global
Environment Facility, Zagreb

- Godišnje izvješće 2009 – Gospodarski odnosi s inozemstvom, (2010). 14.05.2011, Available from:
<http://www.hnb.hr/publikac/godisnje/2009/h-god-2009.pdf>, Hrvatska narodna banka
- Hall, C. M. & Lew A. A. (1998). The Geography of Sustainable Development; an Introduction, In: *Sustainable Tourism: A Geographical Perspective*. Hall C. M. & Lew A. A. (eds.), pp. 1-12, Pearson Education Limited, ISBN-10: 0582322626, Harlow
- Hall, D. (2000). Sustainable Tourism Development and Transformation in Central and Eastern Europe. *Journal of Sustainable Tourism*, Vol. 8, No. 6, (n. d.), pp. 441-457, ISSN: 0966-9582
- Haywood, K. M. (1988). Responsible and Responsive Tourism Planning in the Community. *Tourism Management*, Vol. 9, No. 2, (June 1988), pp. 105-118, ISSN: 02615177
- Horak, S., Marušić, Z., Krasić, D., Tomljenović, R., Kušen, E., Telišman-Košuta, N. & Carić, H. (2007). *Studija održivog razvoja cruisinga u Hrvatskoj*, Institut za turizam, Retrieved from: <http://www.mint.hr/UserDocsImages/SAZETAK-Studija-kruzing.pdf>
- Hrvatska u brojkama, (2010). 25.06.2011, Available from:
http://www.dzs.hr/Hrv_Eng/CroInFig/hrvatska_u_brojkama.pdf
- Implementation of Agenda 21: Review of progress made since the United Nations Conference on Environment and Development in 1992, Republic of Croatia-Country Profile, (April 1997). 25.05.2011, Available from:
<http://www.un.org/esa/earthsummit/croat-cp.htm>, Government of the Republic of Croatia, Zagreb
- Inskeep, E. (1991). *Tourism Planning: an Integrated and Sustainable Development Approach*, Van Nostrand Reinhold, ISBN-10: 0442001223, New York
- Inskeep, E. (2006). *National and Regional Tourism Planning, Methodologies and Case Studies*, World Tourism Organisation, ISBN 10: 92-844-0727-3, Madrid
- Ivandić, N., Telišman-Košuta, N. & Ledić-Blažević, M., (2010). *Hrvatsko hotelijerstvo 2008, Poslovanje hotelskih poduzeća*, 10.06.2011, Available from:
<http://hgk.biznet.hr/hgk/fileovi/17427.pdf>, Institut za turizam
- Jurčić, Lj. (2000). The import dependence of Croatian tourism, *Acta turistica*, Vol. 12, No. 1, (June 2000), pp. 1-16, ISSN: 353-4316
- Kljenak, N. (2011). *Ljeto 2010 – ljeto preokreta za iznajmljivače*, 26.06.2011, Available from:
<http://www.turizaminfo.hr/ljeto-2010-ljeto-preokreta-za-iznajmljivace-na-crno>
- Law on Agricultural Land (Zakon o poljoprivrednom zemljištu). (2008). *Narodne novine* No. 125/08; Retrieved from:
http://narodne-novine.nn.hr/clanci/sluzbeni/2008_12_152_4145.html
- Law on Environment Protection (Zakon o zaštiti prirode), *Narodne novine*, No. 82/1994, 110/2007, Retrieved from:
<http://narodne-novine.nn.hr/clanci/sluzbeni/288893.html>
- Law on Golf Courses (Zakon o igralištima za golf). (2008). *Narodne novine*, No. 152/08, Retrieved from: http://narodne-novine.nn.hr/clanci/sluzbeni/2008_12_152_4146.
- Mansfeld, Y., (2002). Ponovno otkrivanje destinacije pomoću "mrežnog" sustava destinacijskog menadžmenta: primjer sjevernog, ruralnog dijela Izraela, *Turizam* Vol. 4, No. 50, (n. d.), pp. 361-371, ISSN: 1332-7461
- Marušić, Z., Čorak, S., Hendija, Z. & Ivandić, N., (2008). *TOMAS ljeto 2008, Stavovi i potrošnja turista u Hrvatskoj*, Institut za turizam, ISBN: 978-953-6145-19-5, Zagreb

- Marušić, Z., Čorak, S., Sever, I. & Ivandić, N. (2010). *TOMAS ljeto 2010, Stavovi i potrošnja turista u Hrvatskoj*, Institut za turizam, ISBN: 978-953-6145-23-2, Zagreb
- Mason, P., Johnston, M. & Twynam, D. (2000). The World Wide Fund for Nature Arctic Project. In: *Tourism Collaboration and Partnerships, Politics, Practice and Sustainability*, Bramwell B., Lane B. (eds.), pp. 98-116, Channel View Publications, ISBN 1-873150-79-2, Clevedon
- Mason, P. (2003). *Tourism Impacts, Planning and Management*. Elsevier, Butterworth and Heinemann, ISBN: 0 7506 5970X, Oxford
- Mathieson, A. & Wall, G. (1982). *Tourism: Economic, Physical and Social Impacts*. Longman Group, ISBN: 0582300614, Harlow
- Munasinghe, M. (2003). *Analysing the Nexus of Sustainable Development and Climate Change: an Overview*, Organisation for Economic Cooperation and Development (OECD), Retrieved from, <http://www.oecd.org/dataoecd/32/54/2510070.pdf>
- Murphy, P. E. (1985). *Tourism, a Community Approach*. Methuen, ISBN: 0416 35930 2, New York
- Nordin, S., (2003). *Tourism Clustering and Innovation, Path to Economic Growth and Development*, European Tourism Research Institute, Östersund, Retrieved from: http://ekstranett.innovasjon Norge.no/Arena_fs/tourism-clustering-and-inno_etour0104.pdf
- Novak, M., Petrić, L. & Pranić, Lj., (2011). The effects of selected macroeconomic variables on the presence of foreign hotels in Croatia, *Tourism and Hospitality Management*, Vol. 17, No. 1, (June 2011), pp. 45-6, ISSN: 1330-7533
- Perica, S. (2011). U Hrvatskoj 150.000 bespravnih objekata, 26.06.2011, Available from: <http://www.vecernji.hr/vijesti/u-hrvatskoj-150-000-bespravnih-objekata-clanak-295867>
- Petrić, L. (2003). Socioekonomska analiza Dubrovačko-neretvanske i Splitsko-dalmatinske županije s posebnim naglaskom na analizu razvojnih uvjeta i mogućnosti turizma na otocima Visu, Mljetu i Lastovu u kontekstu očuvanja bioraznovernosti. In the project: *Ecoregional Action Programme, Middle and South Dalmatian Islands and Coast*. World Wildlife Fund/Mediterranean Programme, Zelena akcija, Zagreb & Sunce, Split
- Petrić, L. & Mrnjavac, Ž. (2003). Tourist Destination as a Locally Embedded System - Analogy Between Theoretical Models of Tourist Destination and Industrial District. *Turizam*, Vol. 51, No. 4, (n.d.), pp. 375-383, ISSN: 1332-7461
- Petrić, L., Fredotović, M., Grubišić, D. & Baučić, M., (2004). *Program održivog razvitka otoka - otočne skupine Prvić i Zlarin*, Ekonomski fakultet Split & Ministry of Sea, Transport, Tourism and Development, Zagreb
- Petrić, L. (2005). Sectoral study on tourism development at regional/local level. In the project: *Conservation and Sustainable Use of Biodiversity in the Dalmatian Coast through Greening Coastal Development - COAST*, Ministry of Environmental Protection, Physical Planning and Construction, United Nations Development Programme & Global Environment Facility, Zagreb
- Petrić, L. (2006). Tourism in Croatia: The Spanish or Costa Rican Road?, *Development and Transition*, No. 1, (July 2006), pp. 20-26, United Nations Development Programme, Zagreb

- Petrić, L. (2006). Challenges of Rural Tourism Development: European Experiences and Implications for Croatia, *Acta Turistica*, Vol. 18, No. 2, (December, 2006), pp.138 – 170, ISSN 0353-4316
- Petrić, L. (2007). Empowerment of Communities for Sustainable Tourism Development, Case of Croatia, *Turizam*, Vol. 55, No. 4, (n.d.), pp. 431-443, ISSN:1332-7461
- Petrić, L. (2008). How to Develop Tourism Sustainably in the Coastal Protected Areas? The Case of Biokovo Park of Nature, Croatia, *Acta Turistica Nova*, Vol. 2, No. 1, (June 2008), pp. 5-24, ISSN:1846-4394
- Petrić, L. & Pranić, Lj. (2009). Croatian Hoteliers' Attitudes Towards Environmental Management, *Proceedings of the 8th International Conference Challenges of Europe: Financial Crisis and Climate Change*, PDF on CD ROM with full papers, ISSN 1847-4497, Split- Bol (island of Brač), May 2009
- Petrić, L. & Pranić, Lj. (2010). The Attitudes of the Island Local Community Towards Sustainable Tourism Development – the Case of Stari Grad, Island Hvar, *Proceedings of the 1st International Conference on Island Sustainability*, ISSN 1743-3541, Bol/Brač, September, 2010
- Pivčević, S. & Petrić, L. (2011). Empirical Evidence on Innovation Activity in Tourism - The Hotel Sector Perspective, *The Business Review*, Cambridge, Vol. 17, No. 1, (May 2011), pp. 142-148, ISSN 1553 - 5827
- Porter, M. E. (1990). *The Competitive Advantage of Nations*, The Free Press, ISBN: 0-684-84147-9, New York
- Porter, M. E. (1998). Clusters and the New Economics of Competition, *Harvard Business Review*. (November-December 1998), pp. 77-90, 2.07.2011, Available from: <http://www.wellbeingcluster.at/magazin/00/artikel/28775/doc/d/porterstudie.pdf?ok=j>
- Poslovanje hotela u Hrvatskoj 2009, (2010). 16.06.2011, Available from: http://www2.hgk.hr/komora/hrv/zupkom/split/hgkcms/images/Analiza_hotelijsstvo_finalno.pdf, Horwath HTL
- Report of the World Commission on Environment and Development: Our Common Future, (1987). 4.05.2011, Available from <http://www.un-documents.net/wced-ocf.htm> , World Commission on Environment and Development
- Sharpley, R. (2009). *Tourism Development and the Environment: Beyond Sustainability?* Earthscan, ISBN: 978-1-84407-733-5, London
- Simmons, D. (1994). Community participation in tourism planning. *Tourism Management*, Vol. 15, No. 2, (April, 1994), pp. 98-108, ISSN: 02615177
- Škrabalo, M., Miošić-Lisjak, N. & Bagić, A. (2007). Baseline study on Corporate Social Responsibility in Croatia, for the project: *Accelerating CSR practices in the new EU member states and candidate countries as a vehicle of harmonization, competitiveness and social cohesion*, United Nations Development Programme, ISBN 978-953-7429-10-2, Zagreb, 29.06.2011, Available form: http://www.undp.hr/upload/file/205/102972/FILENAME/DOP_english.pdf,
- Sofield, T. H. B. (2003). *Empowerment for Sustainable Development*, Pergamon Press, ISBN: 0-08-043046-2, Oxford.
- Southgate, C. & Sharpley, R. (2002). Tourism Development and the Environment: Beyond Sustainability; In: *Tourism and Development, Concepts and Issues*, Sharpley, R., Telfer & D. J. (eds), (pp. 231-262), Channel View Publications, ISBN: 1-873150-34-2, Clevedon

- Strategija razvoja nautičkog turizma RH za razdoblje 2009-2019. (2008). 10.06.2011, Available from: http://www.mint.hr/UserDocsImages/081224-61_01.pdf, Ministarstvo mora, prometa i infrastrukture & Ministarstvo turizma, Zagreb
- Stubbs, P. (2007). Aspects of Community Development in Contemporary Croatia: Globalisation, Neo-liberalisation and NGO-isation. In: *Revitalising Communities*, Dominelli, L. (ed), pp. 161-174, Ashgate Publishing, ISBN: 0754644987, Aldershot
- Šutalo, K. (2009). *Kupac zemlje na Srđu odustaje od golf terena*, 26.06.2011, Available from: <http://www.monitor.hr/clanci/kupac-zemlje-na-srdu-odustaje-od-golf-terena/22468/>
- Taylor, T., Fredotović, M., Povh, D. & Markandya, A. (2005). Sustainable Tourism and Economic Instruments: International Experience and the Case of Hvar, Croatia, In: *The Economics of Tourism and Sustainable Development*, Lanza, A., Markandya, A. & Pigliaru, F. (eds.), pp. 197-224, Edward Elgar Publishing Limited, ISBN: 1845424018, Cheltenham, UK - Northampton, USA
- Telfer, D. J. (2002). The Evolution of Tourism and Development Theory, In: *Tourism and Development, Concepts and Issues*, Sharpley, R. & Telfer, D. J. (eds), pp. 35-79 Channel View Publications, ISBN: 1-873150-34-2, Clevedon
- Timothy, D. J. (1998). Cooperative Tourism Planning in a Developing Destination. *Journal of Sustainable Tourism*, Vol. 6, No. 1, (n. d.), pp. 52-68, ISSN 0966-9582
- Timothy, D. J. (2002). Tourism and Community Development Issues. In: *Tourism and Development, Concepts and Issues*, Sharpley, R. & Telfer, D. J. (eds), pp. 149-162, Channel View Publications, ISBN: 1-873150-34-2, Clevedon
- Tomljenović, R., Marušić, Z., Weber, S., Hendija, Z. & Boranić S. (2003). *Strategija razvoja kulturnog turizma: Od turizma i kulture do kulturnog turizma*. Institut za turizam, Zagreb, Retrieved from: <http://web.efzg.hr/dok/TUR//Strategija%20Razvoja%20Kulturnog%20Turizma.pdf>
- Tosun, C. (2000). Limits to Community Participation in the Tourism Development Process in Developing Countries. *Tourism Management*, Volume 21, Issue 6, (December 2000), pp. 613-633, ISSN: 02615177
- Tourism Highlights, (2011). 11.05.2011, Available from: <http://mkt.unwto.org/en/content/tourism-highlights>, United Nations World Tourism Organisation, Madrid
- Tourism Satellite Account for Croatia (2011). 15.05.2011, Available from: http://www.wttc.org/eng/Tourism_Research/Economic_Data_Search_Tool/World_Travel_and_Tourism_Council
- Vehovec, M. (2002). Evolucijsko-institucionalan pristup razvoju poduzetništva, In: *Poduzetništvo, institucije i sociokulturni kapital*, Čengić, D. & Vehovec, M. (eds.), pp. 13-36, Institut društvenih znanosti "Ivo Pilar", ISBN: 953-6666-25-1, Zagreb.
- Vukonić, B. (2005). Study on tourism development at national level, In the project: *Conservation and Sustainable Use of Biodiversity in the Dalmatian Coast through Greening Coastal Development - COAST*, Ministry of Environmental Protection, Physical Planning and Construction, the United Nations Development Programme & Global Environment Facility
- Weaver, D. (2006). *Sustainable Tourism*, Elsevier Butterworth- Heinemann, ISBN: 0 7506 6438 X, Oxford



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Lidija Petrić (2012). Croatian Tourism Development Model – Anatomy of an Un/Sustainability, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from:
<http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/croatian-tourism-development-model-anatomy-of-an-un-sustainability>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Built Heritage and Sustainable Tourism: Conceptual, Economic and Social Variables

Beatriz Amarilla and Alfredo Conti

Research Laboratory on the Territory and the Environment (LINTA)

Scientific Research Commission, province of Buenos Aires (CIC)

Argentina

1. Introduction

The origin of tourism in the modern world is closely linked to recognition and appreciation of cultural heritage. In the eighteenth century, the so-called "Grand Tour", from which the word *tourism* comes, consisted of trips of intellectuals and artists from different countries of Europe to the Italian peninsula, and especially to Rome, to take direct contact with relics of classical antiquity. The ancient world, especially the Roman civilisation, had been "rediscovered" by the culture of the Renaissance and Rome had become a destination for those who wanted to know and appreciate classic art, which was taken as a source of inspiration for artistic production of the time (Choay, 1992). This habit meant the implementation of infrastructure and equipment to meet the needs and requirements of the travellers, including transportation systems and accommodation, all of which constitute a background of modern tourist facilities. This initial form of tourism included some components of its current definition: the idea of "tour" meant that travellers returned to their places of residence once their expectations had been met, they were motivated eminently by cultural purposes and funds invested in the destination came from their home countries. In short, it was, in modern terms, a practice of cultural tourism, reserved for a selected social group in terms of education and economic position.

The major economic, social and cultural changes induced by industrialisation all over the world took to new modalities of tourism; among the rights recognised to workers, free time, vacations and leisure appeared, especially throughout the twentieth century. New social groups were gradually incorporated to the practice of tourism. At the same time, new heritage items expanded the realm of tourist attractions, something that has occurred up to the present time. The interest in nature typical of the scientific field between the seventeenth and eighteenth centuries was transferred to the realm of art especially by the nineteenth century Romanticism; the natural environment was considered a source of contemplation and relaxation for body and spirit. The translation of this expansion of the heritage concept impacted in the field of tourism, besides sun and beach and cultural tourism. Nowadays, several modalities appeared, among them ecotourism, adventure, health, business, religious, gastronomic tourism, etc. Over the twentieth century, and particularly the period after the World War II, the progress in transportation and general improvements in revenues facilitated the access of new social groups to the possibility of travelling. Social tourism

emerged, which assured the possibility of holidays for workers, and mass tourism, which has continued to expand, making tourism a top economic activity at international level and, for many countries and regions, a source of economic growth and overall development of communities.

These concepts have undergone several changes throughout time. The qualitative and quantitative evolution of tourism as economic and social activity coincides with the development of heritage concept, assessed mainly in the late twentieth century. New categories of goods would be added to the initial idea of “historic monuments”, which according to the Venice Charter (1964), these are testimonies of “*a particular civilisation, a significant development or a historic event*”; the concept of monument does not longer refer only to great creations but also to “*more modest works of the past which have acquired cultural significance with the passing of time*”. In the late twentieth century, new heritage categories were considered; in 1992, UNESCO introduced the concept of cultural landscape, consisting of the joint work between man and nature. In 2005 the notion of heritage routes was included in the *Operational Guidelines for the implementation of the World Heritage Convention*, which implies the consideration of “*tangible elements of which the cultural significance comes from exchanges and a multi-dimensional dialogue across countries or regions, and that illustrate the interaction of movement, along the route, in space and time*”. Intangible heritage, consisting of literary and musical works, traditions, social practices, oral history, gastronomy and traditional knowledge gained significant ground in the theoretical debate and in the field of heritage management, which is manifested in the adoption by UNESCO of the Convention for the Safeguarding of Intangible Heritage in 2003. In this framework, historic towns and urban areas became one of the most significant heritage assets, since they express, perhaps better than other heritage categories, all the complexity of human relationship with the environment, merging tangible and intangible heritage components. Nowadays, heritage is recognised as social construction and it is highlighted the active participation of all social actors in its identification and management, when defining heritage, according to Prats (1997), as “*the symbolic referent of the cultural identity of the community*.”

These two concepts in evolution, heritage and tourism, are linked with the formal appearance of the concept of sustainable development in 1987. Its more well-known definition indicates that it deals with a development that has to satisfy the current needs without threatening the ability of future generations to solve their own needs. Though the term “sustainable” may be mainly associated to natural resources, a public policy of sustainability cannot exclude today conservation, management and use of the built heritage.

Tourism has had a global booming growth during the last decades, and the close relationship between heritage and tourism brings about opportunities and threats. Among the advantages we can mention the attainment of economic resources, creation of jobs, provision or improvement of facilities and the urban infrastructure, enhancement of public spaces and building restoration as well as the consolidation of the local identity. However, there are important threats related to sustainability. These not only imply alteration or destruction of material components of buildings and sites but also they may distort their values and meanings.

As regards this issue, key economic factors, which need to be identified and analysed, remain. Tourism has always been studied as an economic activity, measuring its incidence, for instance, in the national gross product. However, when we include heritage, the

economic study is subtler and less spread. The International Council on Monuments and Sites (ICOMOS) adopted an International Charter on Cultural Tourism in 1976. The extraordinary growth of tourism over the last decades of the twentieth century led ICOMOS to review the Charter; a new text was adopted in 1999, more suitable to the demands of the moment. This text introduces concepts and recommendations related to the proper interpretation and transmission of heritage values and meanings, with the need to consider the tourism use of heritage as a tool for the integral development of host communities through the idea of participatory planning involving all stakeholders.

In the context above mentioned, the main purpose of this chapter is to study the relationships among three key concepts: built heritage, cultural tourism and sustainability. The conceptual, economic and social variables of this issue are particularly emphasised, making special mention to the case of Latin America countries.

The main problem that will be discussed in this chapter is the degree of conflict among these three concepts, which arise particularly when we pass from theory to practice. We will follow the next steps in order to analyse this problem and to think about the compatibility among sustainability, tourism and heritage. First of all, it is necessary to study the definitions and nuances of the sustainability concept, relating them to the updated conceptions of tourism and built heritage, according to current specialised bibliography and technical documents. Secondly, it is required to link the knowledge cited above to social and economic variables, factors that, according to our hypothesis, can cause the main distortion when we pass from theory to practice. Finally, it is essential to verify these through some case studies. In relation to that, we think that Latin America World Heritage towns are very appropriate examples in order to test the ideas developed before.

The analysis of successful experiences and of problems detected in many cases of historic centre rehabilitation of Latin America included in the list of UNESCO World Heritage – Cartagena de Indias (Colombia) and Colonia del Sacramento (Uruguay), among others – serve as guide for the development of a series of recommendations intended to achieve the tourist sustainable use of the cultural heritage, with social, economic and cultural advantages for the communities involved.

2. Sustainability and built heritage

2.1 About the sustainability concept

“Over the last thirty years, the concept of monument has grown, evolving from the individual building to the historic district of the cultural landscape. Slowly but surely, we will reach the concept of ecosystem, in which it will become obvious that the preservation of a site, even as a historic city, can occur only if it is possible to preserve its environment and all the activities that have traditionally supported the life in the site. Why preserve the fisherman’s town if the river is allowed to go dry or if the industrial plant upstream is allowed to pollute the river and kill the fish?” (Bonnette, 2001).

The previous observation has the advantage of building a bridge between concepts which are very widespread, such as sustainable development and heritage conservation, but they often appear empty of content, or they are interpreted in a different way from the view of other disciplines, or they are not integrated according to a systemic view. Sustainability is a concept

which has been applied, not very accurately, among the people responsible for policies and decision making (Meppem, 1998). There is no coincidence about its meaning, either.

If the sustainability definitions are considered, it may be concluded that most of them are expressed in normative or positivist terms. According to Keynes, a regulatory science can be defined as a body of systematised knowledge referring to the criteria of what something must be; instead, the positivist science considers what things are (Keynes, 1890, as cited by Meppem, T. & R. Gill, 1998).

The most widespread regulatory definition of sustainable development is that emerging from the so-called Brundtland Commission in 1987, which states that development must answer to the current needs without compromising the ability of future generations to meet their own needs. The success of this definition is sometimes attributed to its ambiguity.

In general, there is some agreement in the fact that the scientific positivism is incapable of answering by itself the political and cultural variables that lead the action to a sustainable development. The evidence resulting from the science domains, from sociology, philosophy, economy and law suggests that the conventional regulatory-positivist approach is not suitable from the epistemological point of view. The alternative is to develop a process in which it is taken into account the socio-cultural context where the environmental and economic information circulates, considering the development scenarios more completely.

According to Pearce, the capital stock takes different shapes: works and products, human capital (knowledge, abilities), natural, environmental or social capital. The latter involves the group of social relationships that produce welfare directly or indirectly. The built heritage, which is the main subject of our study, can be thought also as a capital, which comprises a stock of physical works along with ideas, beliefs and values that gather communities and link the present with the past (Pearce, 1998).

As a general rule, the sustainable development requires that the capital stock transferred to the next generation is lower than the capital stock in hands of the current generation. From that, two new concepts have arisen:

- Weak sustainability: the stock should grow through time, but its composition is irrelevant. For instance, if the environment is now degraded, this can be justified since the benefits resulting from the proposed activity are higher than the cost of the resulting degradation. Many projects of conventional urban construction and intervention can be included within the weak sustainability concept.
- Strong sustainability: some goods, like those included in the natural or cultural heritage, are so important that it is indispensable its conservation. Some of the reasons for this are the following:
 - a. The environment has intrinsic values and it is not replaceable. There is no possible replacement (irreversibility).
 - b. The value of the environment and its components is uncertain, therefore, it should not be destroyed for caution. This reason may respond to a kind of “non-use values” (for instance, a plant species can be the key in the future healing of a disease, and this would be impossible if this species becomes extinct).

From the social point of view, the strong sustainability is related with the idea of investing in activities which enable social progress, that is to say, improving the public participation,

democracy, the reinforcement of local communities, information flow and the human capital, since the formation of human capital through education enables the development of other social values. Within the strong social sustainability, it is possible to focus on the cultural capital and, specifically, on the built heritage. There is some agreement about the fact that art and architecture have values similar to those “intrinsic values” of the natural environmental ones. In fact, according to Pearce, it is about a modern interpretation of Ruskin’s thought:

“... it is not about convenience or feelings when trying to preserve or not buildings from past times. We do not have rights to touch them. They are not ours. They belong partly to those who built them and partly to all mankind generations that will follow us.” (Ruskin, as cited by Pearce, 1998).

From the point of view of weak sustainability, this position can be objected. It is held that conservation at any cost is not practical and even doubtful from the moral point of view since the resources spent on conservation could have been used today with other purposes, maybe with higher benefits. The defenders of sustainability often disregard the basic principle of economy: the opportunity costs. Beyond the moral arguments of conservation, the financial resources spent on conservation, especially in developing countries, can be used to solve present basic needs (food, health, housing), which can also be considered as “rights”.

It is also certain that not all the present goods can be preserved with the expectation that future generations consider them as their “cultural heritage”. Leaving the decision in hands of “specialists” would be in agreement, perhaps, with Ruskin’s thought, but this attitude can be considered inappropriate according to the present concept of heritage as “social construction”.

2.2 Man, nature and culture

Each generation has a capital that mainly includes three kinds of goods: natural, cultural (personal property and real estate) and human resources. There is a share, quantitatively smaller, of natural and cultural goods, considered as having special features, and because of this, they deserve to be protected, so that they can be enjoyed by the present and next generations (Lichfield et al., 1993). This apparently simple issue, in practice, results in countless difficulties of complex order, among which economic aspects play a key role.

In the previous paragraph, it is possible to foresee two topics that deserve consideration: that of the relationships among man, nature and culture; and heritage conservations as a problem that affects or involves different generations (the latter, key point in the classical definition of sustainability).

Regarding the first issue, it can be stated that until mid twentieth century the human myth of the supernatural man prevailed, and the opposition between nature and culture was the basis for the prevailing anthropological model. The world seemed to be built by three overlapped strata, isolated from each other: man-culture, life-nature, and physics-chemistry. This situation began to be modified in the 1950s with the opening of the gaps between these tight paradigms, enabling a new concept in the relationships between the natural and cultural things.

It is owed to Schrödinger, pioneer of the biological revolution, the main idea that: living beings are nourished not only by energy but also by complex organisation and information. Thus, the human society, which can be considered the most emancipated as regards nature,

actually nourishes its independence from multiple relations: the more autonomous the living system, the more dependent on the ecosystem where it is integrated (Morin, 1973).

This complexity sometimes seems not to be taken into account in the conservation environment of the natural and cultural heritage, and this can result in the fact that the implemented measures do not produce the expected results. For instance, many of the national and international efforts have been centred on the creation of national parks and protected areas, aimed at the conservation of pristine and intangible goods. Considering cultural landscapes is relatively recent, understanding as such those where the physical and biological features have been extensively modified by human activity. This means that the decisions and social - economic processes prevail in determining spatial patterns and landscape characteristics. Disregarding this aspect, sometimes the protected areas do not offer an integral solution for the wild life conservation, aim of its creation. Then, it becomes necessary the programs oriented specifically to the needs of rural residents, who live on agriculture and on the exploitation of the wild life in the area. This kind of approaches to the conservation fulfils a double purpose: to protect the wild habitat and to respond to human needs at the same time (Young, 1997:137).

Regarding the problem between generations, it is known that, in the Earth Summit held in Rio de Janeiro in 1992, the sustainable development arose as one of the most urgent and critical topics of international politics. Some specialists consider that this critical issue has been mostly dealt from an "emotional" point of view, but not enough progress has been made in the construction of sustainable patterns for a modern industrial society. A serious position requires the study of the resource assessment, what usually results from its contribution to use or profit. The key factor is how the value is considered so that present and future have an equal treatment. Sensitivity is necessary in relation to both and this implies a symmetrical treatment of the generations, in the sense that neither the present nor the future must profit at the expense of the other. Thus, there is no preference for the romantic vision that privileges the future or for the consumption view that only decides in function of the present (Chichilnisky, 1997).

2.3 Tourism and sustainability

Tourist resorts attract cyclic populations throughout time. The tourist's perception of the social and environmental quality of the site influences the future attraction that such places bring about. If tourists have a positive perception of the site, an increasing number of people will visit the area. As this figure increases, the effects of tourism on social and environmental quality increase. Thus, degradation levels may be reached because of excessive visiting, and these levels can revert the tourism trend in the area (Lawrence, 1994:265-66). This process is known as "tourist cycle", shown in Figure 1.

Tourism is cyclic by nature, so are its social and environmental impacts. In Figure 1 there are two representative bands of the tourist population and of sustainability. The first grows through time up to an MTP (maximum tourist population) point, from which the people flow tends to decrease, as a consequence of excessive visiting, pollution, crimes, etc. On the other hand, the negative impacts that indicate a decline of sustainability take some time to revert, since a period of time is needed for the environmental improvement and socio-cultural changes. If the tourists' arrival continues decreasing, the negative impacts increase

from a CNIT (change of the negative impact trend) point. Like in the supply and demand curves of economic models, the tourist population and sustainability flow around the intersection area of both bands. Such area is the sustainable development zone. If the tourist population and the negative impacts do not exceed the maximum levels that this area determines, a sustainable development can be reached in the long term.

Many tourist projects have ignored these tendencies, encouraging tourism growth beyond the recommended limits. This, in the long term, has resulted in the opposite expected effect: the decrease of the tourist flow together with social and environmental negative impacts in the area, sometimes very difficult to revert.

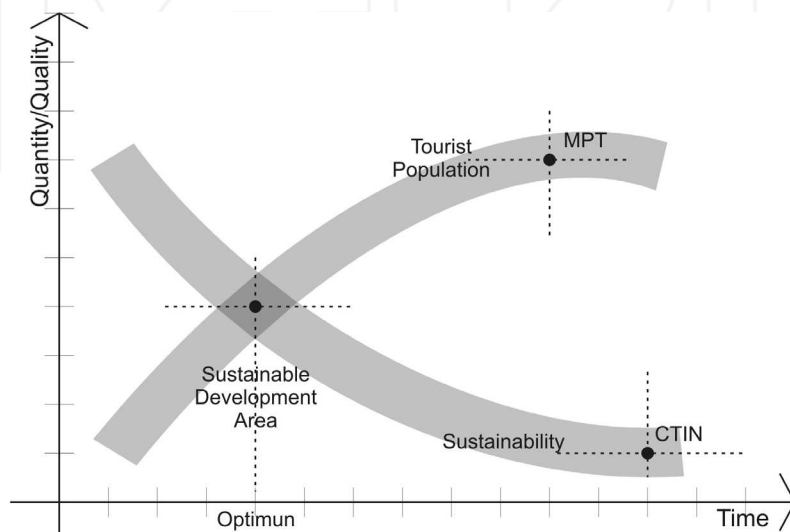


Fig. 1. Sustainable development area. Adapted from Lawrence (1994)

2.3.1 About ecotourism

The interest for the environment, developed in the industrialised countries since the 1980s, has encouraged particular ways of tourism, such as ecotourism. This fact contains potentially excellent opportunities of using tourism as protection tool of natural ecosystems, giving them a socio-economic value in their original estate.

The term “ecotourism” seems to have appeared in Mexico, chosen by Ceballos-Lascurain to define activities related to trips to natural areas in relatively pristine conditions, in order to study, admire and enjoy the flora, fauna and cultural expressions that may have existed (Filion et al., 1994). This concept has been broadened throughout time, including the environmental and socio-cultural consequences resulting from the tourist activity. Thus, nowadays, it is considered that ecotourism is a responsible trip, aimed at preserving the natural environment and at sustaining the local population welfare.

The definition of ecotourism includes a wide range of activities. Some market segments are small and well-defined (ornithologists, observation of rare species), while others are just the opposite (enjoying nature in trips mainly organised with another purpose).

Ecotourism seems especially positive in developing countries, since many of them are characterised by their biodiversity richness, but sometimes they do not have the necessary means for preserving the environment, favouring other forms of unsustainable economic development. In countries with a particular natural and cultural heritage, and with a special sensitivity or tradition in its conservation, these activities may become the main income source of the nation. In Nepal, “*the economic dream of conservationists*” seems to come true (Wells, 1994): a net of well-established protected areas produces, thanks to foreign visitors, an important part of the income of one of the poorest countries in the world.

In some developed countries, ecotourism has a significant importance. For instance, in Canada, millions of inhabitants perform tourist activities related to wild life, such as bird watching. These activities produce a high economic impact on the gross net product, on the income level of the population, on job creation and government income through taxes. In this country, an important part of the income the government receives through taxes from local ecotourism is invested in preserving wild life. Therefore, quantifying the socio-economic importance of ecotourism is a key factor for encouraging governments and companies to increase their efforts in environment conservation.

Though travelling with the purpose of enjoying nature has important benefits, there are also great conflicts. Beyond the well-known negative impacts on society and environment, there are other problems in the developing countries, such as money leakage: international airlines, hotel chains, etc. (Filion, 1994).

2.3.2 Cultural tourism and built heritage

Built heritage must also be studied as the basis for the development of sustainable tourist activities. According to “The Royal Heritage Site Working Group”, tourism and heritage are activities that must find a balance, including understanding the permanent value of the sites with historic and heritage relevance, as well as respecting the original nature and purposes of the site, though its uses have been modified. The full visitor’s enjoyment must be guaranteed, in relation to the site and its social, cultural and aesthetic context, and at the same time its maintenance and conservation in the long term must be also guaranteed so that its integrity is safe through time.

This balance may be altered by some obstacles that hinder a harmonic relationship between heritage and tourist activity, especially in developing countries having population settlements with heritage value (coastal, mountainous zones, fishing villages, etc.). There may appear a great pressure by the tourist use of those settlements; this process coexists, among other phenomena, with the increasing number of new constructions, including holiday houses uninhabited most part of the year and the public inefficiency for providing economic resources for conservation and rehabilitation activities (Öznöğul, 1998). This situation can be observed in many cities in different countries.

The previous paragraph shows the lack of understanding regarding the nature of sites, which are only analysed according to their “picturesque” features or to the way of life characterising them. The massive incorporation of visitors may represent the risk of incorporating foreign patterns which can destroy the cultural heritage to be preserved.

Certain population settlements with heritage value indicate that the building morphology and their characteristic urban fabric respond to complex factors including climate, safety,

economy, politics, socio-cultural and religious factors. That net of interdependent factors creates a strong association between population and the built environment. The open spaces help to place the inhabitants in their social space, influencing the way and intensity of the communication between them. Historically (such as the case of many settlements in Saudi Arabia and nearby zones), the circulation systems were designed for enabling the connection between the residential areas and the agricultural tasks, the cult places and the markets. Many paths were designed as labyrinths for disorienting the rivals in case of attack. More recently, the land subdivision according to a grid, the abandonment of the compact fabric for an extended and disorganised urbanisation, surfacing of passages and open spaces for enabling the vehicle access, as well as the excessive tourist interest have destroyed the original balance (Saleh, 1998).

3. Analysis of the main variables

3.1 Built heritage and the economic variable

Including the economic variable into the domain of nature and culture aesthetics has always been suspicious as it seems impossible to value the invaluable. Regarding this, the viewpoints vary with the culture of each people. As Michel Racine says, referring to the "tourism of gardens" in Great Britain and France, *"... garden tourism has become a business, activity considered as the most noble in the mainly protestant countries, when this activity is often suspected in France"* (Racine, 2001).

However, the association between production, commerce and aesthetics has an early background. Significant technological innovations took place not only to improve hunting or recollection efficiency but also to achieve aesthetics goals. In the Aurignacian period (40 thousand to 28 thousand years ago), the Cromagnon man created several techniques for working ivory, including the preparation and use of metallic abrasives for polishing it. They used the ivory for creating beads, earrings and small figures, and seldom for making tools or weapons. Objects made in bones and mammal teeth, fossils, corals, limestone, etc. have been found; the raw material was not chosen at random, and many materials were from geographically far destinations, acquired by means of trade (PNUD, 1998).

Incorporating the economic aspects to this knowledge field has been expanded in the last twenty years, taking into account the following causes, among others:

- Recognising the existence of a "cultural sector" and of "cultural industries", understanding as such, works and practices related with the intellectual and artistic activity, concept that has been broadened, including recreation, sports and free time (Casey et al., 1996).
- The development of specific methods of economic assessment that, starting from the premise that these goods have special features (association of tangible and non-tangible values), take into account aspects that the market disregard. Thus, the economic assessment of natural and cultural heritage allows the existence of a common measure of comparison with other goods, useful when giving priorities to investments, especially in the public sector.

There are different branches of the economy that are directly or indirectly related to the built heritage. This is considered part of the culture economy; thus, it is linked to the theory of

property rights (public and private sector, or problems related to different generations), the economy of regulatory instruments (incentives and other measures related to heritage conservation policies), cultural tourism, etc.

A feature of heritage is that this has not been produced intentionally as such, as goods or collection of goods, but it is a heterogeneous whole of elements produced for several purposes and that has come down to us with a deeper meaning than the original one. What today is considered heritage is a social and cultural construction, created and controlled by experts. This construction has been changing throughout time and has social perceptions about what is culturally interesting and valuable. According to Pierre Bordieu, it is about the creation of cultural symbols by “consecration”. In the case of heritage, the goals are obtained through standards where, as mentioned before, experts mainly participate (Towse, 2002).

An avoidable consequence is that the heritage stock is always growing, as a result of some mechanisms, such as the designation of goods from certain age or type, the inclusion of new heritage categories, etc. Among other consequences, this situation leads to carry out an economic choice, determining the amount of investments for adding value through conservation or revaluation. As regards its possible tourist or recreational use, either the lack of visitors or the excess of them brings about economic problems to the authorities in charge of heritage.

Once the object and field of study have been defined, it is possible to refer to the different dimensions of the economic research in the domain of culture and heritage (Ost et al., 1998). We are interested especially in two:

- “City or Historic Centre”: this dimension is linked to Urban Economy and, more widely, to the sustainable development issue.
- “Tourist”: heritage is considered as attractive and its impacts are studied in the local economies.

From the economic point of view, the built heritage is subjected to a double approach. It can be considered as goods, as a product (*commodity*) and at the same time, as service support. Heritage as goods is the monument, the site or building with its physical features. From the point of view of services, it is about the concerned built heritage with the use or function to which it is affected or potentially can be.

3.2 Built heritage and tourism: benefits and risks for sustainability

When including the historic environment built by man, the built heritage comprises a great variety of goods: buildings, old monuments and archaeological sites, designed landscapes and gardens, battle fields, industrial buildings and ruins.

Since the 1980s, the interest for the relationships between cultural heritage and tourism has been strengthened and the economic function of heritage has been explicitly recognised by those responsible for decision-making. Performed studies show that each restored and enhanced site gives rise to a certain amount of jobs in the site and in peripheral activities, generating a cost per visitor that can be estimated (Vincent et al., 1993). If taking into account the annual volume of visitors related with certain attractions (for instance, in France about 7 millions annual visitors for the Eiffel Tower and more than 8 millions for the Louvre), it can be observed that these economic effects, direct and multiplicative, are extremely important.

However, this situation, favourable at first, has negative aspects related with well-identified problems: excessive amount of visitors, the lack of content in cultural sites, the risk of developing a pseudo-cultural tourist offer, etc. The excessive visits threaten the existence of buildings and monuments, along with the progressive loss of its cultural identity. The traditional commerce often changes to *souvenirs* shops. The cohabitation becomes difficult; the original inhabitants often emigrate, leaving the historic centres empty in low season, distorting the local urban characteristics.

The badly-administered cultural offer grows and the projects revaluing cultural heritage with tourist purposes are usually faster than the demand. The success of certain cultural sites attracts tourist, hotel and real estate agents. Thus, some behaviour similar to that destroying several sea or mountain sites is developed around the cultural heritage. Tourism, which at first is an important tool for being aware about the heritage value as basis of local cultural identity, becomes finally a way of trivialising urban and rural landscapes.

As regards heritage in hands of private owners, other problems appear. Many of them think that opening their properties to the public is anti-economic and that visits and economic activities organised for making money damage or destroy the heritage to be preserved. In addition, the fact that the building appears in an official list as protected property may influence negatively in its market value, since future modifications are limited. Buildings or areas to be preserved provide a benefit to the society but create a cost for the proprietors (although there are economic incentives for preservation), who are prevented from altering them in order to obtain other economic benefits (Cassey et al, 1996).

4. Case study and discussion

4.1 The sustainable historic city

An interesting example for the study of the interdependence between the economic, cultural, social and environmental variables is the city and, in particular, the historic city in developing countries. The socio-economic causes that lead to the downfall and destruction of that heritage will be analysed, as well as examples of strategies in order to revert the situation, put into practice in some countries with the help of international organisations.

The protective measure of the urban historic heritage should be taken not only to suitably preserve and revitalise buildings and sites with the aim of satisfying the social, cultural and economic requirements. On the contrary, these actions should be tightly linked to a wider objective concerning the urban identity, considered a requirement for increasing environmental and human quality of the settlements, trying to get rid of degenerative forms of the urban fabric such as decline, insecurity and lack of efficiency. This degeneration results in chaotic and unsafe urban environments, with problems of social and environmental decline. In terms of this, Notarangelo mentions Pierluigi Cervellati, who believes that the memory of a historic city should be assimilated with the memory of human beings. When men lose their memory, they become mad, and the same happens with cities (Cervellati, 1991, as cited by Notarangelo, 1998).

A historic city must be preserved in its nature of cultural heritage and economic resource. We will not analyse the first issue, which was considered for the first time, at international level by the Athens Charter referring to artistic and archaeological heritage (1933) "... the

architectonic values must be preserved in all cases, either isolated buildings or complete urban nuclei... must be preserved when they are the expression of a previous culture or reach a general interest..."

We will analyse which is the material benefit, beyond the spiritual one, that preservation offers to the process of urban development and management. It is interesting to study which is the economic advantage that the public or private sector can obtain from the conservation of historic centres. In 1977, the Charter of Machu Picchu introduces for the first time the consideration of the material value underlying in the conservation of historic centres, joining the economic value to the cultural one *"... the action of preserving, restoring and recycling the historic environments and architectonic monuments must be integrated in the vital process of urban development, also because it is the only way of financing and managing this operation"* (Machu Picchu Chart, 1977).

In developing countries, the problems present characteristic features. When the residential and economic activities abandon the historic centres, the benefit resulting from the real estate market declines. As the space demand is reduced, so is cash flow, therefore sales decline and become sporadic. Besides, in many cases, the preservation regulations together with the building deterioration increase construction costs, making the restoration little competitive compared with other areas. These trends prevent the private sector from making new investments in the historic centres: investors look for opportunities outside this area, re-feeding the decline process.

The presence of non-productive urban districts or of those districts that do not meet the idea of an efficient and comfortable city leads to a situation which many historic centres experience. They are aside of the development and transformation processes of the contemporary city, and their inhabitants are excluded and forced to live with the phenomena of social and environmental degradation.

The decline of activities also reduces tax collection. This trend, together with the explosive growth of cities, attracts the public investment towards developing zones, accelerating the decline spiral of the historic centres (Rojas, 1999). Some functions in central areas (government, banks, and commercial areas) often continue. However, the construction of other sites in new administrative, university, commercial centres, and residential neighbourhood areas only emphasises even more the economic exclusion of the historic centres and their physical decline.

The deterioration and loss of cultural resources (monuments, building groups, sites of historic, aesthetic, ethnologic or anthropologic value) is due to a great extent to the urban sprawl; to the unplanned development of the urban infrastructure, the inadequate water provision, sewage and pluvial drainage as well as to the lack of maintenance of both buildings and infrastructure.

In many cities, residential, commercial and industrial buildings from the beginning of the twentieth century, with architectonic and historic values have been destroyed or are in danger because of urban development. Due to the high land value, many houses of interest are demolished to give rise to residential or commercial entrepreneurship. Beyond the cultural damage, these facts negatively affect the tourist activity, with the loss of potential benefits for the local communities.

In this situation, it is habitual for an important part of the low income population to live in old buildings in central historic areas, where relatively high socio-economic classes used to live. With the displacement of these inhabitants towards the suburbs, these huge houses were subdivided in order to be used by several families. However, most of these properties neither are connected to the sanitary infrastructure nor receive an adequate system of rubbish collection, that is why their deterioration and downfall rapidly increase.

In this context, strategic or sector plans for reverting this situation have appeared in many cities in Latin America since the 1990s. Rojas thinks that, in developing countries, the activities destined to preservation may undergo three stages. The first is characterised by the pressure that some cultural minorities exert for establishing some control or legislation on this matter. This brings about isolated interventions in specific monuments, generally financed by private philanthropists. Many of these buildings are destined to public use, what leads to a non-sustainable conservation: investments are made now and then due to the lack of systematic maintenance and inappropriate use.

In Latin America, some countries have reached, at least partially, the second stage, in which governments assume responsibilities in conservation. This participation from the estate, potentially positive, brings about other problems: the lack of continuity in the conservation efforts due to budget restrictions and to the volatility of public resources. The Bank for Inter American Development, which gives credits for conservation, has warned that the conservation process, as currently organised and financed, is not sustainable in the long term and represents a heavy burden in the budgets of the public sector that, also has to prioritise the problems regarding poverty in these countries (Rojas, 2001).

The trend should be progressing to a third stage, in which preservation of historic heritage becomes the responsibility of the community as a whole, including the private sector. Sustainability in the long term can be only achieved when the involved social actors jointly collaborate with this aim.

The action of the public sector allows providing the private sector with favourable conditions for its active participation in the process (Rojas, 2001). Firstly, with the provision of stability in the regulatory frame. Investors are always afraid of risks when acting in an area of unknown future. Secondly, showing the feasibility of investments in non-traditional markets is a possible means of deeply encouraging the private investors.

The strategies for modifying this trend are numerous. Firstly, the traditional way of acting is towards actions aimed at the physical improvement of the area (repairs, maintenance, building enhancement, urban infrastructure and facilities. This attitude is not directly aimed at the economic development of the inhabitants, though it may influence it. On the other hand, a plan of socio-economic action may have value for the population, but it does not act on the functional and spatial structure, on the urban shape and its decline. The best way of sustainable recovery of these areas is based on an integrated strategy of interventions, able to solve the demands of the socio-economic development and the conservation of heritage values, without disregarding the spatial identity of the sites.

Some ideas referred to the effective protection of the cultural resources in developing countries are the following:

- Property ownership: establishing the property ownership and having an updated property registry is a way of promoting the heritage conservation. Legalising land

ownership often enables the owners of properties with historic value to obtain credits for improving buildings and this helps the conservation of this kind of property. These strategies must have the conformity of owners, who sometimes do not want to regularise the register of their properties to avoid paying taxes.

- Establishing flexible controls regarding the alternative uses of these buildings to allow an adaptable use and to ensure the conservation. The local authorities can encourage the conservation and restoration of buildings and historic districts, allowing the private sector to adapt old buildings for new uses. This must go together with policies aiming at expanding the economic basis, attracting investments and creating new jobs.
- Register and protection of priority natural resources: it is necessary to identify and register historic buildings which need special protection and thus, determining how this can be carried out in a context of permanent growth or urban development. Sometimes it is not possible or desirable to preserve all buildings. Many proprietors may resist conservation regulations on a private property, unless they are compensated according to the benefits they would obtain from that land if it was liberated for new uses (apartment tower building, for instance). If the list of buildings to be preserved is excessive, it could be impossible for the Estate to face that burden and in the long term it may lead to a deeper process of deterioration in the area (Berstein, 1994).

4.2 Case study: Latin American World Heritage towns

In the context above mentioned, this chapter will refer specifically to sustainability problems caused by the development of tourist activity in urban centres and historic neighbourhoods, particularly in Latin American countries. It is a kind of heritage highly significant and valued by tourists, since it is in the old city neighbourhoods where the distinctive signs of a particular culture can be seen more clearly: the principal architectonic monuments, the public spaces with higher symbolic value and the most significant components of the immaterial heritage.

The case of historic centres in Latin American cities is apt to set an example of the many problems that are related with the triad heritage – tourism – sustainability, especially in its economic and social aspects. With regard to the origin and evolution of Latin American towns, Hardoy (1971) identifies six stages:

- a. Pre Columbian period, in which 5% of Latin American territory was occupied by urban cultures. Even if the Americas were totally populated before the arrival of the Europeans, original cultures reached different degrees of development; the most advanced cultures were located in Meso-America (a portion of present Mexico and the Central America) and in the Andean region of South America. At the arrival of the Spaniards, some towns like Mexica-Tenochtitlan or Cusco matched or even surpassed in development and architecture many European cities of the time. In some cases, Spanish towns were settled on the remains of pre-Hispanic ones.
- b. Stage of Spanish foundations over the first half of the sixteenth century, based on regional and urban infrastructure of the pre-Columbian cultures.
- c. Establishment, by Spaniards and Portuguese of ports, mining towns, forts and reductions. The territorial structure was based on natural resources and on a communication system and the urban basic schemes were defined around 1580 for both Spanish and Portuguese territories. New towns were especially settled along the roads

- systems linking the production or mining areas with the ports and on the seashore. Spanish towns were settled on the basis of strict legal regulation regarding urban and territorial layouts. The common type was based on a regular grid pattern of streets with a central plaza that constituted the civic, religious and commercial core of the town. Portuguese towns, conversely, were constructed according to more organic urban schemes, sometimes taking into account the topographical features of the setting.
- d. Once consolidated institutions and norms of colonial life, there was a period of about two centuries with no significant changes, with an urban scheme that would remain until the arrival of the railroad. During this stage major administrative and trading centres were consolidated.
 - e. The independent period, which started on different dates depending on the specific countries but was consolidated by the late nineteenth century with the inclusion of countries in the region to the global economic framework, including the massive influx of immigrants in some countries. During this period the railway was incorporated and ports were modernised, the first urban industries and new institutions were settled. Some cities, particularly political capitals and ports initiated a sharp expansion. The establishment of new towns responded to a variety of requirements, among them the consolidation of the boundaries of the new countries, the incorporation of new territories to the productive system, the construction of new ports or the establishment of administrative state or regional capitals. Urban patterns were generally based on the heritage of the previous period.
 - f. Over the twentieth century, the most significant process was the incorporation of former rural population to urban centres; there was an explosive growth of industrial cities and, to a lesser extent, of provincial capitals, and a decrease of population of rural areas or villages.

Latin American historic centres correspond generally to colonial towns, in a few cases constructed upon the remains of Pre-Columbian cities, which conserved their main urban and architectural features with no major changes throughout the nineteenth and twentieth centuries. In these cases, new developments occurred out of the boundaries of the colonial cities; in other cases instead, extensive renovation over the last two centuries prevented the historic cores from preserving their original features. In the cases where the historic centres preserved their traditional features, these areas generally presented diverse degrees of functional and physical degradation whereas those evolving cities (Sao Paulo, Buenos Aires or Santiago) changed drastically the original appearance. The “discovery” of the historic centres started in the 1960s and restoration and conservation works have been developed since then. The most prominent Latin American historic centres are inscribed on the UNESCO World Heritage List. In 2007, 38 out of 84 Latin American World Heritage properties were historic towns or centres, a figure that represented 45.23% of the cultural properties and 31.40 % of the total of World Heritage sites in the region.

Latin American historic towns and centres bear some common features if compared with those belonging to other geo-cultural regions; at the same time there are specificities given by their history, urban and architectural features and symbolic content. At the same time, there are particular pressures and constraints. For example, the construction of major development projects, common today in many historic cities around the world, seems not to appear as a real threat, although some examples can be found in the region. However, the strong impact of tourism, social changes, inadequate maintenance of public spaces,

buildings and sanitation problems, which are not serious problems elsewhere, tend to appear frequently as specific threats to the integrity, authenticity and sustainability of these towns. A characteristic cycle may be described, as follows:

- The active population abandons the historic centres, with obsolete buildings and infrastructure, moving their economic activities to peripheral areas. The area is then populated by the lowest strata of the real estate market, by unemployed or low-income people.
- Decades later, the public sector, sometimes together with the private sector, decides the rehabilitation of these areas, making them a tourist attraction. If the activity is not properly regulated and the carrying capacity is excessive, there is always the risk of beginning again the decay cycle with new damages to the material and immaterial heritage.
- It may take place an expulsion of local inhabitants due to the high cost that now the land and properties have due to the effect of the new commercial value, giving rise to the social phenomenon known as “gentrification”.

Regarding the impact of tourism on historic towns and centres, it is possible to identify some indicators of what could be considered positive impact on the heritage sites and on the local community. The general idea is that tourism constitutes an opportunity for development; particular indicators are economic benefits produced by tourism, creation of jobs related to tourism, improvement of infrastructure and public spaces and opportunities for education and training. With regard to public spaces and infrastructure, World Heritage towns and urban areas are usually a target for improvement and enhancement. Usually, public spaces are well preserved and maintained; adequate urban furniture and infrastructure are provided or improved. This is an action that contributes to a general amelioration of quality of life of local population and enhances the experience of visitors. The inscription on the World Heritage List and the increase in the number of visitors constitute also an opportunity to restore historic buildings. New uses are often related to tourism. It is quite usual in Latin American towns that old one-family houses, quite difficult to continue with its original use, are dedicated to accommodation for visitors. This can be considered an opportunity in two senses; on the one hand historic buildings are restored and given a new use, generally by private investors, and, on the other, visitors may live the experience of lodging in typical historic houses, which is a means for a deeper contact with the local culture.

With regard to threats caused by unplanned or inadequately managed tourism, it is possible to summarise the situation on the basis of the following scheme (Conti, 2011):

- Replacement of traditional population, gentrification.

A frequent aspect related to management of historic urban areas and its tourist use is the displacing of traditional population or depopulation of historic neighbourhoods. This situation is strongly linked to a process that can be noted equally in developed and developing countries. The inscription of an urban area on the World Heritage List implies generally improvement of public spaces, of services and infrastructure. This takes to a rise in the market values of urban land and buildings and takes almost inevitably to the replacement of population. Traditional inhabitants of many historic areas are sometimes displaced by self decision since they prefer to sell their houses and buy new ones out from

heritage areas, something that produces financial benefit. In other cases, they are “pushed” by the pressure of investors or by groups having major revenues who want to buy properties in the prestigious historic areas.

The phenomenon of gentrification means the replacement of typical population of a given urban neighbourhood for another of greater financial resources or more exalted social position. The truth is that this process takes place equally in urban centres around the world, though with higher recurrence in economically disadvantaged countries. The reason that causes this process lies primarily in the fact that the buildings are purchased by individuals or entities, usually affecting them to different uses of the original. Thus, it is common to find old homes converted into hotels, restaurants or shops or even maintaining the residential uses but occupied as secondary homes for short periods throughout the year. This implies that the neighbourhoods gradually lose their population, which means at the same time a crisis regarding some aspects of authenticity. In this case, although the tangible components of buildings may be in good condition, even improved with respect to their previous state, a loss of authenticity of functions appear.

- Threats against authenticity

With respect to the alteration or distortion of heritage values and message, it is necessary to consider heritage as a set of tangible assets to which values related to history, art or science are assigned. In this sense, heritage is a carrier of meanings that we try to transmit, through the conservation of the material substance, from one generation to another. A proper understanding and interpretation of such values is therefore essential to understand the true meaning of heritage, to ensure proper use and to preserve its authenticity, understood not only as the preservation of the tangible components but also the intangible ones as functions, vocations, associated traditions, etc. In this sense, a conflict often observed with the spread of mass tourism is that heritage becomes a sort of spectacle and object of consumption, without reaching the adequate transmission and understanding of its values.

It may happen that while a heritage site is well preserved and its carrying capacity or limits of change are maintained at appropriate degrees, its dedication to tourism involves risks to its authenticity. This is a situation frequently observed in some heritage categories such as historic centres or urban areas. According to the current theory, authenticity is verified in several ways, taking into account tangible and intangible components; thus authenticity includes the consideration of materials, shape and design, setting, functions and vocations, meanings and traditions associated with specific sites (ICOMOS, 1994).

When we refer to threats to authenticity, we refer not only to damage caused on the material components of heritage but also to the risk on the intangible aspects that influence their authenticity. A typical case consists of many very well preserved historic towns or centres, both buildings and public spaces have good and proper maintenance. But excessive devotion to tourism means that the entire neighbourhood is devoted to visitors; all businesses are dedicated to the tourist, the old residences are now hotels or are destined to gastronomic uses, etc. The problem then is that while the material substance may be well preserved, this area has lost or drastically changed its meaning and its original functions, so there are aspects of authenticity that are really at risk. This aspect tends to be one of the most complicated issues in the management structures of heritage sites.

- Impact on traditional ways of life

Another type of impact is related to social aspects and, especially, to the relationship between the local community and visitors. Particularly when there is an economic asymmetry between them (more specifically tourism in economically disadvantaged regions), it is common that residents consider visitors as an "opportunity" to secure or increase their income. This can include the selling of typical products or the adoption of behaviours that are expected to cause impact on the visitor. It is common to find people who dress or act in a way that is not part of their daily lives; they become a part of the stereotypical image of the site and, therefore, something that the tourist expects to see. The problem is that in this way the resident community, or some of its members, are at the service of visitors' expectations; this implies another manifestation of a threat against the authenticity, in this case referred to lifestyles, habits, behaviours, etc.

Intangible heritage is fundamental not only to determine the outstanding universal value but also the authenticity of World Heritage properties. In spite of problems of depopulation and gentrification, most Latin American World Heritage towns retain a very rich intangible heritage made up by, among other components, music, gastronomy and traditions. This intangible heritage becomes also a tourism attraction and could be jeopardised if adequate safeguarding measures are not defined and implemented. It is worth asking what the limit is to safeguard traditional ways of life or social practices so that they could be preserved as authentic cultural manifestations and not as performances for visitors. What usually happens is that members of local population act in the way visitors expect them to. There is a sort of alienation of the local population in the visitor's expectations; this is one of the most important threats against authenticity.

Within the social aspects some "contradictions" appear between what could be called a positive effect on tourism and reality. When talking about tourism opportunities we have referred to the economic benefit, to the possibility of improving urban spaces and the provision of infrastructure and equipment. Often, the economic benefit is not evenly distributed among the resident community; although there is a general improvement of urban space and infrastructure, some sites are inaccessible to the residents. Many times the cost of access to cultural facilities and entertainment are fixed in terms of tourism, making them inaccessible to local people.

In order to illustrate these aspects, we will introduce two specific cases, the World Heritage properties of Cartagena de Indias, Colombia, and Colonia del Sacramento, Uruguay.

a. Cartagena de Indias

The historic centre of Cartagena de Indias and its fortresses were inscribed on the World Heritage List in 1984. The property includes the walled city and a set of fortresses located along Cartagena bay. Cartagena was one of the most important South-American ports over the Spanish period; the richness of the city and the importance of its port are evident in the architectural monuments (churches, convents and private residences) and in the defence system, since the town was several times attacked by pirates. Not only was the town surrounded by a massive wall but several fortresses were erected along the bay, protecting the entrance to the port. Cartagena is considered the most impressive ensemble of military architecture constructed by the Spaniards in the Americas and, at the same time, one of the

most beautiful and well preserved historic centres in Latin America, since much of the traditional urban fabric has been preserved.

It is not strange that the historic centre became a main tourism destination in the region. A joint UNESCO-ICOMOS report of 2006 recognised that *"the historic centre has not undergone substantial physical alterations ... while the use of the urban soil has deeply changed"*. The impact of tourism was the main cause of these changes. Until the 1980s, there were not luxurious hotels in the historic centre; the accommodation offering was limited to hostels of lower-middle level hotels. At the beginning of the twenty-first century, five-star hotels and conferences centres have been installed in former convents, skilfully renovated; palaces and historic houses have been restructured to house charming hotels and hostels and some residences were transformed into second houses for national and foreign tourists. The intense demand has increased the market prices, something that made convenient for residents to sell their properties and to leave the walled city.

Tourism has impacted differently on diverse areas of the historic centre. In the Centro district, the core area of the historic centre where the main institutional buildings are located, some of the positive effects already mentioned above can be noticed, such as the improvement of public spaces, the provision of urban facilities and furniture or new uses for historic buildings (Fig. 2).



Fig. 2. Cartagena, the Centro district. Good state of conservation of buildings and public spaces and high impact of tourism. (Photo A. Conti)

This is the area which exhibits the best state of conservation of the tangible components whereas the intangible ones have changed. The process of gentrification is evident; commercial facilities are related to satisfy the demands from visitors: luxury handicraft, restaurants, bars, night clubs and travel agencies are predominant in this area. San Diego district has traditionally been a more disadvantaged neighbourhood next to the Centro area. The invasive tendency of tourism is more contained, but not less important; it is concentrated around the large hotels and some public squares, and still cohabits, with certain equilibrium, with the traditions of the residual residents. However, this equilibrium is unstable and the increment of the tourist activities could compromise it definitively (Fig. 3).

On the other hand, there are areas where the pressures of tourism are not so evident so far, where traditional local population still lives. The neighbourhood of Getsemaní is the place of residence of low income traditional population. Although the state of conservation of buildings is not as good as in the Centro district and there are some problems with infrastructure, we can still notice the traditional ways of life and uses of the public space. Authenticity is noticeable not only with regard to tangible heritage components but to intangible components as well (Fig. 4).



Fig. 3. Cartagena, San Diego district: balance between traditional life and tourism. (Photo A. Conti)



Fig. 4. Cartagena, Getsemaní district: preservation of traditional population and social life. (Photo A. Conti)

Summarising, Cartagena could be taken as an example of different situations within the boundaries of the historic centre. Economic and environmental sustainability is evident in the districts where the impact of tourism is stronger, while social sustainability is at stake. Conversely, the areas preserving traditional population present deficiencies regarding their state of conservation and quality of life.

b. Colonia del Sacramento

The historic quarter of Colonia del Sacramento, Uruguay, was inscribed on the World Heritage List in 1995. The origin of the town was a village settled by Portuguese in 1680 on a peninsula by the east embankment of the Plata River, opposite of the then Spanish town of Buenos Aires. The village passed from Portugal to Spain and vice versa several times up to 1778, when it came definitively to Spanish rule. Colonia is an interesting example of merging of different urban and architectural features; although there are not impressive architectural monuments, the historic centre retains much of the typical atmosphere of a colonial town, increased by its setting. ICOMOS recognised that *“the main feature of Sacramento is however, its overall townscape, with its mix of wide main thoroughfares and large squares with smaller cobbled streets and intimate squares. The vertical scale is perfectly preserved, only the church tower and lighthouse rising above the mainly single or two-storeyed buildings”* (ICOMOS, 1994).



Fig. 5. Colonia: good state of public spaces and historic buildings. (Photo A. Conti)

Even before the inscription on the World Heritage List, the historic centre of Colonia had become an important tourist destination, the second one in importance in the country (Assunção, 2002). It is worth noting that the town is located some two hours by car from Montevideo, the country's capital city, and fifty minutes by ship from Buenos Aires, which comprises some ten million inhabitants within its metropolitan area. The process of gentrification started much before the inscription of the property on the World Heritage List and has continued ever since. The charming atmosphere of the historic centre made that people from Montevideo or Buenos Aires used to buy residences as secondary houses, a process that took to the progressive depopulation of the historic centre and to the rise of prices of land and buildings within the area. In 2002, Uruguayan authorities reported that the price per square metre was more expensive in Colonia than in Punta del Este, the well-known international Uruguayan beach resort. According to Venturini (2008: 11) the population of the historic quarter was some 300 inhabitants in 2008. Public spaces and architectural heritage are very well preserved in Colonia. Over the last forty years, the Honorary Council, the body in charge of the management, and the local government has made significant investment in restoration, conservation and maintenance (Fig. 5).

The impact of tourism on the public space is easily noticeable; some streets have been closed to motor traffic and have become outdoors cafés or restaurants. Historic houses have

generally been bought by people who use them as second residences and many buildings have been given new uses such as shops, accommodation facilities, restaurants or cafés (Fig. 6).



Fig. 6. Colonia, the impact of tourism on public space. (Photo A. Conti)

As in other historic centres, whilst the tangible components exhibit a good state of conservation, the authenticity of intangible components is especially at risk because of the impact of tourism. In this case, moreover, the proximity with Buenos Aires results in a one-day excursion being the most typical way of visiting the town, with an average of 3000 visitors per day along the whole year (Assunção, 2008); most visitors do not use the accommodation facilities and often spend only a few hours in the site.

5. Conclusion

As stated in the Brundtland report, sustainability includes three dimensions: economic, social and environmental. These three aspects were considered by the World Tourism Organization (WTO) to review the definition of sustainable tourism in 2005, stating that an adequate equilibrium should be established among the three. Although indicators to measure sustainable development have been used over the last twenty years and that WTO has been promoting the use of sustainable tourism indicators since the early 1990s, the

application of systems of indicators to tourism is more recent and still in a tentative face (Rivas García and Magadán Díaz, 2007). There is no a unique methodological approach for the definition of indicators of sustainable tourism (Blancs Peral et al, 2010); the definition and selection of indicators will depend on specific situations. The WTO has developed a system of core and supplementary indicators; among the former, there are several related to physical and social aspects: social impact (ratio of tourists to locals), developing control (existence of environmental review procedure of formal controls over development of site and use densities), planning process (existence of organized regional plan for tourist destination region), consumer satisfaction (level of satisfaction by visitors), local satisfaction (level of satisfaction by locals) and tourism contribution to local economy (proportion of total economic activity generated by tourism only). Among the supplementary indicators to be used for urban environments it is worth mentioning site degradation, restoration costs, levels of pollutants affecting site and measures of behavior disruptive to site (OMT, 1995).

A sustainable city is that which has the capacity of surviving and adapting to processes of changes, and at the same time, providing an environment quality related to settlement patterns and contexts throughout different times. The urban development needs to pay more attention to issues such as durability, the rational use of energy, pollution, natural and cultural heritage, resource conservation and biodiversity (Marat Mendes, 1998).

Two of the most important aspects for an adequate approach to urban conservation are the commitment and participation by local inhabitants in the process. Heritage conservation must be dealt not only by governments but also by all the population. It is no longer a public initiative but a community project (Bonnette, 2001).

As regards the cities in the developing world, and as consequence of the serious social and environmental problems, conservation of cultural heritage is not often seen as a priority. However, it must be taken into account that the destruction is generally irreversible. Therefore, their value and the information they contain is lost forever (Berstein, 1994).

Finally, it is observed that in both developed and developing countries, the tourist activity is growing, that is why it is urgently needed to implement practical measures destined to achieve the “sustainable area” which was previously mentioned, in order to balance the increase of visitors with their negative impacts on the natural and cultural heritage. If these limits are crossed, the opposite expected effects may be reached: deterioration and destruction of the involved heritage, by non-controlled visits that that *fragile matter*, as Torsello says, is not in conditions to bear (Torsello, 1998).

With regard to the items discussed in this paper, it is clear that built heritage has become a main tourist attraction. It is perceived by visitors as a testimony of the identity and attractiveness of the place and by stakeholders and residents as a source for revenue and for developing the tourism system. The presented study cases allow defining some conclusions regarding the relationships between built heritage and sustainable tourism:

- a. In both cases, it is evident that tourism has become a source of revenues and an opportunity for local economy. Nevertheless, it is not evident how these revenues are distributed among local population. Improvement and enhancement of public spaces

- are enjoyed by both locals and visitors but some commercial, cultural or entertainment facilities are practically inaccessible for local population.
- b. Public investment is mainly oriented to areas or sectors especially destined for visitors rather than for locals, while private investment is focused on projects that ensure revenues.
 - c. There is not a necessary relationship between interventions of restoration or enhancement of built heritage, especially historic buildings, and preservation of the authenticity of the sites. The process of gentrification is a sign of loss of authenticity regarding intangible attributes such as traditional functions or social practices. Nevertheless, this situation does not seem to be a problem for visitors, because they feel attracted mainly by the tangible attributes of historic centres rather than for the real life of local populations.
 - d. Sustainability based on economic aspects seems to be evident in both cases, since they can be considered successful from a point of view of generating revenues. The good state of conservation of public spaces and historic buildings allows referring to environmental sustainability as well. What seems to be at stake is social sustainability, on account of the situations explained below, i.e. gentrification, difficulties for local population to access to the facilities especially thought for visitors or acceptance by residents of the changes of use of urban land in favour of tourism uses.

These situations take to rethink how the tourism use of built heritage should be planned and implemented in order to ensure sustainability based on the three above mentioned aspects. Llorenç Prats (2003) challenges the idea that heritage plus tourism necessarily implies development; he proposes that the answer to the question should be “it depends”. Prats proposes three alternatives: a strict preservation and a non-expensive presentation of heritage; considering human resources as a significant heritage component (good technicians and low budget) and, finally, considering heritage as an integral instrument for local planning, not a simple instrument but the axis for local planning. This integration among heritage goods, human resources and proper planning could be the clue for a successful relationship between built heritage and sustainable tourism.

6. References

- Amarilla, B. (2010). Patrimonio cultural construido ¿Valorar lo invaluable? In: *Patrimonio y desarrollo local en el territorio bonaerense: el caso Chascomús*. Ed. by LINTA/CIC, La Plata, pp. 27-35. ISBN 978-987-1227-06-8.
- Assunção, F. (2002). *Estado de conservación de Bienes Específicos del Patrimonio Mundial. Barrio Histórico de Colonia del Sacramento*. Periodic report on the implementation of the World Heritage Convention in Latin America and the Caribbean. Unpublished.
- Berstein, J. (1994). *Land use considerations in urban environmental management*. Urban Management Programme, The World Bank, Washington, D.C. ISBN 0-8213-2723-2.

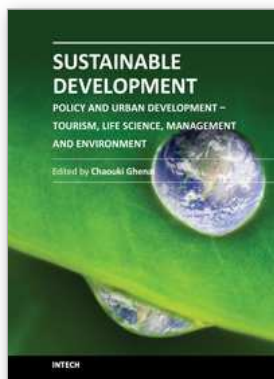
- Blancas Peral, F. J. et al (2010). *Indicadores sintéticos de turismo sostenible: una aplicación para los destinos turísticos de Andalucía*. Revista Electrónica de Comunicaciones y Trabajos de ASEPUMA, Vol. 11, pp. 85-118.
- Bonnette, M. (2001). Strategies for sustainable urban preservation. In: *Historic cities and sacred sites*. Ed. By I. Serageldin, E. Shlugar et al. The World Bank, Washington, pp. 131-137. ISBN 0-8213-4904-X.
- Carta de Machu Picchu (1977). In: *Revista Summa* No. 124, Buenos Aires, 1978, pp. 60-62.
- Chichilnisky, G. (1997). *What is sustainable development?* Land Economics Vol. 73, No. 4. University of Wisconsin Press, USA, pp. 467-491. ISSN 0023-7639.
- Casey, B., Dunlop, R. & Selwood, S. (1996). *Culture as commodity? The economics of the arts and built heritage in the UK*. Policy Studies Institute, London. ISBN 0-85374-671-0.
- Choay, F. (1992). *L'allégorie du patrimoine*. Editions du Seuil, Paris. ISBN 2-02-030023-0.
- Conti, A. (2011). The impact of tourism on World Heritage towns in Latin America. In: *Conference Proceedings "World Heritage and tourism: managing for the global and the local"*. Presses de l'Université Laval, Québec, pp. 385-398. Edited on CD. ISBN PDF: 9782763794389
- Filion, F. Folley, J. & Jacquemont, A. (1994). The economics of global ecotourism. In: *Protected area economics and policy*. Ed. by Munasinghe & McNeely. World Bank and World Conservation Union, Washington, pp. 235-252. ISBN 0-8213-3132-9.
- Hardoy, J. (1972). *Las ciudades en América Latina. Seis ensayos sobre la urbanización contemporánea*. Paidós, Buenos Aires.
- ICOMOS, International Council on Monuments and Sites (1994). *The Nara Document on Authenticity*. Available at:
http://www.international.icomos.org/charters/nara_e.htm (Accessed 17 June 2011).
- ICOMOS (1994): *World Heritage List. Sacramento*. Evaluation of the nomination to the World Heritage List. Available at:
http://whc.unesco.org/archive/advisory_body_evaluation/747.pdf (Accessed 17 June 2011).
- Lawrence, K. (1994). Sustainable tourism development. In: *Protected area economics and policy*. Ed. by Munasinghe y McNeely. World Bank and World Conservation Union, Washington, pp. 263-272. ISBN 0-8213-3132-9.
- Lichfield, L. et al. (1993). *Conservation economics*, ICOMOS, International Scientific Committee, Sri Lanka. ISBN 955-613-043-8.
- Meppem, T. & Gill, R. (1998). *Planning for sustainability as a learning concept*. Ecological Economics Vol. 26 No 2, University of Maryland, USA, pp. 121-134. ISSN 0921-8009.
- Notarangelo, A. (1998): Recovery of historical centres. In: *Proceedings XXV IAHS World Housing Congress*, Lisboa, Portugal, Volume 1, pp. 156-162. ISBN 972-752-024-3
- Morin, E. (1973). *Le paradigme perdu: la nature humaine*. Editions du Seuil, Paris. ISBN 2.02.005343.8
- OMT (Organización Mundial del Turismo) (1995): *Lo que todo gestor turístico debe saber. Guía práctica para el desarrollo y uso de indicadores de turismo sostenible*. OMT, Madrid.

- Ost, C. & Van Droogenbroeck, N. (1998). *Report on Economics of Conservation. An Appraisal of theories, principles and methods*. ICOMOS International Economics Committee, ICHEC Brussels Business School.
- Özgönül, N. (1998). Interrelaciones entre el turismo y el uso de asentamientos tradicionales-históricos. Caso objeto de estudio: una pequeña ciudad en la costa del Egeo de Turquía, Alacati. In: *Libro de Actas del IV Congreso Internacional de Rehabilitación del Patrimonio Arquitectónico y Edificación, La Habana*. CICOP, Tenerife.
- Pearce, D. & Mourato, S. (1998): *The economics of cultural heritage*. CSERGE, University College London (report).
- PNUD, Programa de las Naciones Unidas para el Desarrollo (1998). *Informe sobre desarrollo humano*. Ediciones Mundi-Prensa, Madrid. ISBN 84-7114-771-8.
- Prats, Ll. (1997). *Antropología y patrimonio*. Ariel, Barcelona. ISBN 84-344-2211-5.
- Prats, Ll. (2003). *Patrimonio + turismo = ¿desarrollo?* Pasos, Vol. 1, Nº 2. pp. 127-136. Available at: <http://pasosonline.org> (Accessed 7 July 2011).
- Racine, M. (2001). El turismo de jardines en Europa y particularmente en Francia. In: *Patrimonio paisajista: turismo y recreación*. Ed. by LINTA/CIC, La Plata, pp. 65-76. ISBN 987-98485-3-5.
- Rivas Garcia, J. & Magadán Díaz, M. (2007). Los Indicadores de Sostenibilidad en el Turismo. In: *Revista de Economía, Sociedad, Turismo y Medio Ambiente*, RESTMA Nº 6, 2007, pp. 27-61.
- Rojas, E. (1999). *Old cities, new assets*. Inter American Development Bank, John Hopkins University Press, Washington. ISBN 1-886938-62-8.
- Rojas, E. (2001). Revitalization of historic cities with private sector involvement: lessons from Latin America. In: *Historic cities and sacred sites*. The World Bank, Washington. ISBN 0-8213-4904-X.
- Saleh, M. (1998). *Transformation of the traditional settlements of southwest Saudi Arabia*. Planning Perspectives Vol. 13 No. 2, E & FN Spon, London, pp. 391-400. ISSN 0266-5433.
- Torsello, B. (1998). Architectural conservation as an economic resource. In: *Libro de Actas del IV Congreso Internacional de Rehabilitación del Patrimonio Arquitectónico y Edificación, La Habana*. CICOP, Tenerife.
- Towse, R. (2002). The cultural economy of heritage. In: *The economics of heritage. A study in the political economy of culture in Sicily*, Edward Elgar, UK, pp. 3-19. ISBN 1-84376-041-X.
- UNESCO, World Heritage Committee (2008). *Operational Guidelines for the Implementation of the World Heritage Convention*. Available at: <http://whc.unesco.org/archive/opguide08-en.pdf> (Accessed 17 Juin 2011).
- Venturini, Edgardo (2008). *Quartier Historique de la Ville de Colonia del Sacramento, Uruguay. Rapport de la mission ICOMOS, 9 - 11 juin 2008*. Available at: <http://whc.unesco.org/en/list/747/documents/> (Accessed 22 June 2011).
- Vincent, J. & Patin, V. (1993). Patrimoine culturel et tourisme en France. In: *International Scientific Symposium "Economics of Conservation" Proceedings*. ICOMOS, Sri Lanka, pp. 116-118. ISBN 955-613-045-4.

- Wells, M. (1994). Parks tourism in Nepal: reconciling the social and economic opportunities with the ecological threats. In: *Protected area economics and policy*, World Bank and World Conservation Union, Washington, pp. 319-331. ISBN 0-8213-3132-9.
- Young, K. (1997). *Wildlife conservation in the cultural landscapes of the central Andes*. Landscape and Urban Planning, Vol. 38, No. 3 & 4. Elsevier, Amsterdam, pp. 137-147. ISSN 0169-2046.

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Beatriz Amarilla and Alfredo Conti (2012). Built Heritage and Sustainable Tourism: Conceptual, Economic and Social Variables, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/built-heritage-and-sustainable-tourism-conceptual-economic-and-social-variables>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Sustainability Challenges: Changing Attitudes and a Demand for Better Management of the Tourism Industry in Malaysia

Janie Liew-Tsonis and Sharon Cheuk
*School of Business and Economics Universiti
 Malaysia Sabah*

1. Introduction

1.1 The acceptance of the sustainable development principles in reference to the brundtland report

Before discussing how tourism can be an essential tool for sustainable development, it is necessary to present the importance of sustainable development as a background for understanding its concept and principles. The notion about sustainable development started to come together in 1983, when the United Nations General Assembly (UNGA) established the World Commission on Environment and Development (WCED). One of the main objectives of the WCED was to prepare long-term planning on environmental concerns towards the year 2000 and beyond. The WCED also focused on heightening cooperation among developing countries, including countries at different stages of economic and social development. This was with the intention of creating mutually supportive objectives which took into account the interrelationships between natural resources and economic development.

The term, sustainable development, was popularised in *Our Common Future*, a report published by the WCED in 1987. Also known as the Brundtland Report, *Our Common Future* included the now accepted definition of sustainable development as development which meets the needs of the present without compromising the ability of future generations to meet their own needs. Acceptance of the report by the UNGA gave the term political salience and in 1992 leaders set out the principles of sustainable development at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil. This is probably the most crucial conference to date in promoting the concept of sustainable development; the event is now interchangeably referred to as the Rio Earth Summit, Rio Summit or the Earth Summit. The Rio Summit was the largest environmental conference ever held, attracting over 30,000 people including more than 100 heads of states. The objectives of the conference were to build upon the hopes and achievements of the Brundtland Report, in order to respond to pressing global environmental concerns and to agree on major treaties for biodiversity conservation, climate change and forest management. It also focused on environmental development and conceived frameworks for strategies and measures in minimising and controlling the effects of environmental

degradation. This had greatly assisted governments in the context of increasing domestic and global efforts in the promotion of sustainable development in their own and UN member countries.

Consequently, the event rapidly contributed directly in shaping the concept of sustainable development which led the United Nations Commission for Sustainable Development (UNCSD) to issuing Agenda 21. This was further affirmed, with a globally accepted political statement, called the Rio Declaration on Environment and Development. Agenda 21 is a framework which provides action plans consisting of forty workable chapters, detailing the future of sustainable development from 1992 into the 21st century. Although Agenda 21 is a nonbinding set of recommended approaches, this had since translated into greater co-operation between countries at different stages of economic and social development in the achievement of global objectives.

It is generally accepted that sustainable development calls for a convergence between the three pillars of achievement: economic development, social equity and environmental protection. Sustainable development is a visionary development paradigm and over the past 20 years, governments and private-sector businesses have accepted it as a guiding principle. This had involved progress on sustainable development metrics, and improved private-sector businesses and NGO participation in the sustainable development process. Yet for many, the concept remains elusive and institutional implementation has proven difficult as unsustainable trends continue and political entry points in making real progress remain generally very limited. As a result, market forces have taken over to become, in all intents and purposes, the understudy for the implementation of the sustainable development agenda. However, frameworks of private sector negotiations are not always appropriate platforms for broader strategic management discussions of sustainable tourism or sustainable development.

Unfortunately, while sustainable development is intended to encompass the three pillars, the general perception is that sustainability is often compartmentalised as an environmental issue. In addition to this, and potentially more limiting for the sustainable development agenda, is the orientation of development growth which is predominantly assessed as, economic growth. This is largely due to traditional economic frameworks used by developed countries in attaining unprecedented levels of wealth; in which rapidly developing countries, including Malaysia, aspires to attain. The dilemma with such an approach is that natural resources are often displaced and / or their quality compromised to an extent which threatens biodiversity and environmental preservation. Due to global changing attitudes and more environmentally knowledgeable societies, the demand for better management of businesses, including that of tourism is increasingly evident.

Although there is increasing affluence and technical capacity in implementing more sustainable policies and measures, the required level of political leadership and the engagement of society in Malaysia is still a long way off. This is compounded by economic growth which follows the resource-intensive model of developed countries. Without a concerted effort in addressing levels of consumerism and resource use, it would be difficult to expect a receptive audience when attempts are still directed towards pure economic development practices. In other words, more sustainable development directions are needed which will require levels of dialogue, cooperation and most importantly, conviction; which

are simply not reflected in the practices of multilateral institutions and organisations across tourism and its related businesses.

Even where attempts had been made to turn policies into action, the results have been limited. There is a huge gap between the multilateral processes in which broad goals and strategies had not transpired into national actions, which reflects domestic political and economic realities. Deep structural changes are needed in the addressing the practical side of businesses which allows society at large to manage its economic, social, and environmental affairs. Hard choices may need to be made in translating ideals into workable actions in making tourism more sustainable. However, while fractions argue that Malaysia has been unsuccessful in achieving its sustainable development obligations, it is worthwhile to consider that 20 years is a relatively short time frame to implement the required changes in such a mammoth area. As the country continues to achieve rapid growth, the needed systemic changes will require far-reaching ways in which businesses are managed. This will have impacts on lifestyles and consumption patterns—especially so in a fast developing country, with a rapidly growing middle class. The current global economic and environmental crises and the use of the liberalisation and globalisation models, in the trading of services, could bring renewed receptivity towards a shift in the sustainable development paradigm. The new economic models can demand development directions which could focus on reducing resource use, and integrating economic, environmental, and social issues in policy decision making. The opportunity is certainly there, for progress to go beyond concepts in its move towards actual systemic changes.

2. Malaysia's decision in taking tourism as a sustainable development option and hence, obligation to global agendas

In Malaysia, the tourism industry and its related services have emerged to become the second most important industry over the last twenty years. The industry has remained strong despite several economic slowdowns in Asia and continues to be a key foreign exchange earner, contributing to growth, investment and employment. The allocation of public funds has continued to increase in order to meet the demands of a growing tourist industry. However, global obligations towards Agenda 21 and Local Agenda 21 have not created the planning and management measures necessary to ensure that tourism growth is sustainable. Additionally, new legal measures have not been designed nor implemented, in order for concerns relating to uncontrolled development to be recorded. This challenge is complicated by differing concepts of economic growth and its relevance to sustainable development. The application and approach to sustainable development, including tourism, requires new legal tools which can mitigate and adapt to a knowledgeable traveling market base. Meeting this challenge will involve multi disciplines which are not traditionally deemed to be critical in international negotiations.

The tourism industry has tremendous potential in its contribution to sustainable tourism development, particularly for environmentally and culturally sensitive sites, which can be linked to Local Agenda 21 processes in planning and monitoring. In order to achieve sustainability, the tourism industry is perhaps in the better position in integrating and balancing competing economic, environmental and social interests. These interests are represented as pillars on the sustainable development model. However, the impediments to

achieving sustainable development arise not only from an imbalance of the economic, environment, and social sustainable development pillars, but also from political biases. Based on the economic potential tourism can bring to the country, Malaysia has taken this sector as one of its core development options. The government also recognises the vast potential of tourism as a major source of employment which can create a foundation for entrepreneurial resourcefulness. Hence, a great deal of marketing and promotion effort is placed in attracting increase arrivals to a destination which has much to offer in terms of competitive shopping, and natural icons of global significance. This has led to continued year-on-year growth in tourism arrivals, which are grounds for enthusiasm and concern.

There is no doubt that tourism has the potential to generate the needed revenue for the economy, increase awareness for the host environment and culture, in addition to increasing political incentives for the conservation of natural resources. Nevertheless, there are also increasing concerns that poorly managed or uncontrolled tourism can cause more damage to the environment, culture and society in general. Sustainable tourism is supposed to have the potential to meet each of these challenges. However, if sustainable tourism is to fully achieve its potential, well-founded principles and clear guidelines for the active involvement of stakeholders such as planners, developers and private entrepreneurs, are no longer obligatory, but a necessity. The guidance in facilitating site-specific research on socio-economic and environmental impacts of visitors, and the development of appropriate local, national and regional tourism strategies will need to be imposed.

Sustainable Development –the goal universally agreed to at the Rio Summit in 1992 – has become the main challenge, against the background of a rapidly growing tourism industry in Malaysia. Within the concept of the Brundtland Report and the framework of sustainable tourism, it is now necessary to address the key sustainable development issues especially for environmentally and culturally sensitive areas. The perception that sustainable development is a complex process which is too unachievable or simply too difficult cannot be given too much credence. Twenty years after the publication of the Brundtland Report, the concept behind *Our Common Future*, remains true to form and more critical today. The aims and objectives are realistic in that emphasis is focused on its practicality and application. The attention needs to be on manageable steps in which individuals and society can identify which supports sustainability.

There must now be less concentration on the design and promotion on all-embracing theoretical frameworks and idealistic concepts but rather on, applicable practices which leads to sustainable development; concentrating on identifying and applying lessons from practical experience and implementing the principles and commitments that have already been agreed. Consequently, the development of the tourism sector must begin with the goal of achieving a balance of the three pillars, as tourism offers a good starting point for analysing the relationship between sustainable development and progress. Sustainable tourism can be an effective tool in achieving sustainable development because when practiced, it benefits all the three fundamental pillars.

3. The need to address rapid adaption of technological changes, product innovation and new markets

There is no doubt that tourism is a dynamic industry; and with it, continued challenges are expected from its technologically confident market base. With technology developing,

tourist experiences are evolving at a rapid pace. Tourists acquire sophisticated and refined tastes and needs in differentiating tourism products and destinations based on a variety of sources. These levels of sophistication has transform into real trends where existing tourism products requires deep innovation; especially as the competitive focus is on the quality in service and comfort, combined with the uniqueness of the destination. In order to achieve continuous product innovation, destinations require a change in organisational policies and practices, at macro and micro levels, as well as, in their corresponding strategies. These changes can impact dramatically on profit margins if the engagement of organisationwide strategies, technology skill development and procedures are not in place in addressing this knowledgeable and technology savvy market base.

The 21st century had brought profound changes in the international and Asia-Pacific markets. Accordingly, the operations within the tourism industry in Malaysia, had faced a series of changes which required new strategies in capturing a bigger share of the global market. Among the changes was the increase in disposable incomes of developing nations, economic crises and natural disasters which had a direct impact on the industry. The adjustment of tourism suppliers in meeting the demand had required modifying the content of tourism products and adapting them to the requirements of global agendas, including the creation of products which meets sustainability concerns.

The changes generated by international trends, which already had an echo among the tourism stakeholders, are obvious. In most cases, the base for the development of new markets and new tourism products is represented by market demand. It is noteworthy to recognise that although in Malaysia, national policies for stimulating mass market tourism is still maintained, there is also a shift towards segmentation, specialisation and diversification of markets especially in the eastern states of Sabah and Sarawak, which focuses on nature and culture, as their primary markets. As travelers are becoming increasingly more sophisticated in terms of destination selection, the industry must adapt to rapid technology changes in order to meet demands. New technology, more experienced travelers, global economic restructuring and environmental limits to growth are only some of the challenges facing the industry. The desire to innovate is increasingly enhanced as it becomes the only way in which a highly competitive industry, such as tourism, can survive and prosper.

In most cases, competition can push destination management organisations to invest in innovation. Unless a competitive advantage is secured through innovations in terms of destination or products offered, there will still be uncertainty, in terms of risks and instability. Consequently, the key to success in meeting market demands will rely on the industry's ability to innovate and take risks. The tourism industry must be aware of and anticipate changes in the global tourism market, or risk losing their share of that very market. In order to increase market share, there is also the need for innovations to be backed up by real strategies in order to secure competitive advantages. The main types of innovation which is likely to trigger interest in the development of tourism is the adaptation to tourist purchasing power and behaviour.

The strategies of tourism operators bear resemblance to those in other fields of activity. In this situation, market size expansion, market share enhancement, cost cutting and product mix adjustments are looked into. As strategies go, they are closely associated with product innovation. For instance, tour operators that offered trips to undiscovered areas, expanding

its market share by attracting new customers who had not previously considered such options. Product innovations involve the ability to make one's product stand out from those of the competition. The essence of product differentiation exists in creating a niche as opposed to the competition, either at similar or different approaches, and thus, gains expansion by being a market leader with benefits to match. On the contrary, it is worth mentioning that opening the product market towards mass tourism has been significantly influenced by marketing and advertising playing their due parts, and also by investments in research into new product development and technology.

For instance, the development of holiday packages from Peninsula Malaysia towards the two eastern states of Sabah and Sarawak was heavily influenced by the technological changes in the purchase of plane tickets and the expansion of air accessibility. This has subsequently led to cheaper flights (due to competition), as well as by investments in hotels which further promotes domestic travel. This had underlined the importance of re-discovering domestic attractions whereby the tourism industry took advantage of international trends and adapting them locally. As far as process innovations are concerned, it has been recorded with respect to the length of time it takes to complete travel related transactions and subsequently, bear witness to varied methods of combining decision-making aspects, which led to increased business competitiveness.

Additionally, a combination of marketing innovations (including online retailing of airline tickets or accommodation), selectivity (seat assignment on board the aircraft), and the ability for price comparisons (between airlines) are now available at a touch of a button. Process innovations can be achieved through exclusive technological changes that are linked to the information technology revolution or ones which are specific to the tourism industry. By adapting to e-commerce technologies, the sales process within the tourism industry will have the highest impact. Technology changes the framework of competition regardless of the field of activity, location or size. This has a bigger impact on competitive advantages; as it gives opportunity for the set up of price and product differentiation.

The rapid changes in technology provides the tourism industry with a series of advantages linking it to unprecedented access to markets in terms of distribution channels, pricing policy, cost in shipping, and increase effectiveness. And, technology improvements also offer the travelling markets virtual tourism; even if costs generated by this have displayed a decreased trend in time, innovations constantly need substantial capital investments, either capital-related or pertaining to work force training. Therefore, it can be concluded that certain risks can be associated to technology innovations, despite technological evolutions. Information technology not only changes the volume of information transferred but it also influences the long-term relation within the distribution chain and gives rise to new forms of competition.

This issue has contributed to the metamorphosis of tourism; from a standardised, rigid mass phenomenon to a more flexible, customer-oriented industry which is more sensitive to the latter's needs and expectations. Information technology is certainly deemed as one of the factors which facilitated change. At the same time, it also triggers changes in the traditional organisation of production and can decrease the level of dependence on tourism agencies, as customers can purchase airline tickets or holidays directly via the internet.

Additionally, advancement in technology has contributed in some cases to the disappearance of customer relationships. From the perspective of information technology use, it is also noted that there are differentiations between tourism service providers, as not necessarily all markets enjoy equal rights to accessibility and has the required technical skills. Competitive capacity is still reliant not only on the development and implementation of new technologies but also on the capacity of the tourism industry in learning and adapting itself to changes. Further, the competition is not limited to the way in which the destination is positioned but also, can be due to its performance in the market. The cooperation within increasing levels of competition can be seen particularly in airline and hotel alliances.

4. The adoption of knowledge management strategies and governance in managing tourism development

The tourism industry has become one of the most dynamic industries globally; and, rapid adaptation to technological changes, product innovation and new markets must be explored. The United Nations World Tourism Organisation (UNWTO), which is responsible for overseeing global tourism growth, states that "... tourism is firmly established as the number one industry in many countries and the fastest-growing economic sector in terms of foreign earnings and job creation." The UNWTO also shows that growth of the tourism industry is indeed remarkable, with the number of international arrivals documenting an evolution from a mere 165 million international arrivals in 1970 to over 846 million in 2006. Moreover, the UNWTO forecasts an increase in the arrival number of international tourists to 1.6 billion in 2020. The critical relationship between the tourism industry and sustainable development is an examination of global trends and the challenges they raise. As environmental and societal decisions can be irreversible, individuals who hold key positions in determining policies which affect society must identify and solve unstructured problems which require the use of multiple information sources.

In Malaysia, the tourism industry's ability to maintain global arrivals in the future will depend largely on solid research, in order to better understand and accept new trends and concepts as they appear. The wellspring of future tourism growth in Malaysia is a commitment to good and structured frameworks as determined by differing policies in governance. The Government whether national, state or local, the private sector and non-government organisations (NGOs) is working cohesively in making this a reality. It realises that managing tourism growth depends on forward-looking policies and sound management philosophies which include a harmonious relationship amongst the public sector, private sector, non-government agencies and society at large.

If the assumption that policy decisions are made based on the delivery of rapid development which serves only to address tourist needs, this will undoubtedly cause setbacks to vital questions about the future of the destination, appropriate scale and type of development, and residents' quality of life. This is largely because this said assumption is questionable at times of rapid social change, especially where tourists' knowledge of sustainability, is not taken into consideration. The rise in tourism and international arrivals can be explained by many factors, including population growth, increased tourism segmentation, the development of information technology, and marketing. The internet has transformed the tourism industry, providing a medium for marketing through websites,

email, and website pop ups in addition to a dissemination of advice on where and how to get to the best destination, and a means for reserving airline tickets, car rentals, and hotels.

Consistent with the growth of information technology is the increase in the use of digital cameras and social networks such as Twitter and Facebook, which allow tourists and marketers alike to immediately share images of exotic destinations all over the world via email, blogs and websites. Such exchanges are increasingly influencing travel decisions. Furthermore, increasing efficiency in the transportation sector, such as aviation, increases the range, and capacity of travel. Despite discouraging factors, such as acts of terrorism (Bali bombings, 9/11), the economic crisis (USA, UK and Europe), and natural disasters (earthquake and tsunami in Japan), which sometimes slow the growing rate of tourism. However, the overall long-term growth rate of tourism will continue to increase.

In exploring current solutions, the management of tourism development offers insights for policy makers in seeking better solutions when confronted with issues on sustainability. The continuing importance of market-based strategies for balancing the development of the tourism sector demands a change in the way sustainability is viewed. As the tourism industry has become one of the fastest and largest growing economic sector in Malaysia, it can make an important contribution to sustainable development. Nonetheless, the implementation and development of policies, plans and strategies regarding sustainable tourism is a challenge for policy makers in balancing economic growth with sustainability.

Indeed, many methodologies and assessment tools for sustainable tourism management have been developed by researchers, which recognise the multiple facets of sustainability. Amongst them, Spenceley (2003) developed the Sustainable Nature-based Tourism Assessment Toolkit (SUNTAT) which provided a mechanism to measure sustainable tourism at two levels; strategic (for policymakers and planners) and enterprises (for tourism enterprises and developers), and took into account policy and planning, economics and tourism management, environmental and conservation management and social and cultural issues. Cernat and Gourdon (2007) developed a Sustainable Tourism Benchmarking Tool (STBT) in order to detect sustainability problems in a tourism destination. The tool, using benchmarks and policy-relevant indicators, was also aimed at enabling policymakers to make informed decisions and improve the prospects for sustainable tourism development in their respective countries. The STBT encompassed the key dimensions of economic sustainability (tourism assets, tourism activity, linkages, and leakages), socio-ecological sustainability, infrastructure sustainability and destination attractiveness.

Although there is much discussion that the tourism industry will be affected with the global economic crises, it is clearly evidenced that there will always be a market for tourism, due to an individual's wish to travel and discover new and foreign places. It is without doubt that the tourism industry has proven to be resilient and will continue to expand. As sustainable tourism is not only about protecting the environment, and tourism initiatives do bring benefits to some people and costs to others, what level of development and where to develop has become not only an academic field of study, but a highly political one. In any case, progress towards more sustainable forms of tourism will depend far more on the activities the industry and the attitudes of tourists, rather than solely the actions of public sector bodies and policies. In the highly competitive tourism market, success will come from understanding the target markets, and focus will be on the most profitable prospects in

terms of motivation to visit, economic yield and appreciation of what Malaysia, as a destination, to ensure its long term security as a profitable industry.

There is also continuing efforts to promote domestic tourism for future growth, within the thirteen (13) states of Malaysia. The lack of direct international access to Sabah and Sarawak, the two eastern states of Malaysia, will be the key constraint to these areas. There is clear emphasis that an expanded direct international service and more domestic links are important initiatives for the respective State governments. However, any major changes to the current scenario will not be achieved until open air accessibility is further developed to stimulate commercial demand for access. As international interest grows in authentic destinations, these two eastern states are positioning itself as nature and cultural hubs as specialty destinations, based on natural and cultural experiences.

5. The growth of tourism in Malaysia

The main government machinery behind tourism development is the Ministry of Tourism. This was first established as the Ministry of Culture and Tourism (MCT) in 1987, and further designated in 1990, as the

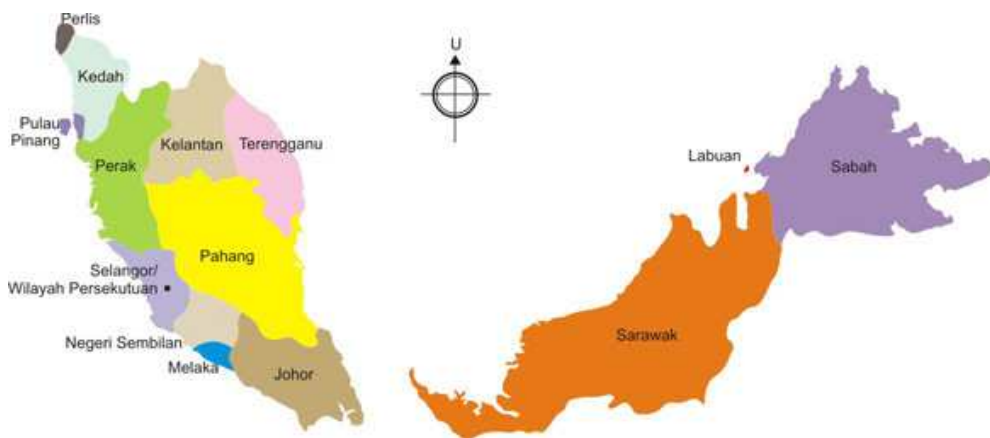


Fig. 1. The thirteen (13) States of Malaysia

Ministry of Culture, Arts and Tourism (MOCAT). In 2004, it reaffirmed itself as The Ministry of Tourism (MOTOUR) in order to fully reflect the responsibility of coordinating and implementing government policies and strategies pertaining to tourism development in the country. MOTOUR's vision is to develop Malaysia into a leading tourism nation and its mission is in the implementation of the National Tourism Policy and building the industry to be the nation's main source of income for socio-economic development. Currently, tourism and its related services is the second largest contributor to the nation's Gross Domestic Product (GDP) and contribution to employment is 1.7 million jobs.

The Malaysian Tourism Promotion Board, or commonly referred to as Tourism Malaysia, is a statutory body established under the Malaysia Tourism Promotion Board Act 1992. Tourism Malaysia's ultimate aim is to increase the number of foreign tourists to Malaysia,

extend the average length of their stay and increase Malaysia's tourism revenue. Its activities centre mainly on promotion and the increase of arrivals for both international and domestic tourism. It also coordinates all tourism related marketing and promotional activities conducted by any organisation; government, non-government or private sector. Tourism Malaysia also offers recommendations for the adoption of appropriate methods, measures and programmes, in order to facilitate or stimulate the development and promotion of the tourism industry within the country.

Malaysia is made up of thirteen (13) states; each has its own government and autonomy in its decision for tourism development. Eleven of the states are located in the Malaysian Peninsula (West Malaysia) and two in the Island of Borneo (East Malaysia). In addition to the thirteen states, Kuala Lumpur, Labuan and Putrajaya are called Federal Territories. At the national level, the direction for tourism development is led by the Ministry of Tourism. At state levels, such as Sabah and Sarawak, this is led by the Ministry of Tourism, Culture and Environment and Ministry of Tourism and Heritage, respectively. Not every state is represented by a designated Ministry for tourism development; of importance, as Sabah and Sarawak relies on nature and culture as the foundation of their tourism attraction, there is more emphasis for both these East Malaysian states to focus on sustainability in the development of tourism.

Tourism development is continuing to be an important economic activity for Malaysia. In the 1960's, tourism was virtually unheard of as an economic option, let alone as a sustainable development option. With complete autonomy to decide on how tourism is developed within the country, each State Government is not only in competition with another state, but also in competition with similar destinations regionally and around the world. This is evidenced by the year-on-year increase of funding allocation towards tourism development and promotion within the country. From the 1970s, the Malaysian government's priority was the provision of basic tourism infrastructure, like highways, airports and upgrading of attractions in each state. This was fast tracked in the 1980's, as a means to meet several development objectives. Tourism was actively promoted, and the focus was in terms of marketing and the improvement of services.

It was anticipated that tourism will increase foreign exchange earnings, lead to an increase in employment, and raise the standard of living of the population; in addition to fostering regional development. However, in spite of two decades of rigorous public sector intervention, tourism was only identified and taken seriously as an industry that had the potential to stimulate the socio-economic development of the country in the late 1980s to mid-1990s, when economic recession hit the region. In order to boost private sector investments, the Malaysian government concentrated on promoting tourism by providing incentives to develop accommodation, visitor centre facilities and actively encourage Bumiputera participation. Bumiputera or Bumiputra is a term widely used in Malaysia. This category of the populace embraces ethnic Malays and other indigenous ethnic groups in the eastern Malaysian states of Sabah and Sarawak.

The sustainable development approach is particularly important in tourism because this sector depends almost entirely on attractions and activities that are related to the built and natural environment; including any historic and cultural features these extends to in society. The tourism industry is both dynamic and diverse. Services and tourism go hand in hand

and to implement a tourism strategy, or make informed decisions involving major tourism projects and events, there is a critical need to have the right information and decision criteria. The concern for the impact of tourism is not confined to developed countries; it is part of a growing concern in regard to the sustainability of tourism in Malaysia, as well. Although meeting the needs of travelers by providing tourism related goods and services have proven to be an attractive form of economic development, unplanned tourism growth can also lead to problems. Attempts to encourage the development and growth of tourism activities are often desirable because tourism creates jobs and offer much needed foreign exchange into the country. However, year-on-year visitor growth into areas which hold the major tourism attractions is likely to have impacts on the environment on site and society, as a whole.

The complex interplay of balancing the sustainable development pillars includes economical, environmental and socio-cultural dimensions. This requires a broad understanding and acceptance from different stakeholders, working directly and / or indirectly in the tourism sector. Malaysia is ranked 16th in terms of global inbound tourism receipts, capturing approximately 2% of global market share in 2008. Of increasing relevance, the tourism industry provides 1.7 million jobs or approximately 16% of total employment in 2008. From its 11th position in 2008, with 21.3 million international arrivals, Malaysia entered the UNWTO *Top 10 Major Tourism Destination Ranking* in the 9th position in 2009. From 2006-2009, revenue from the tourism industry increased 67.1% to MYR 53.4 billion and tourist arrivals increased 43.6% to 23.6 million. For 2011, the Ministry of Tourism is targeting an increase in arrivals to 25 million. National planning and budget allocation in Malaysia is projected every five years. For the latest, 10th Malaysia Plan period of 2010-2015, the target is to improve Malaysia's position to be within the Top 10 in global ranking, in terms of tourism *receipts* and increase the sector's contribution by 2.1 times. It is also projected that this will contribute MYR 115 billion in receipts and provides 2 million jobs for the industry by 2015.

However, the projections for Malaysia from the World Travel and Tourism Council (WTTC), is more conservative. WTTC anticipate that direct contribution of the travel and tourism to Malaysia's GDP for 2011 is expected to be MYR 56.9 billion, which represents 7.2% of the total GDP), and expected to rise by 5.1% per annum to MYR 93.6 billion (7.7%) in 2021. This is expected to support 768,000 jobs directly; representing 6.7% of total employment. Despite these achievements, several issues need to be addressed, including the need to develop vibrant and iconic tourism products, improve maintenance of existing tourism sites and adoption of more focused tourism promotions.

It is without doubt that the key trend of the tourism industry in Malaysia is that, it is on its way up. This trend points to the increasing role and significant contribution of the industry to the Malaysian economy, particularly in the next ten years. From virtually a zero base in the 1960's, there are now clear indications and a recognition that the tourism industry will continue to play a significant role in the Malaysian economy. In order for tourism to be sustainable, it is vital that effective policies and planning take place *today*. Hence, policy makers, planning officials and stakeholders must identify emerging trends in tourism and orchestrate new measures that will lead to orderly growth (and production of quality products) which benefits both tourists and society. While domestic tourism is more difficult to measure, the figure is often estimated to be up to ten times the number of international

visitors. The statistics demonstrate that tourism can create economic development, investment, and income growth within the country. However, the rapid growth of tourist arrivals can also increase pressure on the natural, cultural and socio-economic environments.

Tourism development in Malaysia, like most parts of the world, is growing at a rapid pace and no doubt, is an essential part in the trade in services and economic development. With continued enhanced spending, bringing with it widespread development, an understanding of the complexities and relationships which co-exist in tourism and the roles played within the concept of sustainable development remains unclear. With the expected rise in tourist arrivals, comes the complex interplay of the social, cultural and environmental dimensions of which sustainable tourism commits to. Therefore, a broad understanding, acceptance and commitment of the different stakeholders, either working directly and indirectly in the industry, must be in place. To capitalize on the emerging trends and opportunities, the tourism industry and the public sector will need to improve on the markets' knowledge of Malaysia and what it has to offer.

In determining the direction of the government's aspirations and policies, lie the challenges and interplay of global declarations, such as Agenda 21, and the creation of sustainable policies at national and local levels. These will cumulatively, lead to sustainable development of the tourism sector amongst its thirteen states. In making the decision to take tourism as a sustainable development option, tourism must be planned and managed so that its influences on environmental, socio-cultural and economic benefits are spread widely throughout society. The question is – can Malaysia remain competitive if the global concern for sustainability is not addressed today?

6. The potential and pitfalls in tourism development

Different approaches to the valuation of goods and services can lead to an inconsistent reporting of outcomes. The dilemma lies in the different approaches to the valuation of goods and services by the three fundamental stakeholders within the tourism industry; policy makers (Government direction and guidelines), the private sector tourism industry (in the business of making money) and local residents (the victims or the beneficiaries?). Sustainable tourism represents a value point of referencing in which the management of tourism impacts takes precedence over market economics – although tension between the two is ever present. Further, tourism impacts rarely take precedence over market economics in practice, even though the term *sustainable tourism* is often used. In tourism ventures within natural environments, economic success and environmental impacts are often negatively associated; therefore, policy makers and the private sector must find a balance between the interest for nature and the *impact* of outside influence to these natural areas. As tourism is essentially dependent on the unspoilt nature of a destination's attractions (natural or built), it follows that tourism has the responsibility for, and a need to invest in, the maintenance of the natural environment.

Tourism's relationship with the environment is complex. It involves many activities which can have adverse environmental effects. Tourism, as an industry can no longer claim its success based on economics alone. Many of these negative impacts are linked to the construction of general infrastructure such as roads and airports, and of tourism facilities.

Water, as a natural resource, is often exploited where tourism facilities are concerned. Infrastructure built specifically to generate tourism arrivals such as hotels and resorts, swimming pools and golf courses, generally overuse water which can result in water shortages and degradation of water supplies, as well as generating a greater volume of waste water. A common example is that an average 18-hole golf course built in a tropical country, such as Malaysia, needs a minimum of 1500kg of chemical fertilisers, pesticides and herbicides per year and uses as much water for a minimum of 60,000 adults. Without doubt, the quality of the environment, both natural and built, is essential to tourism. What needs to be recognised is that the negative impacts of tourism development can gradually destroy the natural resources on which it depends, if infrastructure is indiscriminately developed for tourism.

The negative impact of tourism usually occurs when the level of visitor use is greater than the environment's ability to cope with this use, within the acceptable limits of natural changes. Uncontrolled tourism development generally poses enormous pressures on any natural area, and the quality of the environment, is unquestionably essential to the success of tourism. In spite of the large amount of literature available documenting the pressures which unplanned and uncontrolled tourism development can have on natural resources, especially in cases of consumption increases in areas where resources are already scarce, the success of tourism is still being qualified by its economic contributions.

Although tourism can cause the same forms of pollution as any other industry like air emissions, noise, solid and liquid waste, littering, sewage, oil and chemical releases, the increase in transport by air, road, rail or sea amplifies an eroding quality of air. Other negative impacts such as land degradation and pollution are also not taken into consideration when economic benefits are recorded. Tourism can create pressures on local resources such as energy consumption, food supply and other raw materials that may already be in short supply. Greater extraction and transport of these resources intensify the physical aspects associated with their exploitation. Due to the seasonal nature of the industry, during peak season, transient residents such as visitors can be as high as ten times that of the low season for some areas. The higher demands and expectations of tourists places pressures that surpasses the natural development process caused by the increased construction of tourism and recreational facilities, including land clearing and extraction of resources for the use of building materials.

As tourist arrivals continuously increase, year-on-year, tourism is now responsible for an important share of carbon emissions. It is estimated that a single transatlantic return flight emits almost half the carbon dioxide emissions produced by everyday usage and consumption of sources, such as lighting and air-conditioning in vehicles, consumed by an average person yearly. Transport emissions and emissions from energy production and use are linked to acid rain, global warming and air pollution. Some of the impacts are quite specifically caused by tourism activities. For example, tour buses often leave their engines running for hours while waiting for arrivals at airports or while waiting to go out on excursions and to, during and from excursions.

However, it has also been maintained that if properly managed, tourism has a huge potential in creating positive effects on the environment by contributing to environmental awareness, protection and conservation. An example made popular by the travelling public

is that tourism, unquestionably, has facilitated a greater awareness of environmental values. Tourism has also successfully served as a tool to finance the protection of natural areas and thus, led to an increase in their economic importance. Therefore, there is an obvious need to balance the use of tourism as a driver of economic development and the management of its public resource consumption. With the continuous increase in tourism arrivals, there is a need to find a balance between the maximisation of income from tourism and that of exploiting resources beyond its extent of being sustainable. The latter would be equivalent to killing the familiar goose which lays the golden egg, and does not make economic sense for either the public or the private sector.

The indication is that sustainability or conservation can mean very different things in different environments and social circumstances, which makes the practicing of the concept even more challenging. If Malaysia wants its tourism industry to succeed, it needs suitable plans and policies to enhance the development of tourism. A large part of tourism is about travel and the role of the public and private sectors must come together in addressing common goals. In Malaysia, it is largely due to the improvement of such private-public relationship which had contributed to the expansion of tourism. Inevitably, in order for all stakeholders to benefit from tourism, attention needs to be given towards the perceptions and understanding of the participants, including the tourists. This need to take into account the level of involvement each brings to the table and impacts of such involvement. Nevertheless, it is also critical to accept the roles played by the different stakeholders and their inter-relationships. In order for tourism to be sustainable, it is vital that a win-win situation be identified and its implications for sustainable development which benefits economic, social and environmental carrying capacity. Whichever way you look at it, sustainability of the natural and cultural environment is an integral part of the tourism industry.

7. The development of sustainable tourism

The tourism industry is important to Malaysia, as it assists in fulfilling global agendas, whilst serving as a source for economic development. Tourism, like many other sectors of the economy, uses resources, generates wastes and creates environmental, cultural and social costs. The processes laid out in Agenda 21 (and, Local Agenda 21) revitalized the commitment on goals and objectives set out at the Rio Summit which addressed environmental conservation and socio-cultural interactions. The main issues for integration under Agenda 21 are within the areas of social and economic involvement of major groups such as women, children, youth, non-governmental organisations and local authorities; especially in the promotion of education, public awareness and training.

The Ministry of Tourism has advanced the development of tourism by concentrating on the development of policies, strategies and master plans for sustainable tourism. This had required continuous cooperation and consultation among all stakeholders, including the private sector, academic institutions, local communities, and relevant non-government organisations. It also called for capacity building across sectors and public participation to include and involve rural communities. Policies had included financial support and incentives for tour operators and accommodation investors to play a continuing role in developing the tourism sector; however, these policies had not included programmes nor indicated tools and instruments to cover appropriate institutional, legal, economic, social and environmental monitoring frameworks, nor do they include voluntary initiatives and

agreements such as a commitment to corporate social responsibilities (CSR), amongst the stakeholders.

A lot of sustainability debates in Malaysia are about process failures; failures to engage and listen to the right people and organisations in the consideration of long-term, as well as immediate impacts. To take into account wider and less obvious upstream or downstream effects, consultative decision-making can narrow gaps between differing motivations to development and quite rightly, there has been much attention in addressing these deficiencies. It has to be noted that progress has been made in many areas with a commitment to open and transparent participative decision-making. This is accepted as an essential foundation for sustainable solutions across the national Government and its agencies.

To further enhance the sustainability agenda, the extent and depth of discussions has revealed many gaps in the lack of analytical tools in assisting comprehension and acceptance. There has also been a growth in the number of conceptual approaches such as life-cycle analysis, which has been vital in providing a structure for analysis, especially in the identification of priorities and the monitoring of progress in fractions of government agencies. But it is important to keep in mind that such techniques are tools to help decision-making and they do not make the decision itself. All they can practically do is provide direction to ensure that all the economic, social and environmental factors are identified. But assessing the trade-offs between, say, jobs, social cohesion and environmental damage will always be a political decision, and not an academic equation; thus, clear and defined net cost/benefit conclusions are not always the main consideration. This broadly considers how sustainable development has developed in Malaysia and continues to be managed in recent years.

8. Tourism as a tool for sustainable development

Tourism is considered to be a trade in services and differs from the trade in goods. Tourists travel to consume at the host destination, and in the case of international travel this is often, referred as cross-border consumption. With this, the development of tourism has direct environmental, economic and socio-cultural impacts on the consumption patterns within a host country. In terms of economic development, the appeal of tourism is that it can create jobs and stimulate business opportunities. It also generates foreign exchange earnings, injects capital and new money into the development of the local economy. Tourism contributes to government revenue generation through taxes and levies, either directly and/or indirectly. It can also stimulate regional development and the development of infrastructure such as roads, airports, and improve telecommunication links. Therefore, the quality and standard of life for local residents can be enhanced by economic diversification through tourism. Bearing in mind that tourism development can have a positive or a negative impact, or both, it is considered to be a powerful tool for sustainable development.

Where environmental and cultural conservation can lead to an increase of economic opportunities through the development of tourism, this can also be an incentive to protect natural resources; rather than allow for further degradation. Tourism can create financial resources which can be used for overall conservation programs and activities, such as improved park ranger salaries, park maintenance, and the establishment of more national

parks and protected areas. Tourism can also significantly contribute to environmental protection, conservation and the restoration of biological diversity and the sustainable use of natural resources. By nature of tourism's demand of aesthetic standards, pristine sites and natural areas are considered valuable for it to be an attraction; and the need to keep the attraction appealing can lead to the creation of additional natural areas to be protected as public parks. These protected areas can then further contribute to sustainability, in ways that have not yet been fully explored; such as providing a base for new medical treatments or new industries or just by serving as carbon sinks. On the other hand, negative consequences from tourism arise when the level and type of visitor use is greater than the environment's ability to cope with this use within the acceptable limits of natural changes.

For example, everyone drinks water and generates waste. Uncontrolled conventional tourism poses potential threats to natural areas if visitors are not managed properly. It can also put a strain on water resources, which can lead to local populations competing for the use of critical resources and increased costs for purification. Uncontrolled tourism development can also put enormous pressures on an area and lead to land degradation, increased pollution and discharges of solid and liquid waste, habitat loss, and heightened the vulnerability of environmentally sensitive areas such as marine and terrestrial habitats. The negative physical impacts of tourism development include construction activities, infrastructure development, deforestation and unsustainable use of the land. The unplanned rapid development of tourism can also create significant social disruptions and increase environmental and ecological pressures.

The government's focus on the economic pillar alone can lead to deficiencies affecting the environmental and social pillars. Tourism development is often compared to a two-edged sword. On the one hand, it can be a tool for sustainable development. On the other, if not managed adequately, tourism can significantly impede sustainable development. Of central importance, national policies need to reflect a high level of commitment to environmental management, which include strategies to effectively limit social and environmental impacts, in the short and long term, which ensures equitable sharing of benefits.

9. Malaysia's response to the principles of sustainable tourism development

Today, sustainable development is a core issue implicating every step of development. Sustainable development aims to allocate the limited natural resources not only for this generation, but also for future generations. It aims to balance development and the environment, in addition to, maintenance of an appropriate balance between economic and environmental development. As the travel and tourism industry continues to grow in Malaysia, the industry must face up to serious and difficult choices about its future. The decisions made now will, for years, affect the way of life, standards of living, and economic prospects of residents in the country. Based on the attractions which Malaysia is promoting in order to differentiate itself regionally and internationally, many of these decisions may be irreversible. Once Malaysia loses its character which makes it distinctive and attractive to tourists, it will also lose the opportunities that go with a tourist-based economy which is increasingly competitive.

In ensuring that development is going in the right direction, a number of political actions have been determined. Sustainable development has become a principle practice and many

of the recommendations of Agenda 21 have guided the new pathway of policies in addressing the issues. In the recently released 10th Malaysia Plan (2011-2015), the recognition that the quality of the environment, both natural and man-made, is essential to tourism is duly acknowledged. However, tourism's relationship with the environment is complex. It involves many activities that can have adverse environmental effects. Many of these impacts are linked with the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas. The guidelines and details of how negative impacts of tourism development, which can gradually destroy natural resources on which it depends, is however, lacking.

The conflict of interest between public and private sectors in tourism development has been well-documented. If private enterprises remain, to a great extent, unregulated, it is expected that short-term profit maximisation will be sought over and above the interests of sustainability. The growing attention towards tourism development in Malaysia has been centrally driven by the potential economic benefits the industry can bring. This traditional view is now complicated not only by trends towards more socially and environmentally responsible travel but also in the intangible nature of the industry whereby stakeholders are seeking direct involvement in the development of tourism, especially where natural and socio-cultural integrities are concern.

To achieve the 2015 targets set under the 10th Malaysia Plan, the focus will be on attracting a larger share of high spending travelers; and capturing a higher share of high growth segments. The target segments are Russia, India, China and the Middle East, in addition to increasing the overall total number of tourist arrivals from current markets. For this purpose, select key strategies are promoted. The marketing approaches for unique and distinctive travel patterns and needs for visitors are defined. The aim is to attract the markets seeking nature and adventure (including ecotourism), cultural diversity, family fun, affordable luxury, and Meetings, Incentives, Conferences and Exhibitions (MICE).

There is also emphasis for the improvement of existing tourism products through the creation of focused tourism clusters that will leverage on existing and new iconic tourism products, which supports sustainable tourism; such as natural icons within the thirteen states in Malaysia; e.g. the Geopark and Pulau Payar Marine Park in Langkawi, Georgetown (a UNESCO World Heritage Site in Penang), Sipadan Island and Kinabalu Park, (a UNESCO World Heritage Site in Sabah) and the Sarawak Cultural Village and Gunung Mulu National Park (a UNESCO World Heritage Site in Sarawak). Subsequently, considerable budgets are allocated for the improvement and maintenance of tourist sites through multiple approaches. The framework for funding mechanisms is anticipated to be via Government linked companies and corporate sponsorship. It is also expected that stronger enforcement and imposition of entrance fees, particularly in environmentally sensitive and heritage sites, will further enhance the importance in conserving these sites.

It has also been recognised that by realigning promotional and advertising activities with the physical presence of Tourism Malaysia offices overseas, this will in turn enhance Malaysia's presence with the identified core market segments. To further affirm the government's commitment to sustainable tourism development, the beginning of a progressive certification of tourism products and activities will be implemented to ensure that quality, sustainability and safety are accentuated. With this in mind, particularly where national guidelines exist, the concept of sustainable development had influenced legislation,

and policies are continuously building on recommendations from the Brundtland Report and processes within Agenda 21.

10. Conclusion

The debate over environmental conservation and protection is often about the balance between leaving the area in its natural state and / or exploiting it for economic development. This choice is often fraught with pressures from stakeholders with differing motivations. Thus, an atmosphere of mutual cooperation is necessary to ensure that tourism economic opportunities are translated to social and environmental benefits for all and not limited to segments of society. One of many ways to achieve this is by forming strategic alliances with partners from all sectors in creating and establishing links between sustainable economic development and the government's social and environmental obligations.

The call from the UNCD since the Brundtland Report remains as valid and urgent as ever today. The description of similar processes identified in the Brundtland Report has been applied to organisations, including tourism businesses, and these have to some extent encouraged real progress towards the vision for sustainable development. Although it had been necessary to make changes in achieving the Brundtland Report's goals for sustainable development, it is easy to overlook that progress had been made. The continuous effort now is to concentrate on replicating and dispersion of that progress. The twenty years since the Brundtland Report has seen all the processes associated with globalisation developed at a bewildering pace. This, in turn, has helped encourage much greater awareness and understanding of the economic, environmental and social challenges across the world.

There is a strong recognition that effective sustainable development can only be achieved with the engagement of society as a whole. Sustainable development thinking needs to be integrated and ingrained in policy and decision-making at all levels. This had required the development of processes and procedures from the United Nations through all levels of government and individual businesses and organisations. Over the next twenty years, the aim is for sustainable development processes to improve to an extent whereby, sustainability thinking is the norm which does not require special units, procedures or written instructions as it does now.

The same can be said of that which has been applied to Corporate Social Responsibility (CSR). The concept of CSR has become so ingrained in some business practices that it is a self promoting and sustaining end in itself. This has since provided a broad framework for businesses in generating profits which maximises positive contribution to society. Although tourism as an industry will never be completely sustainable, as every industry has its impacts, it can work towards being more sustainable in many ways. Key issues identified include the need for responsible planning and management, where a balance must be found between limits and usage so that changes are monitored. In Malaysia, there remains a strong sentiment that environmental management is the responsibility of the public sector, as effective implementation of sustainable development practices and environmental monitoring, is seen to be for the long-term. This has proven to be a difficult task as methods of information gathering had not expanded, and reinforced basic communication, intellectual, and interpersonal values, are not embedded into private-sector management practices.

Tourism development has helped with environmental protection by creating awareness on its values and in generating mass opinions for conservation; it has also contributed to the promotion of intercultural understanding and acceptance within the country itself. As Malaysia has a multiethnic population, tourism has narrowed the gap between the different ethnic groups. As tourism undergoes fundamental changes globally, from the experiences sought, to setting demands on regulations and an increase in budget for environmental protection, signs of these shifts have been progressively evident. This has varied from statements on natural and cultural values to stipulation of conservation fees. In spite of these, the challenges deriving from differing policy approaches indicates that the interests of all parties are not safeguarded from commercial exploitation and tourism benefits are not transcribed to society and tourists alike.

More attention can be paid to applying existing techniques, concepts and tools where they can add most value. There is certainly the need to build on and exploit the core competencies of different stakeholders. The Malaysian Government has set the broad policy frameworks and through its fiscal, regulatory, incentives and disincentives, catalysed and inspired actions which support sustainability. The Brundtland Report has set out to do, and has done well, in providing a platform and focus for exchanging experience and learning between governments, society and businesses. This had encouraged the networking and scaling up of successes in practical progress whereby sustainable development can work. However, there is a need for a more cohesive interaction amongst implementing stakeholders in embracing tourism within the sustainable development option; taking into consideration the varied depth of knowledge, working practices and priorities of the different stakeholders. The linkage to sustainability and key issues including the need for responsible planning and management is found, between limits and usage, and changes monitored. This requires long-term management and recognition that change is often cumulative, gradual and irreversible.

Hence, in order to address the sustainability of tourism, the economic, social and environmental aspects of sustainable development must include the collective interests of all stakeholders. The tourism industry in Malaysia has to face some serious and difficult choices about its future. The decisions made now will, for years after, affect the lifestyles and economic opportunity of the country. For any tourism development to have the desired effect, it is necessary to position tourism as an improvement to the quality of life for society at large and not just to tourists and visitors. The pitfall of a bottom-up or top-down approach in tourism intervention is largely influenced by the values, rights and responsibilities of the implementing stakeholders. The ability to use data, exercise judgment, evaluate risks, and solve genuine and emerging concerns will determine options for continuing on the road of the past, or address emerging concerns about the rapid development of the industry now to ensure that its future remain just as profitable. The effects on the quality of life of host residents can no longer be determined by past performance.

Tourists, visitors and residents are increasingly demanding that the industry pursue sustainability and care of the environment; as opposed to unconstrained economic growth. It can be argued that the GDP or per capita income is incomplete measures of well-being. These measures not only do not accurately portray the distribution of economic benefits among local people nor do they realistically reflect on important quality of life factors, social

distribution of existing and anticipated costs and benefits of resource use. Although by its very nature, the concept of sustainability makes it difficult to coordinate and monitor, the implementation of sustainable development in the formulation of effective policies and, the deciding factors will have to be how policy assessments are based. Globally accepted principles can contribute to accelerated and effective implementation of sustainable development, even where the prevailing institutional approaches compartmentalise ecological, social, economic and cultural issues, as separate factors. In conclusion, there is certainly a need to systematically explore the linkages that exist, whether recognised or not, between tourism, the environment and sustainability as the Brundtland Report recommended more than twenty years ago.

11. Acknowledgement

The empirical findings of this chapter are part of a research project on “Redefining Tourism Management: Identifying Critical Success Factors on Tourism Sustainability and Corporate Social Responsibility”. This was funded by the Ministry of Science and Technology under its Science Fund Project No: 06-01-10 SF0134 from 2009–2010. The authors hereby express their sincere gratitude to the Ministry of Science and Technology Malaysia, for the opportunity of this research.

12. References

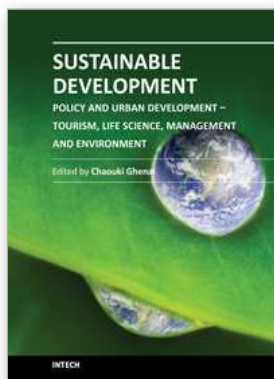
- Abdul Aziz, W, Hani, N, Musa, Z., (2007). Public-Private Partnerships Approach: A Success Story in Achieving Democracy in the Home Ownership for Urban Inhabitants in Kuala Lumpur, Malaysia.
- Ap. J., (1992), Residents Perceptions on Tourism Impacts, *Annals of Tourism Research*, 19(4), pp 665-690.
- Ap. J, Crompton, J., (1993), Residents Strategies for Responding to Tourism Impacts, *Journal of Travel Research*, 32(1), pp 47-50
- Ayala, H., (1996). Resort Ecotourism: A Paradigm for the 21st Century, *Cornell Hotel and Restaurant Administrative Quarterly*, 52 (16), 256-269.
- Baloglu, S, McCleary, K., (1999). A Model of Destination Image Formation, *Annals of Tourism Research*, 26 (9), 868 - 897.
- Bernama, (2009). New Economic Model Expected in Second Half 2009, retrieved March 11, 2011 from <http://www.bernama.com/bernama/v5/newsindex.php?id=414374>
- Biehl, D. (1991), The Role of Infrastructure in Regional Development. (pp. 9-35). In Vickerman, R.W. (eds). *Infrastructure and Regional Development. European Research in Regional Science*. I. Pion. London
- Biederman, P., (2008), *Travel and Tourism: An Industry Primer*, Pearson Education, New Jersey
- Baloglu, S and Mangaloglu, M. (2001). Tourism Destination Images of Turkey, Egypt, Greece and Italy as Perceived by US based Tour Operators and Travel Agents. *Tourism Management*. 22:1-9.
- Baloglu, S and McCleary, K. (1999). A Model of Destination Image Formation. *Annals of Tourism Research*. 26:868-897.
- Bond, P. & O'Flynn, D. (2005, August 2). London Olympics 2012: corporate greed and privatization, *World Socialist Web Site*. Retrieved April 6, 2009, from <http://www.wsws.org/articles/2005/aug2005/olymp-a02.shtml>

- Butler, R., (1980). The Concept of a Tourist Area Cycle of Evolution: Implications for Management of Resources, *Canadian Geographer*, 24(1), 5-12.
- Butler, R., (1991). Tourism, Environment, and Sustainable Development, *Environmental Conservation*, 18(3), 201-209.
- Cater, E. and Lowman, G., (1994). *Ecotourism: A Sustainable Option?*, John Wiley, Great Britain
- Ceballos-Lascurain, H. (2001). *Integrating Biodiversity into the Tourism Sector: Best Practice Guidelines*, UNEP/UNDP.
- Cernat, L. and Gourdon, J. (2007). *Is the concept of sustainable tourism sustainable? Developing the Sustainable Tourism Benchmarking Tool (STBT)*. New York and Geneva: United Nations. Retrieved September 5, 2011 from http://www.unctad.org/en/docs/ditctncd20065_en.pdf.
- Cheuk, S., Liew-Tsonis, J., Phang Ing, G., Razli, I., (2009). An Establishment of the Role of Private and Public Sector Interests in the Context of Tourism Transport Planning and Development: The Case of Malaysia, *Proceedings from EABR Conference, Prague, Czech Republic*, June 8-11, 2009.
- Cook, R, Yale, L, Marqua, J., (2010). *Tourism: The Business of Travel*, 4th Edition, Pearson.
- Cook, R, Yale, L, Marqua, J., (2006). *Tourism: The Business of Travel*, 3rd Edition, Pearson International Edition
- Chon, K., (1991). Tourism Destination Image Modification Process: Marketing Implications.
- Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative and Mixed Method Approaches*, 2nd Ed.. US: Sage Publications.
- Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative and Mixed Method Approaches* (2nd Ed.). US: Sage Publications.
- Crouch, G, Ritchie, J. R.B., (1999), Tourism, Competitiveness, and Social Prosperity, *Journal of Business Research*, 44(3), 137-152.
- Davis, D, Allen, J, Cosenza, R., (1988), Segmenting Local Residents by their Attitudes, Interests, and Opinions Toward Tourism, *Journal of Travel Research*, 27(20), pp 2-8.
- Dogan, H.Z., (1989), Forms of Adjustments: Sociocultural Impacts of Tourism, *Annals of Tourism Research*, 16(2), 216-136.
- Doxey, G., (1975), *A Causation Theory of Visitor-Resident Irritants: Methodology and Research References*, Travel and Tourism Research Associations Sixth Annual Conference Proceedings, TTRA, San Diego.
- Dyer, P, Gursoy, D, Sharma, B, Carter, J., (2007), Structural Modeling of Resident Perceptions of Tourism and Associated Development on the Sunshine Coast, Australia, *Tourism Management*, 28(2), 409-422.
- Dredge, D. & Jenkins, J. (2007). *Tourism planning and policy*. Queensland, Australia: John Wiley & Sons.
- Economic Planning Unit Malaysia. (2006). *Ninth Malaysia Plan, Realising Tourism Potential*. Retrieved April 5, 2009, from <http://www.epu.gov.my/rm9/english/Chapter8.pdf>
- Echtner, C., Ritchie, J., (1992). The Meaning and Measurement of Destination Image. *Journal of Tourism Studies*. 2(2):2-12.
- Fakeye, P. and Crompton, J. (1991). Image Difference between Prospective, First Time and Repeat Visitors to the Lower Rio Grande Valley. *Journal of Travel Research*. 30(2):10-16.

- Frias, D. M., Rodriguez, M.A. and Castaneda, J.A. (2007). Internet vs Travel Agencies on previsit Destination Image Formation: An Information Processing View. *Tourism Management*. 29:163-179.
- Forester, J. (1989). *Planning in the Face of Power*. Berkeley, CA: University of California Press.
- Forester, J. (1993). *Critical Theory, Public Policy and Planning Practice: Toward a Critical Pragmatism*. Albany, NY: State University of New York Press.
- Gartner, W. (1993). Image Formation Process. *Journal of Travel and Tourism Marketing*. 2:191-216.
- Gartner, W. and Bachri, T. (1994). Tour Operators' Role in the Tourism Distribution: An Indonesian Case Study. *Journal of International Consumer Marketing*. 6(3/4): 161-179.
- Getz, D., (1983). Capacity to Absorb Tourism: Concepts and Applications for Strategic Planning, *Annals of Tourism Research*, 10(2):239-263
- Getz, D., (1994). Residents Attitudes Towards Tourism: A Longitudinal Study in Spey Valley, Scotland, *Tourism Management*, 15(4), 247-258.
- Goeldner, C.R., Ritchie, J.R.B and McIntosh, R.W. (2000). *Tourism Principles, Practices, Philosophies*. 8th Ed. John Wiley & Sons Inc. New York.
- Gold, J.R. and Ward, S.V. (1994). *Place Promotion*, John Wiley & Sons, Chichester.
- Godfrey, K, Clarke, J., (2000). *The Tourism Handbook: A Practical Approach to Planning and Marketing*, Continuum, London
- Goodrich, J. (1978). A New Approach to Image Analysis through Multidimensional Scaling. *Journal of Travel Research*. 16(3):3-7.
- Hall, M, Lew, A., (1998). *Sustainable Tourism: A Geographical Perspective*, Longman
- Hunt, J. (1975). Image as a Factor in Tourism Development. *Journal of Travel Research*. 13 (3):1-7.
- Healey, P. (1997). *Collaborative Planning: Shaping Places in Fragmented Societies*. London: Macmillan.
- Holloway, J.C. & Taylor, N. (2006). *The Business of Tourism* (7th ed.). England: Pearson Education Limited.
- Inskeep, E. (1987). Environmental Planning for Tourism, *Annals of Tourism*, Vol.14: 118-135.
- Innes, J.E. (1996). Planning through consensus building: A new view of the comprehensive planning ideal. *Journal of the American Planning Association*, 62(4), 460-473.
- Introduction to the Ministry of Unity, Culture, Arts and Heritage. Retrieved March 25, 2009, from <http://www.heritage.gov.my/about/pengenalan/?c=6>
- Khalifah, Z. & Tahir, S. (1997). Malaysia: Tourism in Perspective, *Tourism and Economic Development in Asia and Australasia* (pp. 176-196). London: Cassel.
- Lerner, M. and Haber, S. (2000). Performance Factors of Small Tourism Ventures: the Interface of Tourism, Entrepreneurship and the Environment. *Journal of Business Venturing*. 16:77-100.
- Liew-Tsonis, J. (2008). Ecotourism Development: Government, Industry and Community Linkages, *Proceedings from the Asia Pacific Tourism Association (APTA) 2008 Conference*, 9-12 July 2008, Bangkok, Thailand.
- Liew-Tsonis, J. (2007). Ecotourism as a Tool for Conservation: An Analysis of the Role of Implementation Stakeholders, *Proceedings from the 5th Tourism Educators' Conference on Tourism and Hospitality*, 2007, 1-4 August 2007, Penang, Malaysia. Malaysia Tourism Promotion Board Act 1992. Retrieved September 12, 2009 from <http://www.agc.gov.my/agc/oth/Akta/Vol.%2010/Act%20481.pdf>

- Mayo, E. (1973). Regional Images and Regional Travel Behaviour. *Proceedings Travel Research Association Fourth Annual Meeting*. Sun Valley, ID. pp. 211-218.
- Mayo, E. and Jarvis, L. (1981). *The Psychology of Leisure Travel*. Boston: CBI.
- Mehta, M. (2009, March 15). Tourism Malaysia Optimistic About Tourist Arrivals. *Bernama (Malaysia)*, Retrieved April 5, 2009, from <http://www.bernama.com/bernama/v5/newsgeneral.php?id=396348>
- M. Schrenk, V. V. Popovich & J. Benedikt (Eds.), *REAL CORP 007: To Plan Is Not Enough: Strategies, Plans, Concepts, Projects and their successful implementation in Urban, Regional and Real Estate Development* (pp. 159 – 165). Wien/Schwechat: CORP.
- Ministry of Tourism Malaysia Corporate Website, *Profile Section*. (2009). Retrieved August 6, 2009 from http://www.motour.gov.my/index.php/kem_profil.html
- Ministry of Transport (2009): <http://www.mot.gov.my/index.php>
- Musa, G. (2000). Tourism in Malaysia. In C.M. Hall & S. Page (Eds.) *Tourism in South and South-East Asia: Issues and Cases* (pp. 144-156). Oxford, England: Butterworth Heinemann.
- Page, S.J. (1999). *Transport and tourism*. England: Pearson Education Ltd.
- Parsons, W. (1995). *Public Policy: An Introduction to the Theory and Practice of Policy Analysis*. Aldershot: Edward Elgar.
- Pearce, P. (1982). Perceived Changes in Holiday Destinations, *Annals of Tourism Research*. 9:145-164.
- Pierce, P, Moscardo, G, Ross, G., (1996), *Tourism Community Relationships*, Elsevier Science Ltd, Oxford.
- Phang Ing, G., Liew-Tsonis, J., Cheuk, S., Razli, I. (2009). An Examination of the Challenges Involved in Distributing a Strong and Consistent Destination Image in the Marketing of Tourism in Malaysia, *Proceedings from EABR Conference, Prague, Czech Republic*, June 8-11, 2009.
- Phelps, A. (1986). Holiday Destination Image: The Problem of Assessment, *Tourism Management*. 7: 168-180.
- Pike, S. (2005). Tourism Destination Branding Complexity, *Journal of Product & Brand Management*. 4(4):258-259.
- Purdue, R, Long, P, Allen, L. (1990). Residents Support for Tourism Development, *Annals of Tourism Research*, 17(4), 586-599.
- Simon, D., (1996), *Transport and Development in the Third World*, Routledge, London
- Spenceley, A. (2003). *Managing Sustainable Nature-Based Tourism in Southern Africa: A Practical Assessment Tool*. Unpublished PhD thesis, University of Greenwich, United Kingdom. Retrieved September 6, 2011, from <http://anna.spenceley.co.uk/files/ManagingSustainableNBTTToolkitSpenceley.pdf>
- Taylor, G, Stanley, D. (1992). Tourism, Sustainable Development and the Environment: An Agenda for Research, *Journal of Travel Research*, 31(1), 66-67.
- Taylor, M. (1995). *Environmental Change: Industry, Power and Policy*, Avebury, Aldershot.
- Thompson, D., Wilson, M. (1994). Environmental Auditing: Theory and Applications, *Environmental Management*, 18(4), 605-615. Tourism Concern, 2009. Retrieved 26 March 2011, from www.tourismconcern.org.uk
- Tourism Malaysia Corporate Website, *About Us Section*. Retrieved March 25, 2009, from <http://www.tourism.gov.my/corporate/aboutus.asp>
- Tourism Malaysia Corporate Website, *Research Section*. Retrieved April 5, 2009, from

- <http://www.tourism.gov.my/corporate/research.asp> United Nations. (1997). *Public-private partnerships: The enabling environment for development* ST/SG/AC.6/1997/L/6). Retrieved April 5, 2009 from <http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN000727.pdf>
- Wall, G., Mathieson, A., (2006). *Tourism: Changes, Impacts and Opportunities*. England: Pearson Education Ltd.
- Wikipedia, (2009). <http://en.wikipedia.org/wiki/Bumiputra#Definition>
- Williams, P., Gill, A., (1991). *Carrying Capacity Management in Tourism Settings: A Tourism Growth Management Process*, Simon Fraser University, BC
- Williams, J, Lawson, R, (2001), Community Issues and Resident Opinions of Tourism, *Annals of Tourism Research*, 28(2), 269-290.
- Woodside, A, Lysonski, S. (1989). A General Model of Traveler Destination Choice, *Journal of Travel Research*. 27(4):8-14. World Future Council. Retrieved March 1, 2011 from <http://www.worldfuturecouncil.org>. World Tourism Organisation. (1997). *Tourism 2020 Vision*, Madrid: TO UN Conference on Environment and Development; Report UN: New York, NY, USA, 13 June 1992; Volume I, Doc A/CONF.151/26 31 ILM 874. *Rio Declaration on Environment and Development (Annex 2)*; UN World Commission on Environment and Development; Report UN: *Our Common Future*; Report, 4 August 1987; UN Documents: A/42/427; Retrieved 16 April 2011 from <http://www.un-documents.net/ocf-10.htm> UN Conference on Environment and Development; *Agenda 21 (Annex 2)*; 13 June 1992; Volume I, Doc A/CONF.151/26. UN Documents: *Background Paper for the UNCSD*; UNCSD: New York, NY, USA, 18 April–3 May 1996; Retrieved 8 March 2011 from <http://www.un.org/documents/ecosoc/cn17/1996/background/ecn171996-bp3.htm> UN Documents: *Documents from the World Summit for Sustainable Development*; WSSD Documents; World Summit for Sustainable Development (WSSD): Mumbai, Maharashtra, India, August 2002; retrieved 01 March 2011 from http://www.un.org/jsummit/html/documents/summit_docs.html UN Documents: *Johannesburg Declaration on Sustainable Development and Johannesburg Plan of Implementation*; Report of the World Summit on Sustainable Development; UN: New York, NY, USA, 4 September 2002; retrieved 01 March 2011 from http://www.un.org/jsummit/html/documents/summit_docs.html UN Documents: *United Nations Millennium Development Goals*; Retrieved 01 March 2011 from www.un.org/millenniumgoals.



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Janie Liew-Tsonis and Sharon Cheuk (2012). Sustainability Challenges: Changing Attitudes and a Demand for Better Management of the Tourism Industry in Malaysia, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainability-challenges-changing-attitudes-and-a-demand-for-better-management-of-the-tourism-indus>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Sustainable Development Global Simulation: Analysis of Quality and Security of Human Life

Michael Zgurovsky

*National Technical University of Ukraine "Kyiv Polytechnic Institute", Kyiv,
Ukraine*

1. Introduction

This research is based on the concept of "sustainable development" being the further development of studies of V. Vernadskij about noosphere (Vernadskij, 1944). It has been theoretically and practically proved that on the edge of the centuries studies about the noosphere appeared to be a necessary platform for the development of three-dimension concept of ecological, social and economic sustainable development (Summit Planet Earth, 1992) and (Johannesburg Summit, 2002).

Economic approach is based on the optimal usage of limited resources and application of natural-, power- and material saving technologies for creation of the gross income flow which would at least provide the preservation (not reduction) of the gross capital (physical, natural or human), with the use of which the gross income is created.

From the ecological point of view the sustainable development is aimed at provision of the integrity of both biological and physical natural systems as well as their viability that influences the global stability of the whole biosphere. The ability of such systems to renovate and adapt to the various changes instead of maintenance of the biological variety in the certain static state, its degradation and loss is becoming extremely important.

Social constituent is aimed at human development, the preservation of stability of social and cultural systems, as well as the decrease in the number of conflicts in the society. A human being shall become not the object but the subject of the development participating in the processes of his/her vital activity formation, decision-making and implementation of the decisions, in the control over their implementation. To meet such requirements it is important to fairly distribute the wealth between the people, to observe pluralism of thoughts and tolerate human relationships, to preserve cultural capital and its variety, including first of all, the heritage of non-dominant cultures.

Systemic coordination and balance of these three components is an extremely difficult task. In particular, the interconnection of social and ecological constituents causes the necessity to preserve equal rights of present and future generations to use natural resources. The interaction of social and economic constituents requires the achievement of equal and fair distribution of material wealth between people and help provision to the poor. And finally, the correlation of environmental and economic components requires the cost estimation of anthropogenic influences on environment. The solution of these tasks is the main challenge

of the present time for the national governments, influential international organizations and all progressive people of the world.

In this research a Sustainable Development Gauging Matrix (SDGM) (Zgurovsky, 2007) within three abovementioned components is proposed and these processes are globally modeled in terms of quality and security of the human life. With the help of this Matrix the sustainable development processes have been globally modeled for a large group of world countries in terms of quality and security of the human life.

2. The methodology of sustainable development evaluation in terms of quality and security of the human life

2.1 Sustainable development as the quaternary functional of quality and security of the human life

The important issue in the process of implementation of the concept of sustainable development is the formation of the measurement system (Matrix) for the quantitative and qualitative assessment of this extremely complicated procedure.

The process of sustainable development will be characterized according to two main components: security (C_{sl}) and quality (C_{ql}) of the human life as it is shown in fig.1.

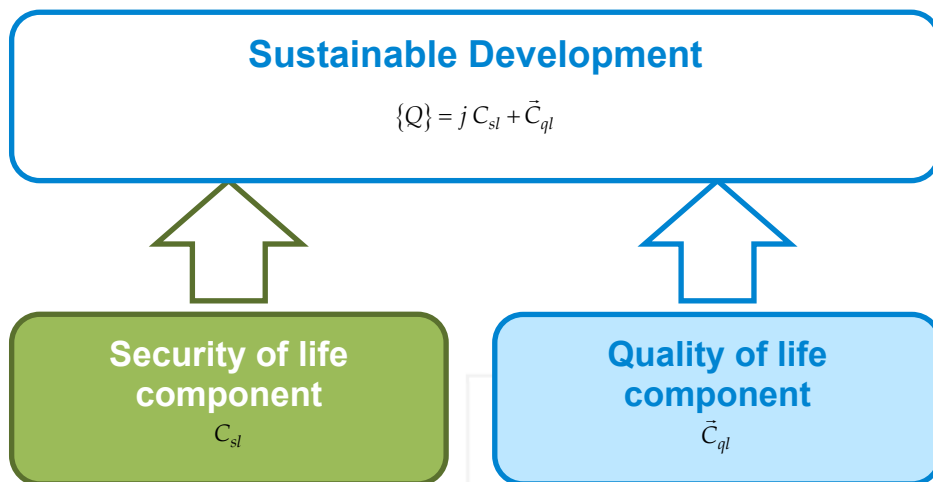


Fig. 1. Quaternary approach to the description of sustainable development process

Under this concept, the generalized measure (index) of sustainable development can be presented by means of the quaternion $\{Q\}$:

$$\{Q\} = j C_{sl} + \vec{C}_{ql}(I_{ec}, I_e, I_s). \quad (1)$$

The quaternion $\{Q\}$ includes an imaginary scalar part jC_{sl} which describes the security of human life and a real scalar part as a projection of the norm of vector radius $\vec{C}_{ql}$ to an ideal vector with coordinates (1;1;1) which describes the quality of human life within three

dimensions: economic (I_{ec}), ecological (I_e) and socio-institutional (I_s). Under this condition j gains a value of a real unit for a normal regular state of society development at $C_{sl} > 0$ and a value of an imaginary unit when a society enters conflict state ($C_{sl} = 0$):

$$j = \begin{cases} 1, & \text{for } C_{sl} > 0; \\ \sqrt{-1}, & \text{for } C_{sl} = 0 \quad (\text{conflict}). \end{cases}$$

2.1.1 Sustainable development estimation methodology in the context of quality of human life

For every country the Euclidean norm of vector radius of human life quality ($\vec{C}_{ql}$) is given in the following form:

$$\|\vec{C}_{ql}\| = \sqrt{I_{ec}^2 + I_e^2 + I_s^2}. \quad (2)$$

In this case the indicators and policy categories included are calculated as a weighted total:

$$I_i = \sum_{j=1}^n w_j x_{i,j}, i = \overline{1, m}, \sum_{j=1}^n w_j = 1, \quad (3)$$

where I_i is a value of an indicator or a category of policy for i^{th} country (the number of the countries is m), w_j is weight of the j^{th} component of I index (the number of the components is n), $x_{i,j}$ is a value of the j^{th} component for i^{th} country.

Such representation of integrated indices (indicators and categories of policy) envisages that components of $x_{i,j}$ in the formula (3) must be non-dimensional and vary within the same range.

Considering the fact that all data, indicators and indices included into the model are measured by virtue of different physical values, may be interpreted differently and change within the different ranges, they were aggregated to the standard form in such a way that all their variations would occur within the range from 0 to 1. The following formula was used:

$$l_{i,j} = \left(1 + e^{\frac{\overline{x_j} - x_{i,j}}{\sigma(x_j)}} \right)^{-1}, \quad (4)$$

where $x_{i,j}$ and $l_{i,j}$ are respectively the initial and standard j^{th} value for i^{th} region, $\overline{x_j}$ is the average value of x_j at sampling and $\sigma(x_j)$ is the corresponding standard deviation. To calculate a mean value and a standard deviation value the following formulae are used:

$$\overline{x_j} = \frac{\sum_{i=1}^m x_{i,j}}{m}, \sigma(x_j) = \sqrt{\frac{\sum_{i=1}^m (x_{i,j} - \overline{x_j})^2}{m+1}}.$$

Such data setting provides that values of indicators being the worst from the point of view of sustainable development correspond to numerical values near to 0, and the best values approach 1.

This normalization gives the possibility to calculate each of I_{ec}, I_e, I_s indices and with the help of them the components with appropriate weighting coefficients. Then the quantitative value of human life quality can be identified as projection of the norm of this vector to an ideal vector with coordinates (1; 1; 1), (Fig.2):

$$C_{ql} = \sqrt{I_{ec}^2 + I_e^2 + I_s^2} \cdot \cos(\alpha). \quad (5)$$

The deviation angle α of the vector's radius C_{ql} from the ideal vector (1,1,1) is estimated on the basis of the values of dimensions I_{ec}, I_e, I_s in the following way:

$$\alpha = \arccos \frac{I_{ec} + I_e + I_s}{\sqrt{3} \cdot \sqrt{I_{ec}^2 + I_e^2 + I_s^2}}, \quad 0 \leq \alpha \leq \arccos \frac{1}{\sqrt{3}}. \quad (6)$$

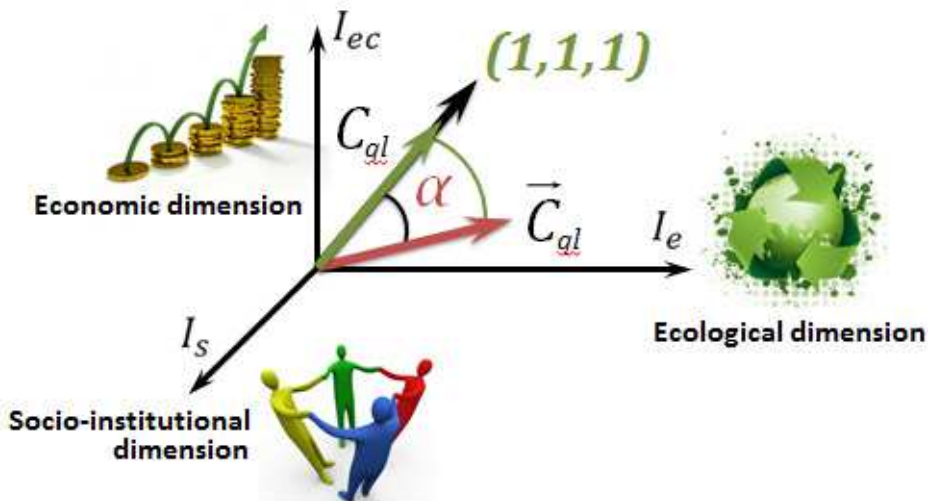


Fig. 2. Human life quality component (C_{ql}) and harmonization level ($G=1-\alpha$)

Thus, the projection of the norm of the vector's radius $\vec{C}_{ql}$ to the ideal vector (1,1,1) characterizes the human life quality and the attitude position of the vector $\vec{C}_{ql}$ in the coordinate system (I_{ec}, I_e, I_s) characterizes the "harmonization" level of sustainable development. We should mention that when the angle α approaches 0, the harmonization level of sustainable development increases, i.e. the equidistance of the vector $\vec{C}_{ql}$ from each of coordinates (I_{ec}, I_e, I_s) will correspond to the highest harmonization value of sustainable development. If this vector approaches one of these coordinates, this will indicate the priority direction of the corresponding dimension development and neglect of two others. Let the value $G=1-\alpha$ be the harmonization level of sustainable development. It will increase when G approaches 1 and decrease when G approaches 0.

As the researches of human life quality and security are conducted with the help of different methods and sets of initial data, it is worth performing them separately in three stages. At the first stage we will analyze the human life quality as one of the components of sustainable development. At the second stage we will investigate the human life security as another component of sustainable development. And at the third stage we will calculate the aggregate value of the Sustainable Development Index using two components and investigate this index.

In order to conduct the research of the life quality component of sustainable development, it is necessary to sample the data with the help of which each of three dimensions of sustainable development will be characterized in the most appropriate way. These data shall conform to the following important requirements: they have to be formed annually on continuing basis by respected and recognized international organizations.

Thus, the life quality component of sustainable development C_{ql} and the harmonization level of sustainable development $G=1-\alpha$ are calculated on the basis of their constituents I_{ec} , I_e , I_s . Considering the requirements to initial data mentioned above the value of every dimension I_{ec} , I_e , I_s will be calculated according to five global indices widely used in the international practice (Tab.1), being annually formed by the recognized international organizations. Let us consider all of them.

Life quality component C_{ql}	Global index	Constituents	Source
Economic (I_{ec})	I_c —Global Competitiveness Index	12 policy categories, 25 indicators	World Economic Forum [www.gcr.weforum.org]
	I_{ef} —Economic Liberty Index	10 indicators	Heritage Foundation & The Wall Street Journal [www.heritage.org/index/]
Ecological (I_e)	EPI —Environmental Performance Index	10 policy categories, 25 indicators	Yale and Columbia universities, USA [www.epi.yale.edu]
Socio-institutional (I_s)	I_{ql} —Life Quality Index	9 indicators	International Living [www.internationalliving.com/]
	I_{hd} —Human Development Index	3 policy categories, 4 indicators	UN Development program [www.hdr.undp.org]

Table 1. Global indices used for calculation C_{ql} and $G=1-\alpha$

The Economic Dimension Index (I_{ec}) will be made of the two following global indices (Table 1.)

1. *The Global Competitiveness Index (I_c)* was created by the organizers of the World Economic Forum. This index is annually estimated for 139 world economics and published in the form of so-called “Global competitiveness report” (World Economic Forum, n.d.). We will use the

data of such report for 2010-2011. The Global Competitiveness Index is formed of the following three groups of indicators: 1 – *the group of indicators of basic requirements (Basic requirements)*; 2 – *the group of indicators of efficiency enhancers (Efficiency enhancers)* and 3 – *the group of indicators of innovation and sophistication factors (Innovation and sophistication factors)*.

The first group includes four complex categories of economic policy: *Institutions; Infrastructure; Macroeconomic stability and Health and primary education*. The second one consists of six policy categories: *Higher education and training; Goods market efficiency; Labor market efficiency; Financial market development; Technological readiness and Market size*. The third group involves two important complex indicators: *Business sophistication and Innovation*.

2. The Index of Economic Freedom (I_{ef}) was created by the Heritage Foundation (The Heritage Foundation, n.d.). This index is formed of the following ten indicators: a level of business freedom; a level of trade freedom; a level of fiscal freedom; a dependence degree of economics on the government; a level of monetary freedom; a level of investment freedom; a level of financial freedom; private property rights; a level of freedom from corruption; a level of labor-market freedom. These ten indicators are calculated according to the expert assessment and usage of different economic, financial, legislative and administrative data.

The Ecological Dimension Index (I_e) will be estimated with the help of EPI (Environmental Performance Index 2010 (Yale Center for Environmental Low& Policy, n.d.)). This index is formed by the **Yale Center** of Environmental Law and Policy together with Columbia University (USA) for 163 countries of the world.

To calculate this index the aggregation method is used according to which EPI 2010 index is formed of two categories of top-level environmental policy (Environmental health, being the sanitary state of environment, and Ecosystem vitality, which is the vital ability of the ecosystem), ten medium-level ecological indicators and 25 low-level indicators.

The presented index and its indicators identify the ability of every country to protect its environment both during a current period of time and also in long-term perspective, on the basis of availability of national environmental system, the ability to resist to environmental impacts and decrease in human dependence on environmental impacts, social and institutional resources of a country to meet the environmental challenges, possibility of global control over the environmental state of the country etc. Moreover, they can be used as a powerful tool for making decisions on the analytical basis including social and economic dimensions of sustainable development of the country.

The Social Dimension index (I_s) will be formed of two global indices:

1. *The Life Quality Index (I_{ql})* which is created by the international organization International Living (International Living, 2009). This index is formed with the help of nine indicators: human life cost, leisure and culture of people, economic state of the country, environmental state of the country, human freedom, human health, an infrastructure state, life risks and safety, climate conditions.

2. *The Human Development Index (I_{hd})*, which is annually calculated under the UNO program 'United Nations Development Program' (UNDP) for the majority of countries which are members of this organization. It is formed on the basis of the aggregation method according to which three policy categories of human development are used on the top level i.e. health, education and welfare of the population of the country.

These policy categories are formed of four indicators that characterize peculiar features of the education system of a country, nation poverty factors, level of unemployment, human health-care activities, gender conditions in the country and other constituents of human development.

Table 2 shows the groups of policy categories and indicators used for global modeling of sustainable development processes in 2010.

Economic dimension		
1. Global competitiveness index I_c		
<i>Object</i>	<i>Policy category</i>	<i>Indicator</i>
1. Basic requirements	Institutional environment	1. Property right 2. Ethics and corruption 3. Improper influence 4. State inefficiency 5. Safety
	Economic infrastructure	6. Transport infrastructure 7. Power and communication infrastructure
	Macroeconomic stability	8. Macroeconomic stability
	Human health and basic education	9. Population health 10. Basic education
2. Effectiveness increase	Higher education and education system	11. Education quantity 12. Education quality 13. Correspondent education
	Goods market effectiveness	14. Competition 15. Demand condition quality
	Labor market effectiveness	16. Flexibility 17. Talent use effectiveness
	Financial market perfection	18. Effectiveness 19. Reliability and confidentiality
	Technological readiness	20. Technology adaptation 21. ICT usage
	Market scales	22. Domestic market volume 23. Foreign market volume
3. Innovation	Business perfection	24. Business perfection
	Innovations	25. Innovations
2. Economic Freedom index I_{ef}		
		1. Business freedom 2. Trade freedom 3. Fiscal freedom 4. Dependence of economics on government 5. Monetary freedom 6. Investment freedom 7. Financial freedom 8. Private property right 9. Freedom from corruption 10. Labor market freedom

Ecological dimension		
Ecological dimension index I_{er} (EPI)		
Object	Policy category	Indicator
1. Ecological health	1. Ecological disease load	1. Ecological disease load
	2. Air pollution (influence on human)	2. Air pollution in facilities
		3. Dust pollution of city atmospheric air
	3. Water (influence on human)	4. Potable water availability
		5. Availability of sanitation means
2. Ecosystem viability	4. Atmospheric air pollution (influence on ecosystems)	6. Sulphur dioxide emissions 7. Nitrogen dioxide emissions 8. Non-methane organic volatiles emission 9. Surface ozone concentration (in ecosystems)
	5. Water (influence on ecosystems)	10. Water quality index 11. Water resources load index 12. Water resources deficiency index
	6. Biodiversity and natural habitat	13. Protected nature territories (biomes protection) 14. Marine protected areas 15. Index of Alliance against complete species extinction
	7. Forestry	16. Growth change of woodland coverage 17. Woodland area change
	8. Fishery	18. Marine trophic index 19. Trawling intensity
	9. Agriculture	20. Intensity of fresh water consumption for agricultural purposes 21. State-subsidizing of agriculture 22. Pesticides usage control
	10. Climate changes	23. Greenhouse gases emission per capita 24. Carbon dioxide emission per unit of generated energy 25. Intensity of industrial greenhouse gases emission

Socio-institutional dimension	
Life quality index I_{ql}	Human development index I_{hd}
Indicators	Category of policy, indicators
1. Life quality	1. Population health
Life cost	Life expectancy index
Leisure and culture	2. Population education
State of economy	Adults literacy index
State of environment	Education coverage index
Human freedom	3. Population welfare
Human health	GDP index
State of infrastructure	
Life risks and safety	
Climate conditions	

Table 2. Policy categories and indicators for global modeling of sustainable development processes in 2010

As it is shown in Table 1 and 2, life quality component of sustainable development C_{ql} and its harmonization degree $G = 1 - \alpha$ in the year 2010 were determined with the usage of twenty two categories of policy and 73 indicators.

On the basis of description of relations between different categories of policy and indicators reduced to common calculating platform, the mathematical SDGM model was developed, the structure of which is presented in Figure 3.

It was taken into account that all data, indicators and indexes included into model (Figure 3) are measured with the help of different physical quantities, may be interpreted differently

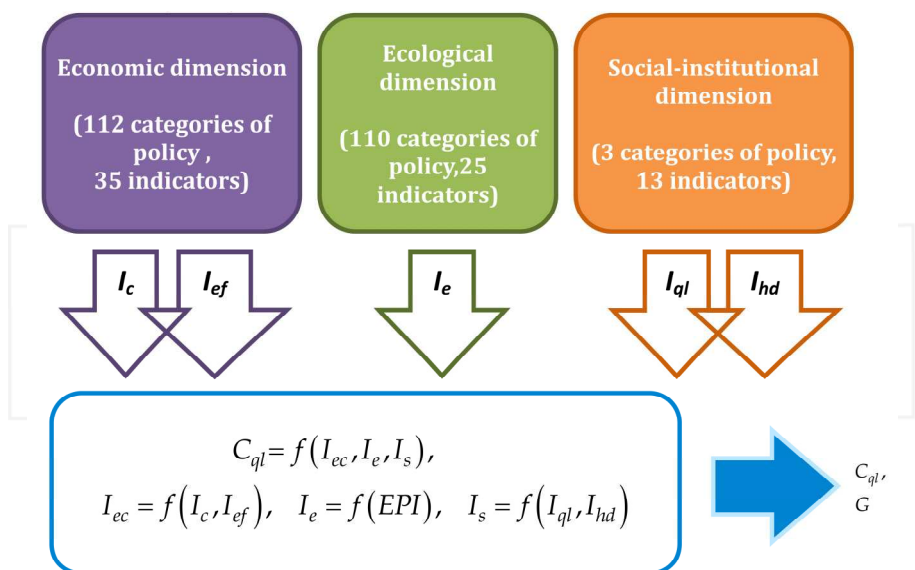


Fig. 3. The mathematical SDGM model for determination of life quality component of sustainable development and its harmonization degree

and change within different ranges. That is why they were normalized for their changes to occur within range from 0 to 1. In this case the worst values of mentioned indicators conform to numeral values close to 1. Such normalization gives the opportunity to calculate every index I_{ec} , I_e , I_s and component C_{ql} through their components with appropriate weight coefficients. In their turn the weight coefficients in the formula of calculation of life quality component of sustainable development C_{ql} are selected in order to give the possibility to provide equal values of economic, ecological and social dimension in the coordinate system (I_{ec} , I_e , I_s).

Therefore, the SDGM model gives the possibility to calculate life quality component of sustainable development C_{ql} and harmonization degree of this development $G = 1 - \alpha$ for every country of the world for which data about global indexes and indicators exist (Table 2).

2.1.2 Methodology of sustainable development assessment in terms of the human life security

Let us consider the global threats to the sustainable development to be those determined in the beginning of the XXI century by such recognized international organizations as UNO, World Health Organization (WHO), international organizations "World Economic Forum, Transparency International", "Global Footprint Network", "International Energy Agency", "World Resources Institute", company "British Petroleum" and others. The analysis of every threat will give the possibility to determine the vulnerability level of different countries of the world to the influence of these aggregated threats. Let us analyze each of the global threats separately.

Threat 1. Global decrease in energy security (ES)

For the first part of the XXI century one of the main critical challenges to the mankind is the rapid decrease in organic fuel resources that are extracted from entrails of the earth, and the increase in consumption of such resources, first of all, by India and China. In the beginning of the 20-ies of the current century, the curves of energy consumption and production of energy from oil will be crossed (AlenkaBurja, n.d.). In other words, the "production-consumption" balance of energy, produced from oil, will change its value from positive to negative (Figure 4). The similar phenomena will occur for "production-consumption" balances of energy, made from gas in the beginning of 30-ies and for the energy generated from uranium-235 in the beginning of 50-ies, accordingly (Figure 4).

Thus, until the mankind invents the energy resources that could fully replace the organic types of fuel and nuclear energy, the energy security of a country in particular and the world in general, will decrease. In order to quantitatively estimate the energy security of different countries of the world let us introduce the energy security index (Energy Security Index, ES) that will be calculated by the formula

$$ES_i = \frac{Exhaustables_i + Renewables_i}{2}, i \in \{countries\},$$

$$Exhaustables_i = \frac{NuclearR_i + CoalR_i + OilR_i + GasR_i}{\max_{j \in \{countries\}} [NuclearR_j + CoalR_j + OilR_j + GasR_j]}, \quad (7)$$

$$Renewables_i = \frac{RenewablesUsed_i}{\max_{\forall j \in \{countries\}} RenewablesUsed_j},$$

where:

- $ES \in [0;1]$, $\{countries\}$ - set of explored countries,
- *Exhaustables* is the component that characterizes the dynamics of resource deflation;
- *Renewables* is the component that characterizes the volumes of usage of renewable sources in national energetic;
- *NuclearR*, *CoalR*, *OilR*, *GasR* –resources of uranium-235, coal, oil and gas (Nation Master, n.d.);
- *Renewables Used* – part of renewable energy produced and consumed by the country (at the expense of use of the energy of water, sun, wind, geothermal heat, biomass and rubbish burning) in percents from total energy consumption (Human Development Report 2007/2008, n.d.).

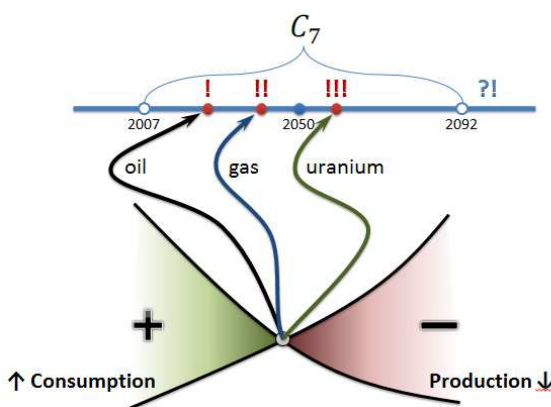


Fig. 4. Change in “production-consumption” balance from positive into negative for energy production from oil, gas and uranium-235, accordingly

Threat 2. The imbalance between biological abilities of the Earth and human needs in biosphere in terms of the change in the world demographic structure (BB)

In February 2011 the population of the planet has exceeded 7 million people living on the total area 510 072 000 km². Daily growth of population is 211 467 people (GeoHive, n.d.). According to the method of arithmetic extrapolation the Earth population will have been 9,75 billion people by the year 2050. That is why the first threat appears being related to the fact that the Earth will be inhabited by the number of people that will exceed its abilities to sustain on the basis of the present natural resources. The Pentagon experts consider that the real problems for the mankind will have occurred by the year 2020, and will be connected with the catastrophic shortage of water, energy, foodstuff that can cause new conflicts on the Earth (Membrane, n.d.).

Nature can satisfy human requirements for business activity and only while this activity remains within the biosphere renewable capacity on the populated part of the planet. The

calculation of ecologically disturbed area (Ecological Footprint) (Global Footprint Network, n.d.) gives the possibility to establish some limit according to which the ecological requirements to the world economics are within or exceed the biosphere abilities to supply the people with goods and services. This limit helps people, organizations and government to create strategies, establish the goals and provide the process according to the requirements of the sustainable development.

Ecologically disturbed territory (Ecological Footprint) determines which its part is necessary to preserve present population according to the present level of consumption, level of technological development and usage efficiency of natural wealth. The unit of measurement of this dimension is average (global on the whole Earth) hectare. The most substantial component of the Ecological Footprint is the territory of the Earth used for foodstuff production, forest area, biofuel amount, ocean (seas) territory, used for fishing and the most important element is the Earth area, necessary to support the life of plants absorbing the emissions of CO₂ as a result of organic fuel burning.

Ecological Footprint envisages that in world economy the people use resources and ecological services from all over the world. Thus, the indicator for a country may exceed its actual biological possibilities. On the basis of it, the essence of Ecological Footprint for a country is the extent of its consumption and global impact on environment.

The same methodology can be used for calculation (in the same values) of biological abilities of the Earth, biological productivity of its territory. In 2011 biological abilities of the Earth were approximately 11.2 billion or 1.8 global hectares per capita (non-human species were not considered). Now the human need in biosphere, i.e. its global Ecological Footprint is 18.1 billion global hectares or 2.7 global hectares per capita. That is why, today global Ecological Footprint exceeds biological abilities of the Earth by 0.9 global hectares per capita or by 50%. This means that vital resources of the planet disappear faster than the nature can renew.

This threat has substantial correlation degree with demographic structure change of the planet population. For example, according to UNO (Human Development Report 2007/2008, n.d.) the biggest growth of population over a period of the following 50 years is expected in the poorest regions of the world: in Africa it will increase in 2 times, In Latin America and Caribbean basin will increase in 1.5 time, at the same time in Europe it will decrease in 0, 8 times. Essential threat is also uncontrolled increase in the urban population in underdeveloped countries. By the year 2050 it will have been doubled approximating to 10 billion people. It will lead to intensification of transport, ecological and social problems, an increase in criminality and other consequencess of chaotic urbanization.

The important tendency of the nearest decades is rapid change in the structure of religious groups of the Earth population. So, from 1980 to 2005 the number of Muslims will increase from 16,5% to 30%, the number of Christians will decrease from 13.3% to 3%, the number of Hindus will decrease from 13.3% to 10%, the number of Buddhists will decrease from 6.3% to 5%. The number of representatives of other religious groups will also decrease from 31.1% to 25% (Science Council of Japan, 2005). These changes will cause the necessity of searching new methods of tolerance coexistence of people on the Earth.

For estimation of increasing threats, connected with imbalance between biological capability of the Earth and human requirements in biosphere, in terms of demographic structure

change of the world we will use the indicator which is ecological reserve (“+”) or deficit (“-”) in global hectares per capita for a country (Global Footprint Network, n.d.).

Threat 3. Growing inequality between people and countries on the Earth (GINI)

According to the World Bank data, in the year 1973 the difference in incomes between the richest and poorest countries were determined by ratio 44:1, and today it is 72:1. The assets of three world's richest people exceed the wealth of 47 countries of the world. Assets of the whole mankind are controlled by 475 richest people. Assets of 50 richest people of Ukraine which amount to 64,4 billion dollars in 2007 exceeded two national budgets of the country, in particular (Donbass Internet Paper. News.dn.ua, n.d.). The correlation between one fifth of the richest and one fifth of the poorest parts of the Earth population has reached 1:75. Wealth of civilization still remains unachievable for the poorest group. Its representatives spend less than two dollars a day; 700 million of them live in Asia, 400 million live in Africa and 150 in Latin America. The gap between the richest and the poorest groups of people of the Earth has risen approximately tenfold according to their living standards in the course of the last 20 years. The threat is considered to be dangerous due to the growing number of the world conflicts, growth of corruption, terrorism and crime, ecology deterioration, a decrease in the level of education and health service support.

In order to estimate the distribution inequality of economical and social boons for each country the SP-index (CIA, n.d.) which identifies these characteristics will be used.

Threat 4. The spread of global diseases (GD)

The World Health Organization considers such diseases as cancer, cardio ischemia, cerebrovascular disease (paralysis), chest troubles, diarrhea, AIDS, tuberculosis, malaria, diabetes to be the most dangerous for mankind as they may not only have bad consequences but also globally spread all over the world.

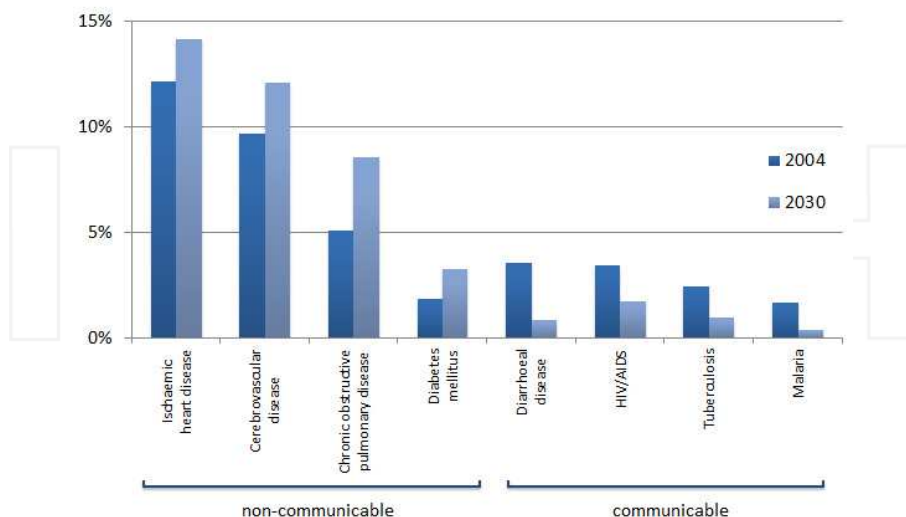


Fig. 5. Comparison of mortality factors, 2004 -2030 (Mathers, 2006)

During the next 20 years the sufficient increase in mortality caused by all non- infectious global diseases and decrease in mortality caused by AIDS, tuberculosis and malaria are expected. Such diseases as cardio ischemia, cerebrovascular disease, lung cancer and diabetes will become main global diseases during this period. At the same time the rate of total mortality from tobacco consumption will increase from 5.8 million people in the year 2009 to 6.4 million in the year 2015 and 8.3 million in 2030. Thus, tobacco is expected to kill by 50% people more than AIDS. Total human mortality on the Earth will be by 10% predetermined by the tobacco consumption.

But for estimation of the level of protection of the countries against quickly-spreading diseases it is reasonable to use the data on infectious diseases. In the further modeling the data on total mortality of the population of the world countries (million per year) caused by the totality of infectious diseases such as diarrhea (the most common mortality factor in underdeveloped countries), AIDS, tuberculosis, malaria and others will be used (Mathers, 2006).

Threat 5. Child mortality (CM)

The child mortality rate or under-5 mortality rate is the number of children who die by the age of five, per thousand live births per year. According to the data of United Nations Children's Fund 11 million children aged less than 5 die every year. Poverty which leads to bad health of mothers, insufficient nutrition and unsatisfactory sanitary is the reason of child mortality. Such factors as infectious diseases, poor health care and conflicts also increase child mortality. Africa, for example, has high rates of child mortality which are connected with AIDS epidemic, poor sanitary conditions and bad nutrition. The increase in child mortality in Iraq and Afghanistan is mostly caused by the conflicts.

According to UNICEF, most child deaths (and 70% in developing countries) result from one the following five causes or a combination thereof: acute respiratory infections, diarrhea, measles, malaria, malnutrition.

There is a significant difference in the indices of child mortality for different countries. In western industrially developed countries from 4 to 7 out of 1000 children die under the age of 5 years. The average rate of child mortality in developing countries is 158. In Sierra Leone, for example, every fourth child dies at infant age. Every tenth child doesn't live to 5 years in Iraq.

The rate of child mortality in the countries of the former Soviet Union in 10-12 times exceeds the rate of child mortality in the countries of Western Europe. It is particularly high in Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.

Leaders of the countries took the responsibilities to decrease the rate of death of children aged under 5 years by two thirds by the year 2015. The United Nations Children's Fund now warns that 98 countries of the world will not be able to succeed in the specified task.

One of the UN Millennium Development Goals (MDGs) is to reduce child mortality, and the target is to "Reduce by two thirds, between 1990 and 2015, the under-five mortality rate". According to the UN MDG Report 2010 child deaths are falling, but not quickly enough to reach the target. Revitalizing efforts against pneumonia and diarrhoea, while bolstering nutrition, could save millions of children. Recent success in controlling measles may be short-lived if funding gaps are not bridged.

Such tendencies signify another global threat due to marginalization of social and economic processes, a decrease in ecological and sanitary standards, impoverishment of people in the majority of countries of the world. In the further modeling, the data on the child mortality rate or under-5 mortality rate will be used. This data is collected by World Health Organization (WHO) and published in WHO Annual Reports and Statistical Information System. That data is also accessible at World Data Center for Geoinformatics and Sustainable Development (WDC-Ukraine).

Threat 6. The growth of corruption (CP)

Corruption is the biggest obstacle to the economic and social development of society. It endangers every change. Corruption has become not only one of the main reasons of poverty but also a source which prevents its overcoming. Although corruption had existed for a long time it became more widely spread in the process of globalization at the end of the 20th at the beginning of 21st centuries.

Corruption in one country had negative impact on the development of other countries which means that countries with the high level of corruption are not limited to the Third World. The process of liberalization in the former socialist countries was accompanied by unprecedented position abuses in 90-ies. Thus, Financial Times proclaimed 1995 to be "the year of corruption". The following years were marked with the spread of this phenomenon almost throughout all countries of the world and corruption itself became of global and international character.

Wellbeing did not become the prerequisite of successful elimination of corruption. The analysis of long-term tendencies revealed by the international organization «Transparency International» showed that during last 12 years the level of corruption has decreased in such countries as Estonia, Columbia, Bulgaria. Nevertheless, the growth of corruption occurs in such developed countries as Canada and Ireland. Such factors of risks as opacity of state authorities, excessive influence of separate oligarchic groups, violation in financing of political parties, etc. exist both in poor and rich countries and unfortunately, tendencies in increase of corruption scale are the same.

Usually, the structure of corruption is different in different countries of the world. Figure 6 illustrates countries and segments of society with the highest level of corruption according to (Transparency International, n.d.).

Figure 7 shows average indices of corruption in different segments of society according to (Transparency International, n.d.).

To estimate the influence of corruption on socio-economical and cultural development of different countries of the world we will use "the index of corruption perception" established by the international organization "Transparency International" (Report on the Transparency International Global Corruption Barometer 2007, 2007).

Threat 7. Limited access to drinking-water (WA)

According to the data of the WHO and the UNICEF (Corruption Perception Index 2008, 2008) the world is under the threat of increase of limited access to drinking-water and sanitary facilities. The fifth part of all mankind (11 billion people) does not have access to drinking-water and 2,4 billion of people do not have minimal sanitary facilities. That is why

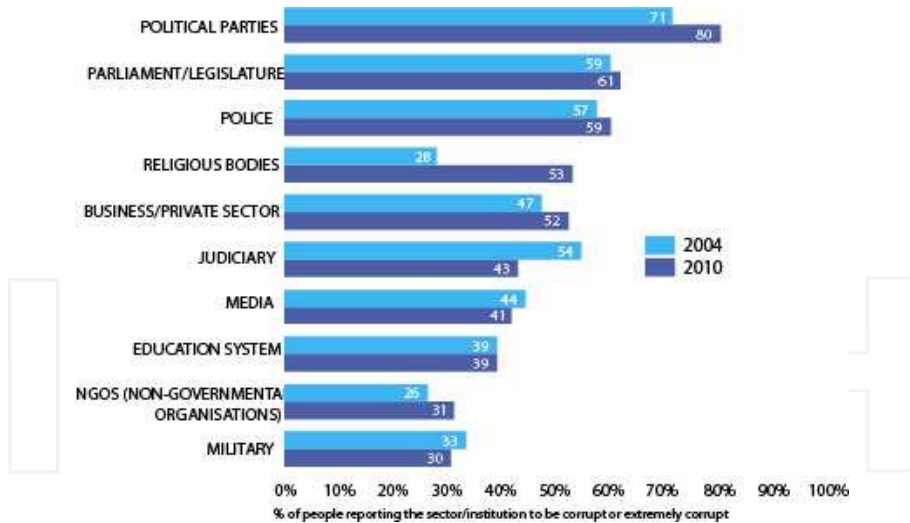


Fig. 6. The structure of corruption according to the data of «Transparency International» (Transparency International, n.d.)

2003 was proclaimed as year of drinking water by the General Assembly of UNO. The period of 2005-2015 starting from the International Day of Water Recourses (22nd of March, 2005) was proclaimed as International decade of actions "Water for life".

The urban regions of underdeveloped countries have complicated situation where due to the rapid increase in the population the problem is exacerbating rapidly. These factors negatively influence the children health. According to the data of the WHO in the year 2005, 1,6 million children aged under 5 (4500 children per day approximately) died as a result of consumption of the dangerous water and inappropriate sanitary facilities.

The more the population of the planet increases, especially in underdeveloped countries, the more struggle for the control of drinking-water recourses will exacerbate another global threat for mankind.

The limited access to the drinking- water will be estimated by the inversed magnitude to the indicator of the access to drinking water (Human Development Report 2007/2008, n.d.).

Threat 8. Global warming (GW)

Global warming is the process of gradual increase in the average annual temperature of the Earth and World Ocean. According to conclusions of the International UNO Expert Group in Climate Control (UNICEF Joint Monitoring Programme for Water Supply and Sanitation, n.d.) and National Academies of Sciences of the Group of Eight, from the end of 19th century the average temperature of the Earth has risen by 1°C and "the major part of warming observed during the last 50 years had been caused by human activities" preliminary by gas emissions which cause green-house effect (carbon dioxide, CO₂) and methane (CH₄).

Estimates obtained with the climate models and cited by the International UNO Expert Group in Climate Control show that the average temperature of the Earth can increase from

one to several °C (in different regions of the world or in the Earth in average) in 1990-2080 years. The warming is expected to cause other climate changes such as an increase in the level of World Ocean by 0,1-5 m. (probably, in 30-40 years), the appearance of new viruses and also the change of atmospheric condensation and their distribution. This may result in an increase in such natural disasters as floods, draughts, hurricanes etc; a decrease in harvests of agricultural crops, the emergence of new epidemic diseases and the extinction of many biological species. As a result of the control over decreasing natural resources the struggle not only between countries but also between separate groups of population can exacerbate. This process will cause new global conflicts. The influence of carbon dioxide emissions on the global warming is much higher than the corresponding influence of methane. That is why the danger of global warming will be estimated by the amount of carbon dioxide emissions CO₂ in metric tons per capita.

Data about emissions is obtained by WDC-Ukraine from Carbon Dioxide Information Analysis Center (CDIAC). It can be obtained with data extraction tool (<http://wdc.org.ua/en/data>). Original data is only the amount of Carbon (C) and calculation has been done to convert Carbon into Carbon Dioxide (CO₂): values were multiplied by according coefficient $(12+16*2)/12$. Per capita emission data is based on calculations: CO₂ emission / population for each country correspondingly.

Threat 9. The state fragility (SF)

After the end of Cold War and Soviet Union collapse (1991) the world has entered the era of new dramatic geopolitical processes. The following 18 years were marked with the blistering growth of globalization. Technical revolution in the field of information-communication technologies has made the world policy more transparent and led to an increase in changes influence which occurred in one region and affected the other parts of the planet. Due to these new qualities of the globalized world it became clear that new geopolitical system is full of unstable, unsuccessful and weak countries. The weakening of retaining mechanisms peculiar to bipolar world and conflict exacerbation between fundamental values of different countries caused a new wave of oppositions, terrorism, violence, territorial claims and irregular development.

Uncontrolled spread of nuclear, chemical and biological weapon, rebuilding of nuclear energetics in such unstable, unbalanced world significantly increases the threat to sustainable development and global security of mankind.

Under such conditions the stabilization of world development becomes possible due to the international cooperation, investments and support to the weak countries and planet regions by the progress of new paradigm of "tolerant, peaceful world". In order to accomplish such global, stabilizing policy the recognized international organizations and scientific centers began to develop analytical instruments for the estimation of new developing tendencies of the world since the beginning of this century. The first attempt to control the tendencies of the global development was a series of reports "The world and the conflict" which were published in the University of Maryland State (USA) in 2001. Reports devoted to the global tendencies of world development were also published in many countries such as Spain, Canada, and Germany etc.

The final aim of the development of new analytical instruments was the attempt to estimate the ability of different countries to act in such important dimensions as conflict, state

administration, economic and social development. Among all these instruments “The index of ability of the peaceful society development” that belongs to the series of reports “The world and conflict”, “Indicators of the world management” developed by the World Bank and “Index of unsuccessfulness of the countries” developed by The Fund of Peace can be mentioned.

For the quantitative estimation of the sustainable development threat in our research the State Fragility Index will be used (The Intergovernmental Panel of Climate Change, n.d.). This index is calculated as average arithmetic value between political and economical instability of the country. Data concerning these values are given in the paper (Marshall, 2008).

Threat 10. Natural Disasters (ND)

Natural disasters are the threat which is not so directly dependent on the human activity comparing to the other threats mentioned above. But, taking into account last reports of the international organizations on climate changes (World Economic Forum, 2010) we cannot state that a human being is beside the point of the dynamics of the natural disasters. For the quantitative estimation of the degree of vulnerability of the world countries to the natural disasters the index of vulnerability to natural cataclysms was developed. The data of the International Disasters Database (Kotlyakov, 2001) and the Centre for Research on the Epidemiology of Disasters (CRED) of the World Health Organization (WHO) are used for its calculation.

Experts of UNO and WDC-Ukraine determined 6 major natural disasters (in the order of danger decrease): draughts, floods, hurricanes, extreme temperatures, earthquakes and tsunami (UNDP, n.d.; Aivazian, 1983).

Index is calculated as follows:

1. The summarized total of people suffered from the natural cataclysms in a year in a country is calculated:

$$\begin{aligned} DisastersAffected_{year, state} = & DroughtAffected_{year, state} + FloodAffected_{year, state} + \\ & + StormAffected_{year, state} + ExtremeTemperatureAffected_{year, state} + EarthquakeAffected_{year, state} + \\ & + TsunamiAffected_{year, state}, \quad \forall year, state. \end{aligned}$$

2. Then the summarized total of people affected $DisastersAffected$ is divided by the amount of population in the country and in the given year:

$$DisastersAffected'_{year, state} = \frac{DisastersAffected_{year, state}}{Population_{year, state}}, \quad \forall year, state.$$

3. After that the obtained data are normalized by the logistic norm:

$$\|DisastersAffected'_{year, state}\| = \left[1 + e^{\frac{DisastersAffected'_{year, state} - M[DisastersAffected']_{year}}{s[DisastersAffected']_{year}}} \right]^{-1},$$

where $M[.]$, $s[.]$ – are approximate average and standard deviation values respectively per year in all countries.

As consequences of the natural disasters usually make a long-term influence on the country, gradually disappearing only with time, the final value of vulnerability index on the natural disasters will be defined as Exponential Weighted Moving Average, EWMA, which has the potential smoothing factor $\alpha = 0,25$

$$ND_{year, state} = 1 - \alpha \cdot \sum_{1 \leq t \leq T_{max}} (1 - \alpha)^{t-1} \cdot \|DisastersAffected'_{year-t, state}\| . \quad (8)$$

The value of the coefficient α was chosen by the experts on the basis of the estimation of the average time and level of the impact of disasters on the country. For convenience of calculations only the last significant $T_{max} = 25$ years will be considered. At the same time the significance of time series will amount to $\varepsilon = e^{T_{max} \cdot \ln(1-\alpha)} = 0,0007525 \leq 10E-3$

The values of vulnerability index for the countries to the natural disasters during 1995-2010 were calculated according to the given methodology.

2.1.3 Determination of the aggregate impact of the total global threats on different countries and their groups

The total impact of the total global treats to different countries and their groups will be determined by the component of human security C_{st} being the part of index of sustainable development in formula (1).

Let us formalize this in the following way. Let every j country corresponds to the vector In correspondence with each country j a vector

$$\vec{T}r_j = (ES, BB, GINI, GD, CM, CP, WA, GW, SF, ND) \quad (9)$$

the coordinates which characterize the degree of the development of the relevant threats, where:

ES is a global decrease in energy security (determined by the index of energy security calculated by the formula 7);

BB is misbalanced biological capacity of the Earth and needs of the mankind in the biosphere in terms of changing world's demography (measured in global hectares per person);

GINI is growing inequality between people and countries of the Earth (measured by Gini-index which changes within the range from 1 to 100; where 0 is a minimum inequality, 100 is maximum inequality);

GD is the spread of global infectious diseases (measured by the total quantity of the people [millions per year] died from diarrhea diseases, AIDS, tuberculosis and malaria);

CM is child mortality (measured by the number of children who died under 5 per 100 newborn)

CP is the growth of corruption (measured by the index of corruption perception varying within the range from 0 to 10; where 0 is a maximum corruption level and 10 - minimum corruption level);

WA is the limited access to drinking-water (the percentage of the population which has no access to drinking-water);

GW is global warming (measured by the quantity of carbon dioxide emissions in metric tones);

SF is state fragility (measured by State Fragility Index (The Intergovernmental Panel of Climate Change, n.d.), which changes in the range from 0 to 23, where 0 - minimum fragility; 23 - maximum fragility);

ND is index of vulnerability to natural disasters (calculated by the formula (8)).

The source data for each danger are normalized by the formula (4) and in the case of necessity converted for the maximum threat to correspond to 0 and minimum threat to correspond to 1. Thus, after normalization the more each threat approaches its zero value it becomes the most “likely to occur” in each specific country. But the more its value approaches 1 it becomes more ‘unlikely to happen’ in that country.

After the normalization for all global threats, the normalized vector is obtained:

$$\vec{T}r_j^0 = (ES^0, BB^0, GINI^0, GD^0, CM^0, CP^0, WA^0, GW^0, SF^0, ND^0), \quad (10)$$

Let us calculate the value for each component of life security C_{sl} , which is norm of Minkowski, which is formed of normalized threats according to $P = 3, n = 10$:

$$C_{sl} = \|\vec{T}r_j\| = \sqrt[3]{\sum_{i=1}^n (\vec{T}r_{ji}^0)^3}. \quad (11)$$

It should be mentioned that in practice the parameter P is mostly chosen to be equal 2. An increase in this parameter increases the model sensitivity for each part of the vector and vice versa its decrease smoothes (reduces) this sensitivity. That is why on the basis of the data analysis of the mentioned threats it is advisable to enlarge parameter P from the value 2 to 3, to increase sensitivity of the models to the threats being insignificant by their quantitative values if compared to the other models but being important by their substantial values.

Let us also introduce the value of vulnerability of the country to the total of the global threats which is the inverse value to the component of the life security C_{sl} :

$$I_{vul} = \sqrt[3]{10} - C_{sl}. \quad (12)$$

Thus, the SDGM model (1-12) combines a lot of indicators and indexes included in it by mathematical correlations making their algebraic convolution. This model combines the data of different nature i.e. economic, ecological and socio-institutional one. Thus, it shows the reverse connection and balance between three integral spheres of society development. With the help of this model it is possible to obtain the numerical value for every dimension of the quality of life and also its single matrix that considers all three dimensions together.

3. The mathematical simulation of sustainable development processes

3.1 Computation for general simulation

The mathematical simulation of sustainable development processes can be performed in three stages. At the first stage we will perform the estimation of life quality dimension C_{ql} as the component of sustainable development index in the formula (1) using Sustainable Development Gauging Matrix (SDGM) (chapter 2.1.). At the second stage we will calculate the total impact of global threats totality on different countries and world countries groups

in the form of human life security component C_{sl} as the component of sustainable development index in the formula (1) (chapters 2.1.2, 2.1.3). At the final third stage we will calculate the value of quaternion $\{Q\}$ according to the formula (1) as the quantitative dimension of sustainable development which considers the human life security and quality of life.

3.1.1 The estimation of human life quality as index of the sustainable development

Calculation of the life quality component C_{ql} of sustainable development and the level of its harmonization $G = 1-a$ will be performed with the use of the mathematical model *SDGM* (chapter 2.1) and global indices (tables 1 and 2). The initial data for the *SDGM* model will be taken from the annual reports of such international organizations as UNO, Heritage Foundation, World Economic Forum, International Living, Environmental Law and Policy Center of Yale University, the University of Columbia (USA).

In order to perform comparative global analysis of the life quality component of the sustainable development let us choose five countries of the world: Countries leading by the quality of life component; group of Eight (G8); the Group of giant rapidly developing countries including Brazil, Russia, India, China (BRIC countries); the group of post-socialistic countries; the countries of Africa.

It should be mentioned that owing to its geographical position and economic status Russia enters the 2nd, 3rd and 4th group simultaneously, while Germany, France and Great Britain belong to the 1st and 2nd groups.

1. Ten leading countries in the year 2010 by the life quality component of sustainable development are presented in table 3. This group includes 9 European countries and 1 country of Oceania. Considering the results of the research it can be seen that countries which in 2005-2010 were 5 world leaders by the index of their sustainable development were not superpowers with dominating ideologies and economies. Basic industries of such

Rate C _{ql}	ISO	Country	Life quality component C _{ql}	Economic dimension I _{ec}	Ecological dimension I _e	Socio- institutional dimension I _s	Harmoni- zation degree G
CLUSTER 1("VERY HIGH")							
1	CHE	Switzerland	1,498	0,872	0,917	0,806	0,947
2	SWE	Sweden	1,398	0,796	0,895	0,730	0,917
3	NOR	Norway	1,379	0,731	0,847	0,810	0,939
4	NZL	New Zealand	1,365	0,816	0,739	0,810	0,956
5	ISL	Iceland	1,357	0,730	0,942	0,678	0,855
6	AUT	Austria	1,343	0,751	0,810	0,765	0,967
7	FIN	Finland	1,342	0,804	0,761	0,760	0,974
8	DEU	Germany	1,338	0,770	0,736	0,812	0,960
9	FRA	France	1,320	0,664	0,812	0,810	0,909
10	GBR	Great Britain	1,319	0,803	0,753	0,729	0,960

Table 3. Ten leading countries according to the life quality component of sustainable development, 2010

countries are not oriented towards the usage of significant natural recourses and cheap workforce. The characteristic feature of these countries is domination of intellectual and highly-technological labor in the additional cost of their economies. All these countries are the world leaders by the ecological dimension of the world. Their innovative activity is of high level; over 4% of their GNP is spent for research and development.

Since the beginning of 1990-s they have been actively working in order to implement the model of the 'environmental economy' and knowledge-based economy. They started large-scale production of new knowledge, 'ecosystem' products and services and in the course of the following few years they included social assets into their strategy as another productive factor of the development. That is why now these counties are the countries with well-harmonized life quality components of the sustainable development i.e. economic, ecological and social ones. These countries have become the closest to the model of the 'smart' society which is the highest form of the developed, knowledge-based society.

2. The Group of Eight countries (table 4), in the year 2010 takes from 8th to 24th positions in the list by the quality of life component in sustainable development (except Russia).

Rate Cql	ISO	Country	Life quality component Cql	Economic dimension Iec	Ecological dimension Ie	Social- institutional dimensionIs	Harmoni- zation degree G
CLUSTER 1 ("VERY HIGH")							
8	DEU	Germany	1,338	0,770	0,736	0,812	0,960
9	FRA	France	1,320	0,664	0,812	0,810	0,909
10	GBR	Great Britain	1,319	0,803	0,753	0,729	0,960
13	CAN	Canada	1,293	0,845	0,608	0,786	0,866
14	JPN	Japan	1,290	0,789	0,725	0,719	0,957
16	USA	The USA	1,268	0,851	0,546	0,801	0,819
CLUSTER 2 ("HIGH")							
24	ITA	Italy	1,169	0,525	0,734	0,767	0,843
CLUSTER 3 ("AVERAGE")							
69	RUS	Russian Federation	0,740	0,358	0,497	0,427	0,868

Table 4. The Group of Eight according to the component of the life quality of sustainable development, 2010

Although they have leading GNP indices in the world they are still on 20-30 places in the world list by quality characteristics of their economic, renewable environmental resources and development of their social assets.

The only exception in this group is Russia (69th position) which being formally included into the Group of Eight is at the same time "excluded" from it by the qualitative characteristics. Dependence of Russian economy on the energy sector is extremely high. This field provides the country with almost 25% of GDP and 50% of national export that makes Russia rather sensitive to and dependent on global market conditions. These results in narrowing the diversification of economic interests of Russia, which in its turn, provides aggressive state-monopoly foreign policy of the country in energy field.

3. BRIC-country group (Brazil, Russia, India and China) is characterized by rapid increase in their economies development that annually reaches 8-12 %. This is provided both due to the growth of innovational, highly-technological components of the development of these countries and by intensive use of their own natural and environmental resources, involvement of cheap labor, giant consumption of organic types of fuel (oil, gas and coal).

In spite of the rapid economic growth these countries hold from the 48th (Brazil) to 85th (India) positions in the rating table by the life quality component of sustainable development (Table 5).

This can be explained by the low level of harmonization of sustainable development for this group of countries at the expense of prior economic development and at the same time substantial backlogs in environmental and social spheres. The countries of this group are characterized by the decrease in ecological results, increase in inequality between people, high corruption levels that tend to increase. These and other factors of ecological and social character restrain harmonized sustainable development of the group of BRIC-countries.

Rate Cql	ISO	Country	Life quality component Cql	Economic dimension Iec	Ecological dimension Ie	Socio-institutional dimension Is	Harmonization level G
CLUSTER 3 ("AVERAGE")							
48	BRA	Brazil	0,902	0,424	0,544	0,594	0,864
69	RUS	Russian federation	0,740	0,358	0,497	0,427	0,868
CLUSTER 4 ("LOW")							
79	CHN	China	0,647	0,459	0,255	0,406	0,773
85	IND	India	0,572	0,418	0,245	0,328	0,789

Table 5. Group of BRIC countries according to the life quality component of sustainable development, 2010

4. Post-socialist countries (Table 6) turned out "scattered" from the 29th to 99th positions of the rating table by the life quality component in 2010. The leaders in this group were the countries of the Central Europe and Baltic, which outstripped the countries of the East Europe and Middle Asia.

For the countries of this group it is not current position by the life quality component of sustainable development that is of great importance but the dynamics of the qualitative changes and differentiation scale that have been observed for the last 15-20 years. From the approximately equal initial conditions in the late 80-ies of the last century, the countries of this group have passed through very different political, economic and mental changes for historically short period of time. The best examples of successful development were shown by the countries of the Baltic, Central and Eastern Europe, and the worst ones were shown by the countries of the Central Asia and North-Caucasian countries of the former USSR.

5. African countries listed by the life quality component of sustainable development are shown in Table 7. Except for South Africa, Tunis and Algeria, they belong to the poorest countries in the world, the GDP per person of which is lower than 5000 dollars.

According to the data of the International Organization “Transparency International”, these countries have the highest levels of corruption, and according to the World Health Organization they have the highest levels of spreading global diseases, such as AIDS, tuberculosis and malaria. In 2010 the characteristics of these countries (except Tunis) greatly decreased in comparison with the previous years, not only by the life quality component in general, but also by all three dimensions of this component. The positive tendency of the sustainable development of Tunis can be explained by significant improvement of innovation climate especially in the sphere of information technologies after the UNO World Summit on Information Society was held in this country in 2005.

Rate Cql	ISO	Country	Life quality component Cql	Economic dimension Iec	Ecological dimension Ie	Socio-institutional dimension Is	Harmonization level G
CLUSTER 2 (“HIGH”)							
21	CZE	Czech Republic	1,214	0,669	0,709	0,725	0,967
23	SVK	Slovakia	1,176	0,611	0,757	0,669	0,912
26	LTU	Lithuania	1,125	0,615	0,646	0,686	0,955
27	EST	Estonia	1,121	0,703	0,553	0,686	0,896
29	HUN	Hungary	1,112	0,553	0,662	0,711	0,898
30	LVA	Latvia	1,095	0,526	0,724	0,646	0,872
32	SVN	Slovenia	1,083	0,591	0,577	0,707	0,907
37	POL	Poland	1,009	0,535	0,538	0,675	0,888
38	HRV	Croatia	1,000	0,435	0,653	0,645	0,827
43	ALB	Albania	0,984	0,470	0,705	0,529	0,826
CLUSTER 3 (“AVERAGE”)							
40	ROU	Rumania	0,992	0,510	0,620	0,589	0,920
47	BGR	Bulgaria	0,932	0,472	0,525	0,617	0,890
56	ARM	Armenia	0,817	0,506	0,480	0,430	0,933
65	AZE	Azerbaijan	0,761	0,474	0,451	0,394	0,923
69	RUS	Russian Federation	0,740	0,358	0,497	0,427	0,868
CLUSTER 4 (“LOW”)							
72	KAZ	Kazakhstan	0,720	0,464	0,413	0,370	0,907
73	UKR	Ukraine	0,714	0,294	0,432	0,511	0,786
74	BIH	Bosnia and Herzegovina	0,707	0,318	0,383	0,523	0,794
78	KGZ	Kyrgyzstan	0,653	0,359	0,463	0,308	0,830
83	MDA	Moldova	0,619	0,146	0,445	0,481	0,602
CLUSTER 5 (“VERY LOW”)							
92	TJK	Tajikistan	0,493	0,264	0,295	0,296	0,948
99	UZB	Uzbekistan	0,411	0,247	0,160	0,305	0,755

Table 6. Post-socialist countries ranked by the quality-of-life component of sustainable development, 2010

On the whole, comparing the group of African countries (table 7) with the leading countries by the life quality component of the sustainable development (table 3) and the Group of

Eight (table 4) it is possible to state that in the year 2010 as compared to the year 2006 the gap between the developed countries of the world and the countries of Africa increases both by standard of living (GDP per capita) and by the life quality component of the sustainable development. This is an alarming symptom due to the increase in inequality in the world, spreading of global diseases, a growing number of global and regional conflicts, the growth of corruption and crime.

Rate Cql	ISO	Country	Life quality component Cql	Economic dimension Iec	Ecological dimension Ie	Social-institutional dimension Is	Harmonization degree G
CLUSTER 3 ("AVERAGE")							
55	TUN	Tunis	0,835	0,509	0,483	0,455	0,954
57	DZA	Algeria	0,796	0,393	0,628	0,358	0,745
60	NA M	Namibia	0,792	0,472	0,455	0,445	0,975
64	MAR	Morocco	0,774	0,434	0,591	0,315	0,753
CLUSTER 4 ("LOW")							
68	ZAF	Southern Africa	0,746	0,532	0,286	0,474	0,760
71	EGY	Egypt	0,734	0,433	0,514	0,324	0,818
76	BWA	Botswana	0,668	0,579	0,150	0,429	0,568
CLUSTER 5 ("VERY LOW")							
89	MD G	Madagascar	0,508	0,391	0,258	0,231	0,767
90	KEN	Kenya	0,508	0,354	0,296	0,229	0,828
91	UGA	Uganda	0,496	0,393	0,268	0,198	0,726
93	GMB	Gambia	0,473	0,372	0,278	0,170	0,706
94	MWI	Malawi	0,462	0,281	0,298	0,221	0,878
95	ZMB	Zambia	0,453	0,335	0,224	0,225	0,803
96	TZA	Tanzania	0,450	0,353	0,237	0,189	0,742
98	MOZ	Mozambique	0,414	0,276	0,293	0,147	0,732
100	SEN	Senegal	0,411	0,339	0,161	0,212	0,693
103	BEN	Benin	0,380	0,315	0,132	0,213	0,672
104	NGA	Nigeria	0,375	0,343	0,138	0,168	0,604
105	CMR	Cameroun	0,371	0,274	0,190	0,179	0,804
106	ETH	Ethiopia	0,323	0,253	0,171	0,135	0,743
107	ZWE	Zimbabwe	0,227	0,073	0,236	0,084	0,482

Table 7. The countries of Africa ranked by the life quality component of sustainable development, 2010

3.1.2 The estimation of human life security as the component of sustainable development index

Using the method of estimation of the total impact of the global threats totality on different countries and world countries groups represented in chapter 2.1.2. (formulae 7-12) let us calculate the life security component C_{sl} for every country considered in this research. On

the basis of the calculation of the standard value of Minkovski threats vector $C_{sl} = \|\bar{T}r_j\|$ let us introduce for every j country the correlation between the clusters of the countries:

$$K_k < K_j \Leftrightarrow \|\bar{T}r_k\| \leq \|\bar{T}r_j\|. \quad (13)$$

The calculations will be performed for the 5 groups of countries mentioned above. Table 8 represents the list of ten leading countries by the life security component of sustainable development in 2010.

Rate Csl	ISO	Country	Life security component, Csl	Biological balance, BB	Child mortality, CM	Corruption perception, CP	Energy safety, ES	Global diseases, GD	Inequalities between countries and people, GINI	Global warming, GW	Natural disasters, ND	State instability, SI	Limited access to potable water, WA
CLUSTER 1("VERY HIGH")													
1	AUS	Australia	1,549	0,916	0,666	0,874	0,931	0,642	0,562	0,143	0,564	0,624	0,670
2	ISL	Iceland	1,527	0,678	0,682	0,874	0,785	0,644	0,958	0,437	0,576	0,358	0,670
3	NZL	New Zealand	1,483	0,858	0,667	0,905	0,478	0,646	0,543	0,663	0,574	0,640	0,670
4	FIN	Finland	1,480	0,872	0,679	0,884	0,412	0,642	0,717	0,268	0,576	0,708	0,670
5	CAN	Canada	1,478	0,916	0,663	0,874	0,627	0,642	0,615	0,178	0,575	0,635	0,670
6	SWE	Sweden	1,473	0,766	0,681	0,897	0,466	0,642	0,748	0,498	0,576	0,669	0,670
7	NOR	Norway	1,451	0,511	0,679	0,869	0,621	0,642	0,735	0,661	0,576	0,640	0,670
8	LUX	Luxemburg	1,434	0,347	0,683	0,847	0,278	0,634	0,958	0,071	0,576	0,689	0,670
10	DNK	Denmark	1,397	0,284	0,674	0,901	0,377	0,642	0,752	0,353	0,576	0,722	0,670
CLUSTER 3("AVERAGE")													
9	PRY	Paraguay	1,398	0,918	0,537	0,258	0,975	0,586	0,227	0,644	0,546	0,515	0,425

Table 8. Ten leading countries by the life security component of sustainable development, 2010

All leading countries, except Paraguay, are in the cluster with very high values of life security index of sustainable development (table 8). It should be noted that Canada is the only representative of G8 group included in the list of ten leading countries.

Among G8 countries (Table 9) Italy has the worst values (43rd place). It should be mentioned that Russia in spite of rather low values of separate indices ("Corruption perception", "People inequality", "Global Warming") is on the 16th place which is due, first of all, by a large amount of natural resources.

In the group of BRIC countries (Table 10) we can see that Brazil and Russia have the significantly better results by human life security component while China and India the

Rate Csl	ISO	Country	Life security component Csl	Biological balance, BB	Child mortality, CM	Corruption perception, CP	Energy safety , ES	Global diseases, GD	Inequalities between countries and people, GINI	Global warming, GW	Natural disasters, ND	State instability, SI	Limited access to potable water, WA
CLUSTER 1 ("VERY HIGH")													
5	CAN	Canada	1,478	0,916	0,663	0,874	0,627	0,642	0,615	0,178	0,575	0,635	0,670
13	USA	The USA	1,368	0,244	0,656	0,801	0,908	0,634	0,448	0,128	0,505	0,619	0,654
20	DEU	Germany	1,315	0,296	0,674	0,835	0,328	0,642	0,693	0,357	0,575	0,569	0,670
21	FRA	France	1,312	0,374	0,676	0,754	0,304	0,639	0,611	0,476	0,571	0,701	0,670
23	JPN	Japan	1,281	0,244	0,679	0,815	0,282	0,632	0,750	0,345	0,570	0,146	0,670
30	GBR	Great Britain	1,246	0,272	0,667	0,815	0,282	0,633	0,547	0,370	0,566	0,455	0,670
CLUSTER 2 ("HIGH")													
43	ITA	Italy	1,210	0,255	0,678	0,485	0,306	0,644	0,545	0,411	0,575	0,671	0,670
CLUSTER 3 ("AVERAGE")													
16	RUS	Russian Federation	1,353	0,611	0,625	0,267	0,977	0,614	0,391	0,320	0,570	0,679	0,603

Table 9. The G8 countries ranked by the life security component of sustainable development, 2010

Rate Csl	ISO	Country	Life security component Csl	Biological balance, BB	Child mortality, CM	Corruption perception, CP	Energy safety , ES	Global diseases, GD	Inequalities between countries and people, GINI	Global warming, GW	Natural disasters, ND	State instability, SI	Limited access to potable water, WA
CLUSTER 3 ("AVERAGE")													
15	BRA	Brazil	1,353	0,865	0,576	0,418	0,695	0,574	0,202	0,628	0,549	0,720	0,621
16	RUS	Russian Federation	1,353	0,611	0,625	0,267	0,977	0,614	0,391	0,320	0,570	0,679	0,603
CLUSTER 4 ("LOW")													
79	CHN	China	1,115	0,431	0,584	0,407	0,713	0,605	0,433	0,533	0,145	0,472	0,478
83	IND	India	1,100	0,489	0,306	0,385	0,646	0,430	0,530	0,644	0,408	0,577	0,460

Table 10. BRIC countries group ranked by the life security component of sustainable development, 2010

rates of people life security practically coincide with the positions of these countries in the life quality rating of sustainable development.

For the group of post-socialistic countries (table 11) the main feature is the growth of difference by the value of human life security component. Thus, in 2010 the positions for this group vary from 16 (Russian) to 102 (Uzbekistan).

Rate Csl	ISO	Country	Life security component Csl	Biological balance, BB	Child mortality, CM	Corruption perception, CP	Energy security , ES
CLUSTER 2 ("HIGH")							
24	SVN	Slovenia	1,278	0,328	0,677	0,728	0,324
28	EST	Estonia	1,271	0,597	0,667	0,728	0,326
29	HRV	Croatia	1,267	0,431	0,666	0,463	0,306
33	SVK	Slovakia	1,232	0,416	0,655	0,508	0,296
36	LVA	Latvia	1,230	0,625	0,649	0,508	0,460
38	POL	Poland	1,226	0,361	0,661	0,564	0,312
39	LTU	Lithuania	1,225	0,496	0,658	0,553	0,314
40	HUN	Hungary	1,216	0,460	0,663	0,575	0,300
42	CZE	Czech Republic	1,211	0,309	0,677	0,553	0,301
53	ALB	Albania	1,179	0,445	0,620	0,364	0,395
CLUSTER 3 ("MIDDLE")							
16	RUS	Russian Federation	1,353	0,611	0,625	0,267	0,977
41	ARM	Armenia	1,212	0,438	0,570	0,313	0,295
44	AZE	Azerbaijan	1,199	0,438	0,490	0,276	0,292
46	BGR	Bulgaria	1,197	0,374	0,639	0,429	0,296
84	ROU	Rumania	1,099	0,467	0,622	0,429	0,345
CLUSTER 4 ("LOW")							
50	KAZ	Kazakhstan	1,187	0,481	0,527	0,313	0,651
65	UKR	Ukraine	1,152	0,438	0,613	0,267	0,388
77	KGZ	Kyrgyzstan	1,121	0,525	0,480	0,241	0,540
81	BIH	Bosnia and Herzegovina	1,109	0,438	0,618	0,343	0,318
87	MDA	Moldova	1,094	0,467	0,602	0,375	0,276
94	TJK	Tajikistan	1,069	0,489	0,330	0,249	0,514
CLUSTER 5 ("VERY LOW")							
102	UZB	Uzbekistan	1,038	0,460	0,477	0,225	0,319

Table 11. Post-socialistic countries ranked by the life safety component of sustainable development, 2010

Rate Csl	ISO	Country	Life security component Csl	Biological balance, BB	Child mortality, CM	Corruption perception, CP	Energy safety , ES	Global diseases, GD	Inequalities between countries and people, GINI	Global warming, GW	Natural disasters, ND	State instability, SI	Limited access to potable water, WA
CLUSTER 3 ("AVERAGE")													
32	NAM	Namibia	1,242	0,839	0,459	0,508	0,495	0,202	0,049	0,684	0,505	0,710	0,533
49	TUN	Tunis	1,189	0,452	0,580	0,474	0,347	0,540	0,448	0,615	0,573	0,727	0,568
64	MAR	Morocco	1,155	0,474	0,489	0,375	0,286	0,586	0,446	0,684	0,574	0,736	0,339
98	DZA	Algeria	1,057	0,445	0,461	0,323	0,320	0,526	0,560	0,555	0,564	0,586	0,373
CLUSTER 4 ("LOW")													
37	EGY	Egypt	1,227	0,438	0,569	0,323	0,313	0,579	0,623	0,620	0,576	0,713	0,654
56	BWA	Botswana	1,171	0,597	0,522	0,630	0,409	0,062	0,135	0,593	0,569	0,689	0,586
104	ZAF	Southern Africa	1,009	0,431	0,035	0,530	0,494	0,153	0,168	0,370	0,527	0,691	0,514
CLUSTER 5 ("VERY LOW")													
45	TZA	Tanzania	1,198	0,503	0,161	0,304	0,826	0,133	0,574	0,683	0,542	0,689	0,068
47	ETH	Ethiopia	1,192	0,489	0,145	0,313	0,833	0,179	0,667	0,685	0,394	0,653	0,022
57	CMR	Cameroon	1,169	0,583	0,090	0,267	0,743	0,180	0,374	0,681	0,573	0,731	0,236
59	GMB	Gambia	1,167	0,354	0,154	0,333	0,764	0,326	0,323	0,681	0,568	0,694	0,533
62	MOZ	Mozambique	1,158	0,597	0,093	0,294	0,848	0,156	0,326	0,644	0,372	0,701	0,042
66	ZMB	Zambia	1,150	0,618	0,062	0,343	0,825	0,037	0,265	0,681	0,396	0,659	0,101
69	MWI	Malawi	1,138	0,518	0,174	0,375	0,764	0,059	0,484	0,685	0,399	0,666	0,323
71	BEN	Benin	1,136	0,489	0,113	0,333	0,677	0,256	0,493	0,675	0,544	0,724	0,250
76	UGA	Uganda	1,122	0,467	0,083	0,294	0,764	0,123	0,412	0,684	0,482	0,691	0,157
92	KEN	Kenya	1,076	0,481	0,097	0,267	0,784	0,138	0,316	0,676	0,375	0,616	0,095
93	SEN	Senegal	1,071	0,525	0,146	0,343	0,577	0,301	0,481	0,676	0,562	0,600	0,177
95	NGA	Nigeria	1,069	0,496	0,026	0,294	0,853	0,153	0,405	0,392	0,574	0,509	0,089
96	MDG	Madagascar	1,064	0,611	0,153	0,343	0,764	0,339	0,324	0,683	0,454	0,121	0,028
106	ZWE	Zimbabwe	0,991	0,489	0,188	0,267	0,728	0,003	0,275	0,659	0,443	0,147	0,356

Table 12. Countries of Africa ranked by the life security component of sustainable development, 2010

For the countries of Africa (Table 12) we have the average (Namibia, Morocco, Tunis, Algeria), low (Egypt, Botswana, South Africa) and very low values of life security component of sustainable development. This results in permanent political and military conflicts in this region.

Analyzing Ukraine by its vulnerability to the global threats we see that in comparison with 2009 the rate of its national security has become slightly better, but still remains significantly low (by the human life security index Ukraine has reached the 65th position from 78th position). For Ukraine the worst threats still are the following: level of spreading of global diseases, especially AIDS and tuberculosis, which is one of the highest in the world; very high level of corruption; low level of energy security; high child mortality; high level of state fragility.

3.1.3 The estimation of sustainable development index as quarter functional of human life security and quality

Having obtained the values of life quality component of sustainable development C_{ql} (tables 3-7) and component of human life security C_{sl} (table 8-12), let us calculate the value of sustainable development index I_{sd} , as a quarter functional by the formula (1) according to the SDGM methodology. The results of calculations for 5 groups of countries are shown in Tables 13-17 accordingly. All countries have been distributed into 5 clusters by the sustainable development index: "Very high", "High", "Average", "Low" and "Very low".

According to table 13, ten countries with the highest values of sustainable development index include 7 European countries (Iceland, Sweden, Norway, Switzerland, Finland, Denmark and Luxemburg), one country of Northern America (Canada) and the countries of Oceania (Australia and New Zealand). They are characterized by low level of vulnerability to the global threats (high level of national security), high indices of human life quality in the economic, ecological and social dimensions, high harmonization level of sustainable development (figure 8).

Cluster 1 ("Very low") contains the group of the most "successful" countries of the world, including the G8 countries, except Russia; they have the highest rates of life quality and lowest rate of vulnerability to the impact of global threats totality according to Table 13, 14.

On the contrary cluster 5 ("Very low") contains the countries with low values of life quality component of sustainable development and these countries are more vulnerable to the impact of global threats totality. Ukraine together with China, India, South Africa and other countries has been included to cluster 4 ("Low") with low level of sustainable development. Most of these countries have average and low values of life quality and security components of sustainable development. This means that there is the definite correlation between vulnerability to the global threat totality (global saecurity) and life quality component of sustainable development of these countries.

BRIC countries group hold the following rating positions: Brazil – the 35th position, Russia – the 49th position, China – the 78th position, India – the 86th position.

Rate Isd	ISO	Country	Sustainable development index Isd	Life quality component Cql	Life security component Csl
CLUSTER 1 ("VERY HIGH")					
1	ISL	Iceland	2,883	1,357	1,527
2	SWE	Sweden	2,870	1,398	1,473
3	AUS	Australia	2,859	1,310	1,549
4	NZL	New Zealand	2,848	1,365	1,483
5	NOR	Norway	2,830	1,379	1,451
6	CHE	Switzerland	2,827	1,498	1,329
7	FIN	Finland	2,823	1,342	1,480
8	CAN	Canada	2,771	1,293	1,478
9	DNK	Denmark	2,707	1,310	1,397
10	LUX	Luxemburg	2,691	1,257	1,434

Table 13. Ten leading countries ranked by sustainable development index, 2010

Rate Isd	ISO	Country	Sustainable development index Isd	Life quality component Cql	Life security component Csl
CLUSTER 1 ("VERY HIGH")					
8	CAN	Canada	2,771	1,293	1,478
12	DEU	Germany	2,654	1,338	1,315
13	USA	The USA	2,636	1,268	1,368
14	FRA	France	2,631	1,320	1,312
16	JPN	Japan	2,571	1,290	1,281
17	GBR	Great Britain	2,565	1,319	1,246
CLUSTER 2 ("HIGH")					
26	ITA	Italy	2,380	1,169	1,210
CLUSTER 3 ("AVERAGE")					
49	RUS	Russia	2,093	0,740	1,353

Table 14. G8 countries ranked by sustainable development index, 2010

G8 countries are "scattered" in the table from the 8th (for Canada) to the 49th position (for Russia) (Table 14).

Rate Isd	ISO	Country	Sustainable development index Isd	Life quality component Cql	Life security component Csl
CLUSTER 3 ("AVERAGE")					
35	BRA	Brazil	2,256	0,902	1,353
49	RUS	Russia	2,093	0,740	1,353
CLUSTER 4 ("LOW")					
78	CHN	China	1,762	0,647	1,115
86	IND	India	1,672	0,572	1,100

Table 15. BRIC countries group ranked by sustainable development index, 2010

Post-socialistic countries also took different positions by sustainable development index (table 16). The clusters with very high and high value of sustainable development index contain Slovenia, Lithuania, Estonia, Slovakia, Croatia, Latvia, Hungary, Poland, Czech Republic, Bulgaria.

Rate Isd	ISO	Country	Sustainable development indexIsd	Life quality componentCql	Life security component Csl
CLUSTER 2 ("HIGH")					
22	CZE	Czech republic	2,425	1,214	1,211
23	SVK	Slovakia	2,408	1,176	1,232
24	EST	Estonia	2,393	1,149	1,244
29	SVN	Slovenia	2,360	1,083	1,278
31	LTU	Lithuania	2,350	1,125	1,225
32	HUN	Hungary	2,327	1,112	1,216
33	LVA	Latvia	2,325	1,095	1,230
34	HRV	Croatia	2,268	1,000	1,267
38	POL	Poland	2,235	1,009	1,226
43	ALB	Albania	2,163	0,984	1,179
CLUSTER 3 ("AVERAGE")					
45	BGR	Bulgaria	2,129	0,932	1,197
49	RUS	Russia	2,093	0,740	1,353
50	ROU	Rumania	2,091	0,992	1,099
54	ARM	Armenia	2,029	0,817	1,212
60	AZE	Azerbaijan	1,961	0,734	1,227
CLUSTER 4 ("LOW")					
64	KAZ	Kazakhstan	1,907	0,720	1,187
68	UKR	Ukraine	1,889	0,854	1,036
73	BIH	Bosnia and Herzegovina	1,816	0,707	1,109
75	KGZ	Kyrgyzstan	1,774	0,653	1,121
CLUSTER 5 ("VERY LOW")					
83	MDA	Moldova	1,713	0,619	1,094
97	TJK	Tajikistan	1,562	0,493	1,069
104	UZB	Uzbekistan	1,450	0,411	1,038

Table 16. Post-socialistic countries ranked by sustainable development index, 2010

Russia, Rumania, Georgia, Moldova, Armenia have been included into the cluster with average values of sustainable development index. The countries with low and very low value of sustainable development index include Ukraine, Azerbaijan, Kyrgyzstan, Tajikistan and Uzbekistan.

All countries of Africa, except for Namibia, Morocco, Tunis and Algeria, are in the clusters with low and very low value of sustainable development index.

Rate Isd	ISO	Country	Sustainable development index Isd	Life quality component CqI	Life security component CsI
CLUSTER 3 ("AVERAGE")					
53	NAM	Namibia	2,034	0,792	1,242
55	TUN	Tunis	2,024	0,835	1,189
62	MAR	Morocco	1,929	0,774	1,155
70	DZA	Algeria	1,859	0,761	1,098
CLUSTER 4 ("LOW")					
61	EGY	Egypt	1,961	0,761	1,199
71	BWA	Botswana	1,853	0,796	1,057
80	ZAF	Southern African Republic	1,755	0,746	1,009
CLUSTER 5 ("VERY LOW")					
88	TZA	Tanzania	1,648	0,450	1,198
89	UGA	Uganda	1,640	0,473	1,167
90	ZMB	Zambia	1,618	0,496	1,122
92	MWI	Malaya	1,600	0,541	1,059
93	KEN	Kenya	1,600	0,462	1,138
94	GMB	Gambia	1,584	0,508	1,076
95	MDG	Madagascar	1,572	0,508	1,064
96	MOZ	Mozambique	1,571	0,414	1,158
98	CMR	Cameroon	1,540	0,371	1,169
99	BEN	Benin	1,517	0,380	1,136
100	ETH	Ethiopia	1,514	0,323	1,192
101	SEN	Senegal	1,482	0,411	1,071
105	NGA	Nigeria	1,443	0,375	1,069
107	ZWE	Zimbabwe	1,218	0,227	0,991

Table 17. Countries of Africa ranked by sustainable development index, 2010

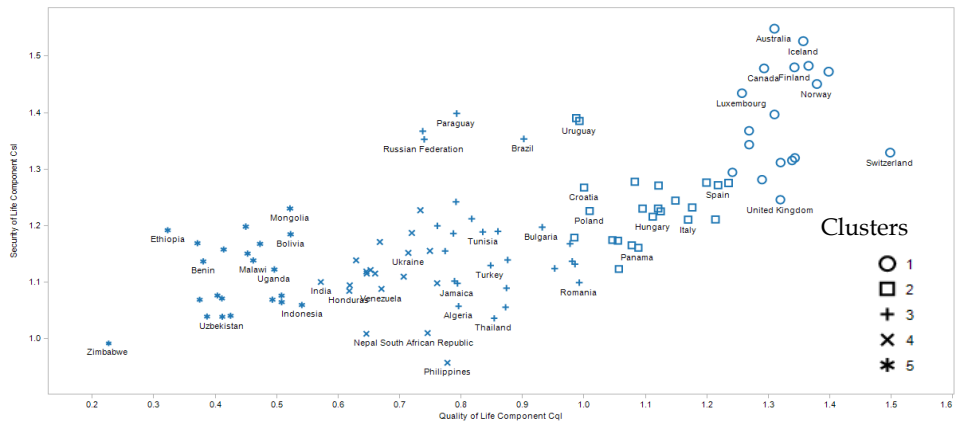


Fig. 6. Clusterization of countries in the coordinates of life quality and security

3.2 Country profiles construction on example of Ukraine

One of the main applications of the Sustainable Development Gauging Matrix (SDGM) is using actual data on indicators and parameters of sustainable development for a given country with the purpose of decision-making at various levels of the country's governance.

Using the country profiles service (<http://wdc.org.ua/en/services/country-profiles-visualization>) provided by WDC-Ukraine one can easily obtain dashboard for each world country to perform further in-depth analysis.

For 2010 results Ukraine has $I_{sd}=1,889$, $C_{ql}=0,854$, $C_{sl}=1,036$ with rankings #68, #73, #65 correspondingly. Each sustainable development component and its can be displayed in a dimension diagram (Fig. 7).

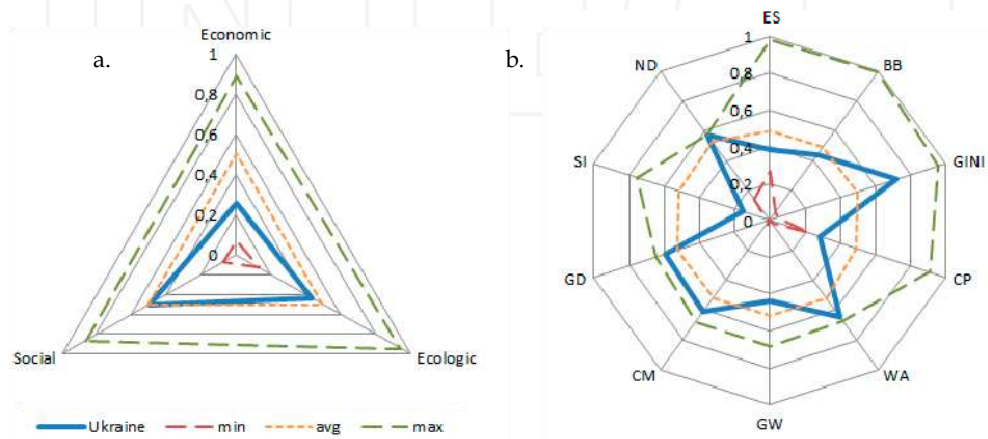


Fig. 7. Dimension diagrams for Ukraine's quality of life(a) and security of life (b).

Given figure gives possibility to handle visual analysis of the strengths and weaknesses of Ukraine through comparison of the values for certain indicators with their extreme and average meanings.

Considering the quality of life diagram one can point out, that Ukraine has better developed social dimension and poorer economic dimension. Analyzing the security of life component we can name as strengths indicators which values are better than average: people inequality (GINI), access to potable water (WA), health (CM, GD) and natural disasters (ND). Accordingly weaknesses are energy security (ES), biological balance (BB), corruption perception (CP), CO₂ emissions (GW) and state instability (SI). The most critical situation is with corruption and state instability that corresponds to the evaluations of experts from many international organizations like World Economic Forum, World Bank, etc. about Ukraine development problems.

4. Conclusion

In this research the system of indexes and indicators has been developed and the gauging matrix for sustainable development processes (SDGM) in three dimensions: economic, ecological and socio-institutional has been offered. Using this matrix and initial data,

obtained by the recognized international organizations we have developed the mathematical model that gives the possibility to calculate the components of human life quality and security as the components of sustainable development index and harmonization level of this development for every country. The global modeling of sustainable development processes for the large group of the countries in terms of human life quality and security has been performed. The results of modeling have been explained in details for every dimension of the sustainable development.

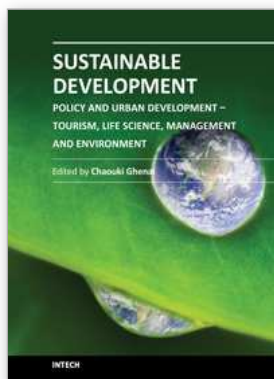
5. Acknowledgment

The author expresses his gratitude to the employees of ICSU World Data Center for Geoinformatics and Sustainable Development Kostiantyn Yefremov, Andrew Boldak, Alexis Pasichny, Tetyana Matorina, Olena Poptsova for their assistance in data gathering and computer modeling of the presented results.

6. References

- Aivazian S. A. (1983). *Applied statistics: Fundamentals of simulation and primary data processing [Text]* (Reference book), S. A. Aivazian, I S. Yenukov, L. D. Meshalkin, Finances and statistics, Moscow
- AlenkaBurja (n.d.). Interview with Hermann Scheer – Energy is a driving force for our civilisation – SOLAR ADVOCATE [Electron. resource]. Access link: http://www.folkecenter.dk/en/articles/hscheer_aburja.htm
- CIA (n.d.). The World Factbook [Electron. Resource]. Access link: <https://www.cia.gov/library/publications/the-world-factbook/>
- Corruption Perception Index 2008 [Electron. resource] (2008). Access link: http://www.transparency.org/policy_research/surveys_indices/cpi/2008/cpi_2008_table
- Donbass Internet paper NEWS.dn.ua (n.d.). Parade of moneybags: 50 richest people of Ukraine have amassed \$64,4 billion [Electronic resource]. Access link: <http://novosti.dn.ua/details/46009/2.html>
- GeoHive (n.d.). Current World Population [Electron. resource]. Access link: <http://xist.org/earth/population1.aspx>
- Global Footprint Network (n.d.). Ecological Footprint – Ecological Sustainability [Electron. resource]. Access link: <http://www.footprintnetwork.org/en/index.php/GFN/>
- Human Development Report 2007/2008. Fighting climate change: Human solidarity in a divided world [Electron. resource] (n.d.). Access link: http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf
- International Living (2009). 2009 Quality of Life Index [Electron. resource]. Access link: <http://www.internationalliving.com/index.php/Internal-Components/Further-Resources/qofl2009>
- Johannesburg Summit (2002). Access mode: <http://www.un.org/russian/conferen/wssd/>
- Kondratiev N. D. (1989) *Problems of economic dynamics [Text]*, Economics, Moscow
- Kotliakov V. M. (2001) Global Climate changes: anthropogenic impact or natural variations?, *Ecology and life*, V. M. Kotliakov, №1. Access link: <http://www.ecolife.ru/jornal/ecap/2001-1-3.shtml>
- Marshall M. G. (2008). Global Report on Conflict, Governance and State Fragility 2008 [Electron. resource], In: *Foreign Policy Bulletin*, M. G. Marshall, B. R. Cole. Access link: <http://www.systemicpeace.org/GlobalReport2008.pdf>

- Mathers C. D. (2006). Projections of Global Mortality and Burden of Disease from 2002 to 2030 [Electron. resource], In: *PLoS Medicine*, C.D. Mathers, D. Loncar. Access link: <http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.0030442>
- Membrane (n.d.). Pentagon experts: global warming will ruin the Earth [Electronic resource]. Access link: <http://www.membrana.ru/articles/misinterpretation/2004/03/03/182200.html>
- Nation Master (n.d.). World Statistics, Country Comparisons [Electron. resource]. Access link: <http://www.nationmaster.com/index.php>
- Report on the Transparency International Global Corruption Barometer 2007 [Electron. resource] (2007). Access link: http://www.transparency.org/content/download/27256/410704/file/GCB_2007_report_en_02-12-2007.pdf
- Science Council of Japan (2005). Japan Vision 2050. Principles of Strategic Science and Technology Policy Toward 2020 [Text], 30 p.
- Statistical Information System of World Health Organization (n.d.). Detailed database search [Electron. resource]. Access link: <http://apps.who.int/whosis/data/Search.jsp>
- Summit «Planet Earth», Rio-de-Janeiro (1992). Access link: <http://www.un.org/ru/development/progareas/global/earthsummit.shtml>
- The Global Competitiveness Report 2009–2010, World Economic Forum, [Electron. resource] (n.d.). Access link: <http://www.weforum.org/pdf/GCR09/GCR20092010fullreport.pdf>
- The Heritage Foundation (n.d.). Index of Economic Freedom: Link Between Economic Opportunity and Prosperity [Electron. resource]. Access link: <http://www.heritage.org/index/>
- The Intergovernmental Panel of Climate Change [Electron. resource] (n.d.). Access link: <http://www.ipcc.ch/index.htm>
- Transparency International. Visualizing the 2010 Corruption Barometer. [Электронный ресурс] (n.d.). Режим доступа: http://www.transparency.org/policy_research/surveys_indices/gcb/2010/interactive_2
- UNDP (n.d.). Bureau for Crisis Prevention and Recovery – the DRI Analysis Tool: [Electron. resource]. Access link: <http://gridca.grid.unep.ch/undp/analysis/result.php>;
- UNICEF Joint Monitoring Programme for Water Supply and Sanitation (n.d.). Water for life: Making it happen [Electron. resource]. Access link: http://www.who.int/entity/water_sanitation_health/waterforlife.pdf
- UNO Development Program (UNDP) [Electronic resource] (n.d.). Access link: <http://www.un.org/russian/ga/undp/>
- Vernadsky V. I. (1944). Some words about noo-sphere [Text]. *Success of modern biology*, Vernadsky V. I., № 18, issue 2, p. 113–120
- World Economic Forum (n.d.). Global Competitiveness Reports [Electron. resource]. Access link: <http://www.weforum.org/en/media/publications/CompetitivenessReports/index.htm>;
- Yale Center for Environmental Low& Policy (2008). Environmental Performance Index 2008 [Electron. resource]. Access link: <http://epi.yale.edu/>
- Zgurovsky M. Z. (2007) Sustainable development global simulation: Opportunities and threats to the planet [Text]. *Russian Journal of Earth Sciences*, Zgurovsky M. Z., Vol. 9, ES2003, doi:10.2205/2007ES000273



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Michael Zgurovsky (2012). Sustainable Development Global Simulation: Analysis of Quality and Security of Human Life, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainable-development-global-simulation-analysis-of-quality-and-security-of-human-life>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

People, Places and History – Towards the Sustainability of Social Life in Traditional Environments¹

Oscar Fernández
University of León
Spain

1. Introduction

The study of the historical centres of cities has not attracted much attention, perhaps because they have been considered a “consolidated urban phenomenon”, or maybe for a number of other reasons. Nevertheless, they are places of great interest, liable to far-reaching transformations and innovations, with much social interaction, which varies over time, for they are generally inhabited by one group of individuals, the residents, and used and enjoyed by others, depending on their functionality, which is usually one of tourism, leisure and culture. And the most interesting point, as I shall try to point out, is that it is a phenomenon with characteristics and peculiarities common to many historical centres of medium-sized cities of southern Europe.

This article examines the characteristics, problems and solutions offered by historical centres in different cultural contexts. Before going into a general analysis, I offer a study of the case of the historical centre of the city of León, in Spain, which will allow us to reflect later and make proposals for the sustained development of such places.

León is a medium-sized city with a complex structure with a dominating urban characteristic reaching beyond the actual municipal boundaries. It forms, together with its suburbs, a small conurbation of nearly 180,000 inhabitants. It has two thousand years of history and is very attractive because of its situation in north-west Spain, an area where different peoples have settled and different cultures have developed over time. It is a centre of such important routes as the Pilgrim Route to Santiago, the Silver Route and the *Mesta* route of sheep transhumance. All this contributes to its cultural value and heritage of different periods and styles. Notable examples of this heritage are the 1st-century Roman city walls, St Isidore’s Basilica and the Royal Burial Vault of the Kings and Queens of León (12th century), the Gothic Cathedral (begun in 1255) and the 18th-century Renaissance San Marcos building, now a *parador* (state-run hotel). The old city, the walled area, is the Roman and Medieval enclave, with a history going back over two thousand years. The quarter is characterized by a great morphological, functional and social variety. It retains a major role

¹ This study is part of a project financed by the Spanish Ministry of Science and Technology (ref. FFI 2009-12186).

in the life of the city owing both to its geographical location in the centre of the city and to its historical and cultural significance. The gradual process of degradation undergone in recent years has made it less competitive in comparison with other areas and new neighbourhoods of the city, which are more dynamic, despite the considerable efforts of the city council over the last ten years to maintain public spaces, buildings, lighting and other improvements, with the help of European financing. In this article, we shall analyse the problem of historical centres, general to many Spanish and Italian cities, and others of southern Europe.

Later, through the case study of the historical centre of the city of León, I shall concentrate on one of the most urgent problems for its people: habitability, housing and other indicators of sustainability. We consider that it is also possible to speak of the construction of sustainable cities through the situation of historical centres, for despite having their own life, they also form part of the rest of the city. By applying the criterion of sustainability, we shall discover how to achieve the city of tomorrow, the city of progress, while at the same time preserving and safeguarding our cultural heritage brought to us by the city's history.

The central methodological position of the discipline of anthropology is based on participatory observation, with in-depth interviews yielding qualitative information. We also use quantitative data obtained from a habitability survey, using indicators of sustainability, carried out in the city of León in 2004 under the auspices of the Re Urban Mobil Project and within the framework of research performed by the group led by Dr. Cervantes (2004 www.re-urban.com) for León City Council. The methodology of the survey is based on that of the UFZ-Centre for Environmental Research Leipzig-Halle. Over a total population of 5,364 living in 2,443 homes in the historical centre in 2004, 287 homes were contacted and 261 questionnaires were distributed, of which 206 were analysed, representing 8.4% of the homes and 3.8% of the population.

The information is completed from archives and other graphical sources, which allow us to corroborate data, along with bibliographical sources for purposes of comparison.

2. The situation and the problems of historical centres of medium-sized cities

Although the problems of historical centres are manifest and they are a constant source of preoccupation, they have received less attention than they deserve. Their situation has been tackled from different disciplines and in different countries and contexts. A recent review of the literature shows that the preoccupation aroused has come from different scientific angles and is present in diverse cultural contexts. Thus for example, Rossi (2004), writing on the process of urban change undergone by the centre of Naples over the last decade, examines the role of a number of local institutions, such as the judiciary, the new urban political elites, institutionalized civil society and urban social movements. They are the instigators of the dynamics of urban change "from above", and later of dynamics "from below". Another case from the same country is offered by Lo Piccolo (1996), who examines the different attempts to preserve and restore the historical centre of Palermo, a historical city with a unique cultural heritage, typical of the southern Mediterranean cities, for its setting, the wealth and variety of its architecture and its historical buildings, its characteristic habitational problems, and the different preservation plans implemented. More recently, Sancassiani (2005), from an optimistic standpoint, gives data about Italy in general, though with specific reference to

a survey on the implantation of Local Agenda 21. Maiques (2003) shows the configuration of the townscape of Valencia, Spain, another European Mediterranean city, from a historical perspective. The creation of an intellectual and political discourse based on biological and medical metaphors helps to create an image of urban society at a definite historical moment. Another case is the one offered by Williams (2002) on the “who”, “why” and “to what purpose” of the Historic Cairo Restoration Program, after many years of neglect. A different cultural context, but not for that less interesting, is offered by Middleton (2003), who says that recuperating a city through tourism is having some repercussions in Latin America, for example in Quito, the object of his study. The solutions offered may be similar to European ones, although he says that there could be some disadvantages to them if any type of social conflict arises to prevent their development.

But if we concentrate on the historical centres of many southern European cities, we shall see that they are characterized by a marked development during the second half of the twentieth century, more so in the last quarter. Reviewing these studies and the various institutional forums offering information on the progress and achievements within the development of European programmes and projects, and continuing previous studies (Fernández, 2000), I shall outline the situation of many historical centres similar to those of Bologna in Italy, León in Spain, Leipzig in Germany and Ljubljana in Slovenia, all participants in the Re Urban Mobil Programme; and a number of historical centres of medium-sized cities of southern Europe involved in Local Agenda 21, which offers strategies for changing many situations, including that of historical centres (<http://www.un.org/esa/sustev/documents/agenda21/index.htm>) plus other cities that are signatories to the Aalborg Charter (<http://www.sustainable-cities.org>).

It could be argued that the analysis of the period 1960-1990s shows the typical development of many of these cities, as well as in León: the resident population is mainly aging, generally working class, with housing units occupied by a single person paying a low rent, a situation which would seem to have prevented investment in renewal. In the most degraded parts of old districts, where the buildings are on the verge of ruin, the people largely belong to low-income groups and even socially excluded ones. There are often small shops and craftsmen's workshops recalling the economic activities of bygone days, generally the Middle Ages. Aging is therefore accompanied by a functional residualness, a step towards the socio-economic degradation of a neighbourhood, with the planning and social consequences of a social and functional vacuum. The progressive aging and social exclusion of the residual population are factors that have contributed to the decay of neighbourhoods, brought on by the low purchasing power of the population and progressive impoverishment of economic and social relationships. The tendency of the last few years has generally meant a progressive loss of population, which has given rise to the replacing of the original social group of the area. Poverty and the decay of accommodation pushed all those who could afford it to other parts of the city, which meant that those remaining belonged to low-income groups.

Another common phenomenon in historical centres has been the inability to bring about a social unification of all the residents of the neighbourhood. Furthermore, the arrival of new ones implies a structural division within it into old and new residents. The latter are on the road to exclusion, favoured by the fact that the unity of the group, if indeed it can be called

that, mainly made up of the elderly, is based on tradition and common symbols, and on the knowledge afforded by years of living in the area. In the case of Spain, for the period in question, there were half a million people living in historical centres, with characteristics like those already mentioned, that is an elderly population with major shortcomings in services and accommodation, with a mean unemployment rate of 27.6% and 21.6% of the population with only elementary education. They are the only areas with a major amount of rented accommodation (44.5%) and a high proportion of empty dwellings (21.3%) (<http://habitat.aq.upm.es/doc.html>). In general, over half of the residents were born outside the municipal boundaries and are of low social classes. A quarter of the houses were lying empty and of those occupied, only 25% were owner-occupied. About 40% were severely dilapidated.

An analysis of references showed us that the areas in question had suffered deterioration in building and planning quality as well as falling behind socially and environmentally, some of them affected by social exclusion, an increase in the elderly population and people with low resources, neglect of buildings by well-off, etc. this brought about a crisis of economic activity, with the loss of traditional activities, the occupation by marginalized groups of buildings with inadequate sanitation that made them difficult to live in, and a consequent proliferation of tenement slums. The social image of these areas fell, and this deterioration gradually spread to neighbouring districts.

To this situation of depopulation and neglect there must be added the difficult problem arising from the new functionality being acquired by these neighbourhoods, now leisure areas, with an increasing number of bars and restaurants, which in principle met the demand of a cultural tourist sector offered by the area through the historical buildings and museums normally situated in such areas. This saturation of bars and the like, and their impact on night life and their concentration in certain parts of historical centres has discouraged new residents from entering the areas, along with other commercial functions and services. What we have seen is that the rehabilitation of these areas has become a pressing question, for they needed a very careful reformation in order not to affect their historical atmosphere and character and increase their vitality, and even their picturesqueness (various authors, *Places to Live*, 2003).

A similar process in these southern European centres, according to another study about León, (Fernández, 2000) has consisted, as the catastrophic tendency has waned, in new population groups coming into these districts, and not only the socially excluded, ethnic minorities or foreigners in precarious employment situations. Attracted by the gradual processes of restoration, young professional people are moving in, choosing these areas for their accessibility and central position. Moreover, the rehabilitation plans carried out have generally formed part of public programmes with European funding, mainly through the European Regional Development Fund (ERDF), such as those mentioned above (Urban, Re Urban, etc.) They have the advantage of setting up networks of cities with similar problems, affording the possibility of information exchanges and synergies (http://europa.eu.int/comm/regional_policy/intro/regions1_en.htm).

The effects have been varied and, at times, limited, mainly in small and medium-sized cities. The positive effects have served to establish guidelines for renovation, and grime, filth and damp have gradually given way to colour. The preservation of historical centres has become

an aesthetic task, whereby the historical and artistic city is rediscovered for citizens and tourists alike. Carefully chosen light colours for façades have become a visible sign of this recuperation, which we trust is not just a facelift. Another characteristic tendency has been pedestrianization, with non-residents' cars being denied entry, and space thus being liberated for citizens to walk around and enjoy the historical buildings.

On the other hand, however, there has always been a noticeable division of the subgroups living in historical centres, which means that they fail to achieve the group identification necessary for solving problems facing all of them, while bringing out their socio-economic diversity and multiculturalness.

3. The historical centre of the city of León

After this brief overview, we shall now concentrate on the case of León, where, after a period of lethargy, the strategies applied are fairly typical of those outlined above.

In León, three factors come together which, according to J. Borja (1997, 2003), are necessary for the success of urban transformation projects: the sensation of acute crisis brought on by the awareness of the globalization of the economy, the harmonization of public and private urban key players together with the generation of local leadership (both political and civic), and the joint will and consensus of the citizens for the city to take a step forward, both physically and socio-economically and culturally.

Thus, León, with the brokerage of the council and the impulse of the global macroeconomic current imposed and facilitated by the European Union, and under the auspices of the Regional Development Fund, in the 1990s, sought the revitalization of its old quarter but with criteria that in some way were imposed on it from outside. Thus arose the Urban pilot project "Building León: a Development Proposal for the Old City 1995-1999", which, while also potentially applicable to other historical cities centres in the European Union, sought to bring new life to the historical centre of León. It was felt necessary to involve young people and revitalize the economy of the area by attracting small and medium-sized firms, and to improve the quality of life of the residents. In this way, the historical centre would not merely be a collection of historical buildings for tourists and visitors but the living district that it historically used to be, a place with its own identity and, in short, the definite and dynamic urban reality which, also historically, it has sought through the consensus of physical, social and economic structures. Furthermore, these projects include the idea of competitiveness at different levels, both internal, within the city, and external, with other similar cities, both Spanish and European. And this idea of competitiveness has made itself very much felt in the territorial debate, according to Díaz Orueta (1997). Because of it, and in line with globalizing and subsidy-based policies, there has been an on-going struggle to attract investment. Much effort has been made to modernize infrastructures, and much money has been spent on defining strategies to determine the place León should take in the hierarchies of cities.

The work of social and political groups functioning in the district, which has had partial and isolated successes in line with Rossi's ideas (2004), is to be interpreted as directed at organizing the group and establishing an infrastructure for social dynamics leading to co-existence, solidarity and an improvement of the quality of life. A significant case was the

“León Típico” Residents’ Association, which had a major social and political impact (Fernández, 1997), originally based on opposition to the previous political regime in its struggle for the artistic and cultural heritage of the district. But now, because of the absolute lack of stimuli, and the loss of interest of the citizenry, it has largely given up solidarity to concentrate on improving the quality of life. This means peace, being able to enjoy a walk, no noise at night and, if necessary, the possibility of bringing charges against annoying bars or other premises causing any kind of nuisance (noise, drugs, and so on). But this piecemeal work, though positive, must include a search for alternatives to the stagnation of the problems of the resident population.

The Urban pilot project had praiseworthy aims, for it sought the recuperation of the historical centre as an active and integral part of the city, while giving it a live role, in order to avoid it becoming a merely monumental centre, and improved the appearance and sanitation of the district with a pneumatic system of refuse collection. It did not, however, solve the structural problems concerning the aging population, the situation of its housing, or the functionality of the area as one for night life, which quite definitely affected the quality of life through noise pollution. These are the main problems facing the old quarter of León and those which the residents consider the most worrying.

Specifically, the residents mention such problems as the deficient state of their homes, the loss of crafts and commercial activities, an aging population and the abandonment of the area as one of residence, in relation to its night life, which engenders high levels of pollution, especially at weekends. Although the old quarter is set in the centre of the city of León, major functional changes have taken place in it and in the city as a whole: as a place of residence it is in decline, as 1900 residents have left in the last ten years; there has been a loss of activity as a result of the changes in the location of administrative services; religious and educational functions have been run down, though not as regards space, owing to the drop in the number of students and in the numbers of residents of religious homes and convents. On the other hand, art, culture and tourism have grown in importance. Trade has been strengthened in some of the better-known streets, which have been renovated, but to the detriment of other parts of the district, where it has disappeared altogether. The southern part of the old quarter, known as the *Barrio Húmedo*, or “Damp Quarter” retains its major role as a night spot. Bars, restaurants and discothèques take up most of the business premises, almost to the exclusion of other shops or services, causing much nuisance to residents through the great amount of noise generated at night.

As has already been said, the population of the historical centre was 5,364 in 2004. Over 60s account for a third of the total, at 1,832. Another significant fact that we observed is that 16% of the homes are occupied by people living alone. Although the population is mainly an aging one, young professional people are moving in, as there are signs of the rehabilitation of the area. Although most of the population comprises Spanish nationals, at given moments, foreign immigrants and ethnic minorities have set up in this area owing to the availability of cheap housing, usually with deficient sanitation. At present, foreigners account for only 3% of the population.

As for the socio-economic structure, over 85% of the population has at least received primary education, 34.6% having been to university. Although a variety of occupations are represented, 27.8% of the population is retired.

The district's central position means that the normal way of getting about within the city is walking, 70.4% of the population using this means, with journey times of 15-20 minutes, although half of the homes have one car and 18% have two while a third have none. In turn, of those who have cars, half have access to garage space or pay for a parking place, while the other half leave their vehicles parked in the streets, which causes thoroughfare problems because of the recent pedestrianization of a number of streets.

Fieldwork shows that one of the means of creating cohesion in the quarter is through the mutual personal acquaintance of residents. The certainty of meeting the same people every day creates affinity, which is borne out by statistics: more than a quarter of the residents of the old city (25.7%) have lived there all their lives, and the remainder have been there for varying periods, ranging from 10-25 years (18%), 6-10 years (11.2%) to under 5 years (10.2%). Of those who have moved into the area, over half (54.3%) said that the accommodation was what they wanted, that the centre was near, and a third said that their places of work or study were near. Regarding social life in the quarter, most residents consider themselves fairly or very involved in it, which contrasts with the fact that most of them find out what is happening in the area through the local press or television and radio, while 10.3% find out from the residents' association, 4.6% from the parish church and a few (4.1%) because they see what happens personally. Just over half (54.4%) do not feel adequately informed about local issues. A similar percentage (54.6%) say that they know of some association at work in the area like the residents' association, a social or community grouping working for the district or for some sector such as tradesmen or caterers, or for the local heritage or NGOs. Nevertheless, the real percentage of active participation in the life of the district is only 17.9%, as opposed to 82.1% who say that they do not participate.

Relationships between residents may be said to be good, and over half of them (53.3%) say that they have relatives or friends in the area, and see them often, perhaps daily and at least weekly. Half of the residents of the old town would recommend others to move into the area, for its central position and convenience, although they would not recommend it from the noise point of view.

Most of the residents are owner-occupiers (61.2%). Given the age of the buildings, few upper flats have lifts, only 15.5%, and the same may be said for central heating (12.1%), and that in a city where the weather is cold for 8 months of the year. 68.4% of residents tend to use diverse types of gas, diesel, coal and electric fires and heaters.

The level of satisfaction of residents of the area with their housing is very variable. The main complaints concern the condition of the roofs and ceilings, heating and the quality of the windows, all of which are connected with the external environment (climate, noise pollution, age of the buildings, etc.).

Another source of complaints is the lack of facilities for children, of play areas, and the excess of noise at night, together with the lack of services for the elderly and of cultural activities and facilities. The points of greatest satisfaction are the numbers of restaurants and cafés, street cleaning and the novel system of pneumatic selective refuse disposal, installed under the auspices of the Urban pilot project.

But the general feeling among the residents is one of improvement, especially over the last few years, at least as far as outward appearances are concerned, as in this regard, the

changes have been far-reaching. This has been helped by the policy of pedestrianization, as the removal of motor traffic has improved the quality of the environment, while the renovation of streets, squares and façades has improved the general appearance. But the main problem, nocturnal noise pollution, has yet to be solved. It may also be the source of another problem, vandalism directed against renovated street furniture.

The perception of the district's future for most residents (60.4%) is positive, while a minority of 19% consider it negative. Despite this, answers about the future of the quarter are equally divided into those who think that it will be restored, and that it will have nothing but bars and restaurants, and those who think that it will depend on the will of the council and of the politicians in power at any given moment. It is significant that 18.5% of the people would move to another district if they could, because of the problem of noise at night, especially at weekends.

In short, we have found some positive feelings among the population of the historical centre regarding a gradual recuperation of the population (which is false, as the statistics show), the accessibility of the city centre, improvements brought about by the pedestrianization of certain areas, improvements to façades and streets and the area's becoming attractive as a residential one because of its architecture and historical setting. Also mentioned are the social atmosphere, the air quality, the cleanliness of the streets and the system of refuse disposal, together with good relations among residents, the number of bars and restaurants, a favourable opinion concerning the overall situation of the last few years and positive feelings regarding the district's future as a residential area. Negative feelings recorded concentrate on the excessively aged population and the number of homes with over sixties living alone and who depend on their old-age pensions, which are usually low. There is also some unrest concerning the state of housing, usually with regard to its age, the conditions of the streets and pavements, the levels of noise at night, the lack of green areas and trees, of children's play areas, of cultural and leisure facilities and of public social centres, activities for the young, sports fields, centres for the aged and public social centres in general, together with the physical state of buildings, poor access to information, and so on.

4. Towards the sustainability of historical quarters

It has now become quite necessary to apply the criterion of sustainability to city planning and development. At the world level, one of the initiatives of the Earth Summit held in Rio de Janeiro in 1992 was to foment local initiatives to support sustainable development. In Europe, the Treaty of Amsterdam of 1999 confirmed in articles 2 and 6 that balanced and sustainable development, together with the protection and improvement of the environment, were basic aims of the European Union. The criterion of sustainability, however, has not been felt excessively in historical cities, which are in the process of change and development.

Brugmann (1992) and Tjallingii (1995) proposed considering the city as an ecosystem and using ecological concepts to understand the problems of urban sustainability and find solutions for them. It is certainly true that advances are being made in the construction of the city, approaching the aims of sustainability, of a modern and dynamic city developing in an attractive setting, and one that is healthy from the environmental point of view. Through a strategy of integration of the environmental elements of different sectorial policies, a kind

of progress is being sought that satisfies the needs of the present without jeopardizing the ability of future generations to satisfy their own needs.

One of the typical sustainability proposals that we have seen applied in many historical centres has been the freeing of spaces from traffic. As motor traffic is the main source of urban atmospheric pollution, action must be taken to reduce its impact. As an example, Handy and Clifton (2001) have evaluated the possibility that providing local shopping opportunities will help to reduce automobile dependence. Although local shopping does not show great promise as a strategy for reducing automobile use, but it does show promise as a strategy for enhancing quality of life in neighbourhoods, at least partly by making driving once again a matter of choice. The topic has a complex solution, because, as Black, William R., and Peter Nijkamp (2002) say, "solutions will succeed or fail on the basis of social response". As emissions cannot be stopped altogether, for it is impossible to prohibit all traffic, an effort must be made to rationalize and improve the quality of air through innovative traffic policies, the use of noise-reducing surfaces and public transport policies directed at the improvement of the environment, although, as we have seen, where traffic noise has been eliminated, other forms of noise pollution have taken its place.

Nevertheless, I believe that the role of sustainability in the study of historical centres of this type need not be limited to environmental questions. It would seem necessary to bear in mind other kinds of indicator which in principal could be considered as emerging, such as society and culture, principally in the historical areas that we are dealing with, where taking the old town as a consolidated fact has caused other aspects just as basic to the lives of the citizens to be forgotten. We shall thus be able to bring out the value of the city as a cultural heritage, as a living place, one of co-existence, of commercial and cultural exchange, of the exchange of knowledge, a seat of institutions and a place of leisure. This must also be translated into actions capable of recuperating the normal aspects and activities of the historical city, which are the basis of its formation and development, and which are at risk of disappearing as the result of the burgeoning development of suburbia, with alternatives for coexistence totally detached from the traditional urban nucleus.

In this regard, one of the aspects to consider is the concentration of the cultural heritage characterizing historical cities, especially their old quarters. This fact determines their close association with a growing type of tourism: cultural tourism, or, more specifically, "heritage tourism". This is the case that Ian Strange (1999: 302) explores. He presents the argument that in some places attempts to reconcile the potentially conflicting and incompatible demands of urban competitiveness and urban sustainability are being pursued through the application of sustainable development policies to the management of local environmental and historical assets. He shows analyses the varying ways in which policy makers in historic cities are engaging in action to regulate localised patterns of economic and physical growth. Indeed, a major dilemma for many small- to medium-sized historic cities revolves around the simultaneous need to manage the conservation of the physical fabric of the city and accommodate the pressures associated with an expanding range of economic development and tourist-related activities and functions. Nevertheless, not all urban heritage is a resource for tourism, and not all spaces attract visitors or offer any significant use for tourism. There are other spaces in the historical quarters which are also lived in, and which have value for the collective memory of the residents. Evidence tells us that the rehabilitation of certain spaces with a monumental or historical value has been to the detriment and neglect of areas

without such value. It cannot be denied that the association of culture, tourism and historical cities has obvious advantages for communities and the places that are home to them, such as income from visitors, the physical and functional renovation of the areas in question, and so on, but it also has a number of negative effects of growing importance. As far as space is concerned, these effects are especially felt in a small part of the old city defined as a “historical city of interest to tourists”. Together with the advocacy of urban sustainability, there arises the need for models of tourism development able to maximize the benefits and minimize the costs of attracting tourists, especially in the more fragile and vulnerable sectors. Likewise, a better flow of information concerning the projects and programmes in any way affecting the neighbourhood and its inhabitants will contribute to social sustainability, while also stimulating the participation of the citizens in the face of the tendency for today’s society to become less and less solidarity-minded, as we have seen in the countryside. Of course, it would be desirable to enhance local management with integrated decision making involving public and private institutions and the community at large. In many Local Agenda 21 cities, an opportunity to renew, innovate and increase the processes of participation is arising in this way. The community’s involvement in these processes of gradual and strategic change is a fundamental condition for their success. In this regard, Agenda 21 offers a forum and processes that could strengthen the community. Some Spanish cities, such as Barcelona and Granada, or even, Swedish (Adolfsson Jörby, 2002) or Austrian (Astleithner and Hamedinger, 2003, and Narodoslowsky, 2001) or Italian ones, as borne out by Sancassiani’s recent study (2005) have approached them as governance experiences, where different key players take part in the processes and take on their share of the joint responsibility regarding the shared goals. These are, then, participative processes directed at establishing a different relationship between the local authorities and the various social actors at work.

Another point to consider is the increased value of the built-up city and the improvement of its infrastructures, fomenting their recycling and preserving the architectural heritage. This would enrich cultural identity, while improving the aesthetic quality of the townscape. Generating urban diversity and complexity (in residence, economic activity, culture and services) would help to reduce the need for mobility, which would make the city more attractive as a place to live, work and offer services. The substantial improvement of living conditions and social cohesion, and of quality of life (housing, education, work, health, culture, leisure, and so on) would help us to regain the idea of a city as a common project of its citizens.

Likewise, there arises the need to stimulate economic dynamism, which would be helped by the setting up of workshops and schools of traditional activities linked with the area, such as restoration, plastic arts, crafts, etc., where education and training would be a first step towards economic consolidation. In this concern, Summers, M., Childs, A., Corney, G. (2005) show the case of education for sustainable development (ESD) in initial teacher training. They find that schools are not yet well developed as sites for student teacher learning in the domain; student teachers generally have greater understanding of sustainable development than their mentors; geography mentors perceive themselves to be better prepared for mentoring in this area than their science counterparts (who feel ill-prepared); for both students and mentors, there are significant gaps in understanding of education for sustainable development. The transmission to lower levels may be significant also. But

certainly, it is not possible to base sustainability only on souvenir shops in the daytime and bars and restaurants at night. While on the subject of education, I would suggest that there should be education in ethics for the young, together with alternatives to alcohol-based nocturnal leisure in bars and discothèques that are open well into the small hours of the morning. Such measures could be evening sports activities and a management of culture allowing for a more affordable culture for young people. The noise pollution caused by existing leisure activities is a new source of annoyance in these cities, and, as we have seen, many historical centres that have managed to rid themselves of the noise generated by traffic are suffering from the noise produced by the aggressive spread of nocturnal leisure. It is certainly true that southern European cultures, especially Mediterranean ones, and noticeably in Spain, are characterized by celebrations and street life, and therefore by rowdy open-air partying. But it is just as true that in our cultural environment, noise is becoming more and more a source of urban annoyance. There is a problem of the proliferation of fixed points of noise pollution such as discothèques, bars, open-air terraces and other leisure-time activities. The conflict between the right to rest and the right to leisure and social relationships is generating new urban unrest, in some cases of a serious nature, which is making it necessary to set up mechanisms of dialogue, shared responsibility and arbitration. However, the socio-cultural life of such places is also an asset that makes them attractive and contributes to local vitality and vibrancy in a way that buildings and artefacts do not, (and is not easily separated into what is either critical or tradable capital). In this particular case, communication channels must be opened up between those who run bars and shops, youth groups and residents to find a solution based on the satisfactory compromise of rights. In this regard, in the local setting, campaigns of awareness, education and environmental information have an effective background for generating social change, for it would seem that they get feedback from processes of community participation and are more permeable to the influence of ecological and environmental organizations. Therefore, cities play a basic role in changing their citizens' habits and values regarding the new paradigm of sustainable development.

Most of these problems are typical of the historical centres of our cities. But we might consider that the solution to many of them depends on transforming these historical centres into places of convergence where there are activities with an obvious function within the framework of the city as a whole. Considering and studying them in a piecemeal way and in isolation will give us a sectorial view, with an obvious dysfunctionality leading to degradation and destruction through their separation from the rest of the city. They will have to be considered within global strategies, at the same level as the rest of the city and its zones of influence, as part of a cultural legacy belonging to the whole community and forming part of a dynamic process in which the old city has a number of attributes that can neither be repeated nor regained. When the elderly people of the area speak to us of bygone days, of time immemorial, what is really essential is the message: the proclamation of the prestige and age of the city, the idea of a past with a presence in the present. But the most interesting thing is how they cling on to them emotionally. This is all the clearer when they tell their personal experiences, however disastrous. As long ago as 1946, Annoni pointed out that the historical centres of cities collaborated in the development of a modern town, insofar as they offer culture, rest and leisure. This obliges us to find a concept of Historical Centre within the context of the city, not just to preserve its history, but also to look after its social life.

Now may be the time to consider again the city as a joint project, as a space for human relationships, as a place where there will inevitably be conflicts, which can and must be resolved via consensus and not by the imposition of a dominating element, by applying to problems created over a long period of time solutions that are not quantified in units of time measured by political legislatures. But above all, it is fundamental that we should seek a project of a city for the future from a more comprehensive point of view than today's, transcending the interests of political parties and economic groups, with our sights always on the people. In short, what is sought is to maintain, or even regain the original urban structure of the city as an area that is lived in, and stressing the value of the historical centre and its importance in the development of the city.

5. Conclusion

The historical centres of cities still have their character as multifunctional areas but the pace of renovation of facilities is quite slow and this impedes competition with other more dynamic neighbourhoods.

In the object of our study, the old city of León, through its historical buildings, it is a symbol of the whole city and the seat of many of its urban, social and cultural values. Moreover, it is a dynamic urban reality which throughout history has striven to strike a balance between physical, social and economic structures. The old city is living through a critical situation where there are obviously many difficulties when it comes to finding an operational model that allows it to get away from the cycle of physical, social, cultural and functional deterioration.

The residents of the historical area have lived there for a long time and many of the old buildings are inadequate and occupied by single people living alone. There is a low percentage of young people, and hardly any in middle age. Although over half the population feel that the district has improved in general over the last few years, people would like to see green spaces, public, social and cultural services, shops, more trade in general and anything that will give more daytime life to the area.

In this regard, we have drawn up a proposal of sustainability for areas of this type which, through criteria of culture and society, seeks to contribute to revitalizing the commercial and leisure activities normal in a consolidated city, by means of specific actions like the maintaining of the resident population, encouraging the refurbishment of old homes, along with the preservation of their topological characteristics and their adaptation to the demands of today's life, and attracting new generations so that they will, together with the present population, guarantee the survival of activities and urban co-existence. Furthermore, one of the greatest problems detected is the danger that these historical centres will become mere monumental areas with an exclusively museum-like character, which leads us to conclude that it is important to integrate historical centres in the daily life of whole cities.

Our cities require sustainability, and to achieve it, we need changes in our concept of what a city should be, and to reconsider the way decisions are made regarding certain policies and new outlooks on how to get tomorrow's problems into a political debate focussed on today. This is an urgent task which requires specific commitments and a great capacity to learn.

Many of the challenges and problems mentioned will only be sorted out (legal, fiscal and regulatory policies aside) with a new social consensus allowing for a change in attitudes and daily behaviour patterns of most of the people. The historical city is the background to the processes of collective identification, of belonging, which creates community, and it is in that community environment that new alliances of sustainability must be created. The positive role of local government and of the city as a whole are, owing to their proximity and permeability, generally recognized, but there is still a long way to go. And the way is not without obstacles, for as humans we have to recognize that we are all somewhat contradictory and we want a lot of things at the same time. But we must remain aware of the demands that the discourse on urban sustainability creates if we want more than well-meaning rhetoric.

The cultural standpoint, and that of Europe's historical heritage, should regain the taste for human projects, advocating the city of Erasmus (quoted by A. Clayton and N. Radcliffe, 1994), who, far better than modern town-planners and humanists, recognized that the ultimate goal of any discipline had to be the improvement of the quality of life of the human being in a development compatible with Nature and the environment.

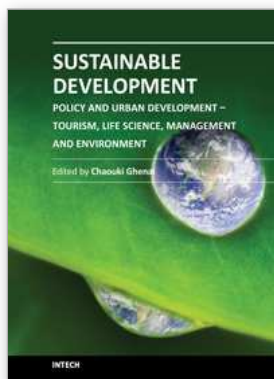
6. References

- Adolfsson Jörby, S. (2002) Local Agenda 21 in Four Swedish Municipalities: a Tool Towards Sustainability?, *Journal of Environmental Planning and Management*, 45 (2): 219–244.
- Annioni, A. (1946) *Scienza ed Arte del Restauro Architettonico. Idee ed Esempi*, Artistiche Framar. Milano
- Ashworth, G. & Tunbridge, L. E. (1990) *The Tourist-Historic City*, Belhaven, London.
- Ashworth, G. J., Tunbridge, J. E. (1999) "Old cities, new pasts: Heritage Planning in selected cities of Central Europe", *GeoJournal*, 49 (1): 105–116.
- Astleithner, F., Hamedinger, A. (2003) "Urban Sustainability as a New Form of Governance: Obstacles and Potentials in the Case of Vienna" *Innovation: The European Journal of Social Sciences*, 16 (1): 51–75.
- Baker, S., Kousis, M., Richardson, D. & Young, S. (1997) Introduction: the theory and practice of sustainable development in EU perspective, in: S. Baker, M. Kousis, D. Richardson & S. Young (Eds) *The Politics of Sustainable Development*, pp. 1–42. Routledge, London
- Black, W. R., and Nijkamp, P. (eds.) (2002) *Social Change and Sustainable Transport*, Indiana University Press, Bloomington.
- Blowers, A. & Evans, B. (Eds) (1997) *Town Planning into the 21st Century*. London: Routledge.
- Blowers, A. (1997) Society and sustainability: the context of change for planning, in: A. Blowers & B. Evans (Eds) (1997) *Town Planning into the 21st Century*, pp. 153–168, Routledge, London.
- Borja, J. (1997) Las ciudades como actores políticos, *América Latina*, Hoy 15: 15–19.
- Borja, J. (2003) *La ciudad conquistada*, Alianza, Madrid.
- Borja, J., & Castells, M. (1996) *Local y Global: la gestión de las ciudades en la era de la información*, Taurus, Madrid.
- Boyko, C. T., Cooper, R., Davey, C., (2005) Sustainability and the urban design process, *Proceedings of the Institution of Civil Engineers: Bridge Engineering*, 158 (3) 119.
- Brugmann, J. (1992) *Managing Human Ecosystems: Principles for Ecological Municipal Management*, ICLEI, Toronto.

- Castells, M. (2000) Urban sustainability in the information age, *City*, 4 (1) 118.
- Cheshire, P. (1979) Inner Areas and Spatial Labour Markets: A Critique of the Inner Areas Studies, *Urban Studies*, 16: 29-43.
- Clayton, A. and Radcliffe, N. (1994) *Sustainability: a Systems Approach*. London: Institute for Policy Analysis and Development for the World Wide Fund for Nature.
- Commission of the European Communities (2001) *Consultation Paper for the Preparation of a European Union Strategy for Sustainable Development*, SEC, 517, Brussels.
- Committee for Economic Development (CED) (1995) *Rebuilding Inner City Communities: A New Approach to the Nations Urban Crisis*, CED, New York.
- Costantini, V., Monni, S. (2005) Sustainable Human Development for European Countries, *Journal of Human Development*, 6 (3): 329-351.
- Cowell, R. & Owens, S. (1997) Sustainability: the new challenge, in: A. Blowers & B. Evans (Eds) *Town Planning into the 21st Century*, pp. 15-32, Routledge, London.
- Dekay, M., O'Brien, M. (2001) Gray City, Green City. *Forum for Applied Research & Public Policy*, 16 (2) 19-28.
- Díaz Orueta, F. (1997) Las ciudades en América Latina: entre la globalización y la crisis, *América Latina, Hoy*, 15: 5-13.
- European Commission (1994). *Local Development Strategies in Economically Disintegrated Areas: A Proactive Strategy Against Poverty in the European Community*. European Commission Social Papers, 5.
- European Commission (1996). *European Sustainable Cities*. EU Expert Group on the Urban Environment. http://europa.eu.int/comm/environment/urban/home_en.htm
- Fernández, O. (1997) *Aproximación Antropológica a la ciudad de León: El Centro Histórico*, University of León, León.
- Fernández, O. (2000) Renewal of historic-city areas, between Globalization and Localization, *Metropolitan Ethnic Cultures: Maintenance and Interaction. The relationship between traditional culture and modernization in cities*. Beijing Inter-Congress, IUAES: (A2): 1-12.
- Fernández, O. (2007) Towards the Sustainability of Historical centres: a Case-study of León, Spain. *European Urban and Regional Studies*, 14 (2): 181-187.
- Finco A., Nijkamp, P. (2001) Pathways to urban sustainability, *Journal of Environmental Policy & Planning*, 3 (4) 289.
- Fung M, Kennedy CA. (2005) An Integrated Macroeconomic Model for Assessing Urban Sustainability, *Environment and Planning B-Planning & Design*, 32 (5): 639-656.
- Garde, AM. (2004) New urbanism as sustainable growth? A supply side story and its implications for public policy, *Journal of Planning Education and Research*, 24 (2): 154-170.
- Gibbs, D. (1997) Urban sustainability and economic development in the United Kingdom, *Cities*, 14 (4) 203-209.
- Glasson, L., Godfrey, K. & Goody, B., Absalom, H. & Van der Borg, J. (1995) *Towards Visitor Impact Management. Visitor Impacts, Carrying Capacity and Management Responses in Europe's Historic Towns and Cities*, Avebury, Aldershot.
- Handy, SL; Clifton, KJ (2001) Local shopping as a strategy for reducing automobile travel, *Transportation*, 28 (4): 317-346.
- Hannerz, U., (1986) *Exploración de la ciudad. Hacia una antropología urbana*, FCE, México.
- Harris, J. M. (2003) *Rethinking Sustainability: Power, Knowledge, and Institutions.*: University of Michigan Press, Michigan.
- Hudson, R. (2000) *Production, Places and Environment. Changing Perspectives in Economic Geography*, Prentice Hall, Harlow.

- Hudson, R. (2005) Towards Sustainable Economic Practices, Flows and Spaces: Or is the Necessary Impossible and the Impossible Necessary? *Sustainable Development*, 13 (4): 239-252.
- ICLEI (International Council for Local Environment Initiatives) (1995) *European Local Agenda 21 Planning Guide. How to Engage in Long-term Environmental Action Planning Towards Sustainability*, ICLEI, Fribourg.
- Jackson P. 2002. Commercial cultures: transcending the cultural and the economic. *Progress in Human Geography* 26: 3-18.
- Kelly, R. and Moles, R. (2000) Towards Sustainable Development in the Mid-west Region of Ireland, *Environmental Management and Health*, 11 (5): 422-432.
- Lake, A. (1996) The City in 2050: How Sustainable?, *World Transport Policy and Practice* 2/1 (2): 39-45.
- Lewis, G., Brabec, E. (2005) Regional land pattern assessment: development of a resource efficiency measurement method, *Landscape and Urban Planning*, 72 (4) 281.
- Lo Piccolo, F. (1996) Urban Renewal in the Historic Centre of Palermo, *Planning Practice and Research*, 11 (2): 217-227.
- Low, S. M. (ed.) (1999) *Theorizing the city: the new urban anthropology reader*. Rutgers, New Brunswick.
- Lynch, K. (1960) *The Image of the City*, MIT Press, Cambridge, MA.
- Maiques, JVB, (2003) Science, politics and image in Valencia: a review of urban discourse in the Spanish City, *Cities*, 20 (6): 413-419.
- Marat-Mendes T, Scoffham E. (2005) Urban Sustainability And The Ground Rules That Govern Urban Space, *Urban Morphology*, 9 (1): 45-46.
- Marvin, S. & Guy, S. (1997) Creating myths rather than sustainability: the transition fallacies of the new localism, *Local Environment*, 2 (3): 311-318.
- McMahon, S.K. (2002) The Development of Quality of Life Indicators – a Case Study from the City of Bristol UK, *Ecological Indicators*, 2 (1-2): 177-185.
- Meethan, K. (1997) York: managing the tourist city, *Cities*, 14 (6): 333-342.
- Middleton, A. (2003) Informal traders and planners in the regeneration of historic city centres: the case of Quito, Ecuador, *Progress in Planning*, 59: 71-123.
- Narodoslawsky, M. (2001) A Regional Approach to Sustainability in Austria, *International Journal of Sustainability in Higher Education*, 2 (3): 226-237.
- National Research Council Board on Sustainable Development (2002) *Our Common Journey*, National Academies Press, Washington.
- Newman, P. (1998) From Symbolic Gesture to the Mainstream: next steps in local urban sustainability, *Local Environment*, 3 (2): 299-311.
- Newman, P. (2005) Story and Sustainability: Planning, Practice and Possibility for American Cities, *International Journal of Urban and Regional Research*, 29 (2): 468-469.
- Pareja Eastaway, M., Støa, E. (2004) Dimensions of housing and urban sustainability, *Journal of Housing and the Built Environment*, 19 (1) 1.
- Pendlebury, J. (1999) The conservation of Historic areas in the UK. A Case study of "Graninger Town", Newcastle-upon-Tyne, *Cities*, 16 (6): 423-433.
- Rees, W. E.; Devuyt, D., Luc H., and Walter de Lannoy, (eds.) (2001) *How green is the city? Sustainability assessment and the management of urban environments*. Columbia University Press, New York.
- Richardson, D. (1997) The politics of sustainable development, in: S. Baker, M. Kousis, D. Richardson & S. Young (Eds) *The Politics of Sustainable Development*, pp. 43-60, Routledge, London.

- Rossi, U. (2004) The multiplex city - The process of urban change in the historic centre of Naples, *European Urban and Regional Studies*, 11 (2): 156-169.
- Rydin, Y. (1997) Policy networks, local discourses and the implementation of sustainable development, in: S. Baker, M. Kousis, D., Richardson & S. Young (Eds) *The Politics of Sustainable Development*, pp. 152-174, Routledge, London.
- Sancassiani, W. (2005) "Local agenda 21 in Italy: an effective governance tool for facilitating local communities' participation and promoting capacity building for sustainability". *Local Environment*, 10 (2): 189-200.
- Santos, M. A. (2005) Environmental stability and sustainable development, *Sustainable Development*, 13 (5): 326-336.
- Singh, R. B., (ed.) (2001) *Urban Sustainability in the Context of Global Change: Towards Promoting Healthy and Green Cities*, Science Publishers, Inc. Enfield.
- Stephen M. W., and Timothy B. (2004) *The Sustainable Urban Development Reader*, Routledge, London.
- Steven B. S.B. Kraines; D.R. Wallace (2003) Urban sustainability technology evaluation in a distributed object-based modelling environment, *Computers, Environment and Urban Systems*, 27 (2) 143.
- Strange, I. (1996) Local politics, new agendas and strategies for change in English historic cities, *Cities*, 13 (6): 431-438.
- Strange, I. (1997) Planning for change, conserving the past: towards sustainable development policy in historic cities?, *Cities*, 14 (4): 227-234.
- Strange, I. (1999) Urban Sustainability, Globalisation and the Pursuit of the Heritage Aesthetic, *Planning Practice & Research*, 14 (3) 301-311.
- Summers, M., Childs, A., Corney, G. (2005) Education for sustainable development in initial teacher training: issues for interdisciplinary collaboration, *Environmental Education Research*, 11 (5): 623-647.
- Tjallingii, S. (1995) *Ecopolis. Strategies for ecologically sound urban development*. Leiden: Backhuys publishers.
- Tomé, S. (1982), Memoria urbana y crisis de los barrios históricos a través del ejemplo de la ciudad de León, *Tierras de León*, 4: 23-36.
- Urry, J. (1995) *Consuming Places*. London: Routledge.
- Valentin, A., and Spangenberg, J.H. (2000) A Guide to Community Sustainability Indicators, *Environmental Impact Assessment Review*, 20 (3): 381-392.
- Van Dijk Mp, Zhang Ms (2005) Sustainability indices as a tool for urban managers, Evidence from four medium-sized Chinese cities, *Environmental Impact Assessment Review*, 25 (6): 667-688.
- VVAA (2003) *Places to Live. Case Studies in Urban Regeneration*, CECODHAS.
- Walton, J. S., M. El-Haram, N. H. Castillo, R. M. W. Horner, A. D. F. Price, C. Hardcastle (2005) Integrated assessment of urban sustainability, *Proceedings of the Institution of Civil Engineers: Engineering Sustainability*, 158 (2) 57.
- Wen Zg, Zhang Km, Huang L, et al. (2005) Genuine saving rate: An integrated indicator to measure urban sustainable development towards an ecocity, *International Journal of Sustainable Development and World Ecology*, 12 (2): 184-196.
- While, A; Jonas, A. & Gibbs, D. (2004) The environment and the entrepreneurial city: searching for the urban 'sustainability fix' in Manchester and Leeds, *International Journal of Urban and Regional Research*, 28 (3): 549-569.
- William M. Lafferty (Ed.) (2001) *Sustainable Communities in Europe*. London: Earthscan.
- Williams, C. (2002). Transforming the old: Cairo's new medieval city. *Middle East Journal*, 56 (3): 457-475.



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Oscar Fernández (2012). People, Places and History – Towards the Sustainability of Social Life in Traditional Environments, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/people-places-and-history-towards-the-sustainability-of-social-life-in-traditional-environments>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Raise It, Feed It, Keep It – Building a Sustainable Knowledge Pool Within Your R&D Organization

Wiebke Schone, Cornelia Kellermann and Ulrike Busolt
*Hochschule Furtwangen University
Germany*

1. Introduction

In light of the increasing globalization and economic competitiveness of the emerging countries, a key to competitive advantages of the western European countries, the United States and Japan lies in leveraging their innovative potential. With regard to the costs of living, social security systems and costs of labor, the industrialized countries can hardly compete with the emerging countries in the producing industry. Since neither Europe, the US nor Japan can beat the low production- and low technical development costs of the emerging countries, it is vital for their economies to focus on their key competences: The stimulation and driving of new innovative products to the market by means of inventions and patents within the R&D (research & development) industry.

Pursuing this target does not only imply high quality education in science and engineering. The actual economic value reveals itself in the researchers' and scientists' industrial careers, when their knowledge is applied to solving technical problems and is transformed into economic return in terms of inventions, patents and products. Hence, we need to realize the importance not only to recruit high quality experts for our research and development, but furthermore to preserve and build on this knowledge throughout the organization in order to gain a sustainable return of the high Western labor costs through innovative new technologies and scientific findings.

This target can be achieved by improving two main aspects within a company's R&D organization: Firstly by creating conditions that secure long term employment of the researchers, and secondly by understanding, improving and nurturing the inventors' communication within the organization.

2. State of research

The Western industry is based on its innovative power in research and development. There is a growing demand for highly skilled personnel in science and technology, such as researchers and engineers (BMBF, 2010). The aim must be to include the whole range of the innovative and inventive potential. Especially women represent a high educated potential labor force, whose potential has not been fully tapped into yet.

In R&D most work structures are team-based as this helps to solve creativity demanding problems and to stimulate innovation. A potential benefit of diversity regarding teamwork in R&D such as differences in education, national background, age or gender is still a research topic that is not fully explored.

The human resources development of female experts and executives in R&D gains rising importance as a critical success factor. In many cases the CEO of a high technology company is the former head of the R&D department (Hartmann 2007, 2009). Looking e. g. at the automotive industry, these individuals were often pioneers with excellent expertise. Within the high technology industry an important indicator for R&D success is expressed in the number of inventions and patents. In Germany and in all European member states women are not as often mentioned as inventors on a European patent as their share of the qualified workforce would indicate. A pronounced gap exists as e. g. in Germany about 6% of the inventors of European patents were female whereas about 12% of the qualified personnel (engineers and researchers) were female in 2003 (European Commission, 2006a, Busolt & Kugele, 2009). This gap is a result of a still dominant responsibility of women for family duties, a lower rate of overtime work and more part time work. Moreover women might tend to leave the R&D department earlier than men do as the possibility to combine family duties with a less challenging job in other departments as e. g. quality management or sales might seem more achievable. The latter departments rarely offer any possibilities to generate inventions. Disregarding the detailed reasons why women do not generate as many inventions as their share of the qualified personnel demands, we can state that qualified women represent the largest and most obvious potential to gain sustainable innovative power.

Some studies conclude that gender heterogeneous teams perform better than homogeneous teams as the team members have different ideas and perspectives (Frink, Robinson & Reithel 2003; Hirschfeld, Jordan, Field, Giles & Armenakis, 2005). Other studies indicate a source of friction and a therefore minor performance of gender heterogeneous teams (Jehn, 1995; Pelled, Eisenhardt & Xin, 1999; Randel, 2002). Most studies have forcibly compared homogeneous male teams with gender heterogeneous teams as women are still a minority in R&D (e.g. Burris, 2001). Being aware of this methodological drawback, Pearsall et al. conducted their study by assigning students to foursome teams (Pearsall, Ellis & Evans, 2008). The analysis of the functioning and the performance of homogeneous female teams in R&D is an important aspect on the way to tap the full potential of women in R&D. This is the only constellation in which women might experiment and perform in their own way of teamwork. The results reflect the view of women and lead to valuable improvement recommendations for companies in order to gain higher performing teams (Schone et al, 2011).

Furthermore the working conditions are different for a product development department, where narrower deadlines and high pressure for the achievement of objectives are dominant, and for a fundamental research department where more creativity, lateral thinking and rethinking of old beliefs are tolerated (Schone, 2009). Moreover the measurement of R&D team performance, i. e. creativity, innovation power, efficiency and net output by means of indicators is difficult. The performance of university scientists is measured by their scientific output, i. e. scientific publications (e. g. Martín-Sempere, Rey-Rocha & Garzón-García, 2002). The industry is more interested in the innovative

productivity and patents are needed to protect inventions. The number of patent applications is an indicator for the successful inventive achievement of individual researchers in science and technology. Patents, especially if they are not limited to only one country but include more countries as e. g. European patents do, are therefore an output indicator for R&D teams in industry (Busolt & Kugele, 2009). Nevertheless patents have the drawback that they do not differentiate regarding the effort and the creativity of the inventor team and it is therefore barely possible to assess the "real" value of a specific patent. Previous knowledge of the inventors as well as earnings from the products based on the patent is not observable.

3. Study methodology

In our study, we focused, among others, on the knowledge management of male and female inventors in the R&D industry. We observed that a number of highly qualified female researchers drift off their professional field of research during their professional career. How come those highly qualified female researchers seek positions outside their professional expertise and follow jobs in marketing, public relations etc. instead of research? What can be done to preserve the knowledge of these female researchers within the organization? A further research question was: what is the impact on innovation of homogeneous gender teams versus heterogeneous gender teams? The knowledge transfer and its influence on their respective innovative power were investigated as well as knowledge transfer patterns and communication structures. The questions that arise are how to improve the sustainability of knowledge within an organization on the one hand and to find out if inventor teams benefit from diversity within the team on the other hand.

Inventor teams work together for a limited period of time to generate a solution to a specific problem. Therefore they represent ideal conditions for the investigation of team work. In the German industry, there are only a limited number of homogeneous female inventor teams. However few, this allows a comparison between homogeneous female teams, homogeneous male teams and heterogeneous teams. We classify teams as successful when they comprise of inventors who have been granted a European patent, without further assessment of the actual patent value.

We concentrate on the specific determinants of gender impact on R&D inventions in the German industry. Hereby, our main research questions affect the four subgroups:

- homogeneous female inventor teams
- homogeneous male inventor teams
- heterogeneous gender balanced inventor teams
- heterogeneous male dominated inventor teams

In order to gather data and to contact the inventors, an SQL data base for all European patent applications within Germany was created for the years 2001-2006. Based upon raw data, which were specifically extracted by Eurostat for the EFFINET project, the following steps have been applied to the data base:

- Gender specific attribution (due to classification of the inventor's first name)
- Correlation of inventors to institutions or companies
- Correlation of inventors to specific industry branches

- Determination of inventor team constellation according to the above described team
- Characteristics (by gender specific attribution)

The data base includes the inventor's name, home address (as appearing on the patent application), company or institution and industry branch as well as the differentiation in which team constellation the patent was created.

Our study was conducted in three parts: a statistical analysis of the European patent database, a qualitative interview phase in order to gain insight into the innovation environments and to generate first hypotheses, and a quantitative online survey to verify and deepen our findings.

In the qualitative phase, 21 expert interviews with male and female inventors were conducted. The percentage of interviewees from each of the four target groups described above is distributed evenly. The interview participants have applied for at least one industry patent which was created within a team consisting of at least two inventors.

Our research interest during these interviews focuses on team work, innovative and organizational environment, communication structures and knowledge transfer impacting on the innovation- and patent creation processes.

Based on the hypotheses generated from these expert interviews a quantitative online survey served to verify our findings. A total of 357 inventors participated in this survey. Since the number of homogeneous female inventor teams is rather limited (approx. 300 European patents in Germany within the past 10 years) and a significant amount of those patents can be found in chemistry, pharmacy and medical equipment, our focus for the quantitative research lies on these industry sectors in order to guarantee an equal distribution of participants between the four team constellations (homogeneous female inventor teams, homogeneous male inventor teams, heterogeneous gender balanced inventor teams, heterogeneous male dominated inventor teams).

3.1 Statistical analysis of the European patent database

For over 40 years, the European Patent Organization has been in charge of granting and tracking the patents that have been applied for in Europe. In our study, we analyzed the European patents over the last 10 years according to their technological fields, economic sectors and the gender of the inventors. The aim was to figure out the appearance of female researchers in patenting as base for our research. The analysis of the patent database included the following major steps:

3.1.1 Institutional sector allocation

Patents are applied by industrial companies, universities, research institutions or individual inventors, but can also be applied in cooperation between these actors. Thus, data concerning R&D personnel are usually broken down by institutional sector. The patent database provides the name, country and address, but not the institutional sector of the applicants. To assign patent applicants/inventors to institutional sectors an institutional sector allocation was performed.

3.1.2 Inventor's first name gender assignment

Patent databases of the European Patent Organization do not provide the gender of the inventors. Therefore, an assignment of the inventor's first names to either male or female gender is a necessary precondition to obtain gender disaggregated statistics. First name gender assignment of a large number of names from different countries required a complex, multistep procedure to reach the best results. About 93% of all European names were identified as either male or female with variations between 81% and 100% for the European Member States.

3.1.3 Assignment of patents and inventors to technology fields

An International Patent Classification (IPC), a system of 31 technical units and eight sectors, was developed by the World Intellectual Property Organization. Patent data in the database were treated at the subclass level of the International Patent Classification; thus only the first four digits of the IPC were used for breakdown and aggregation.

3.1.4 Assignment of patents and inventors to economic sectors

Patent and inventor statistics, which usually are presented by technology fields (IPC), do not easily match with data on personnel in R&D, which for the business enterprise sector are usually broken down by economic sectors (NACE). In consequence, one cannot compare data of inventors with data of researchers easily (output-input comparison) without further data transformation from technology fields (IPC) into economic (industrial) sectors (NACE). Hence, methods have been applied to match IPC based technology fields to industrial sectors. As a result, technology fields are shared between industrial sectors.

3.2 Qualitative expert interviews

In the course of the expert interviews with the inventors the problem-centered interview (Wintzel, 1996) has been applied, a theory-generating method ranging between the narrative interview style and structurally guide lined interview. This semi-structured approach allows the experts (interviewees) to share knowledge based on their very own value system within the structural and content boundaries of the research focus.

The interview comprised a warm-up phase including the interviewee's general characteristics, such as professional career and current job position. Furthermore, the description of the specific innovation settings and knowledge transfer of the granted patent is split into an organizational-, team- and individual level with focus on the inventor's perceptions of team work, innovation- and efficiency determinants.

The whole interview has been recorded and subsequently transcribed. Additionally, a postscript of the interview has been generated, in which situation-dependent and non-verbal aspects, interpretation ideas and special characteristics of the interview have been noted.

A summarized and anonymized case description serves as a basis to consolidate the data and investigate central motives in order to generate theory. The interpretation of the data is intended to maintain its explorative, qualitative approach and is not intended to conclude

quantitative, generalizing statements. It was, however, the goal to develop first hypotheses to be further tested, verified and developed with the subsequent quantitative online survey among a larger group of participants.

3.3 Online survey

As stated above, the online survey served to test, verify and further develop the hypotheses generated from the qualitative expert interviews. The content of the 35-question survey includes a general section on the innovators' characteristics, such as professional education, career and family situation. This is followed by a generalized section on the participants' own opinion on organizational-, team- and individual influencing factors on the knowledge transfer, innovation culture and efficiency determinants within their R&D environment. Finally, the survey explores the innovation environment of one specific patent in its development and accompanying team processes. The survey questions have been answered in full by 310 inventors, representing team members of the four different inventor team constellations.

4. Do we sufficiently tap our inventors' knowledge?

Analyzing the European patent database, we found that there is a tremendous gap between the headcount of female researchers and scientists in R&D versus the headcount of female inventors. Exemplarily, the figure below shows the European patents of the year 2003 to illustrate the gap.

AT	Austria	IE	Ireland
BE	Belgium	IT	Italy
BG	Bulgaria	LT	Lithuania
CY	Cyprus	LU	Luxembourg
CZ	Czech Republic	LV	Latvia
DE	Germany	MT	Malta
DK	Denmark	NL	Netherlands
EE	Estonia	PL	Poland
ES	Spain	PT	Portugal
EU	European Union	RO	Romania
FI	Finland	SE	Sweden
FR	France	SI	Slovenia
GR	Greece	SK	Slovakia
HU	Hungary	UK	United Kingdom

Table 1. Country abbreviations

The statistical analysis served as a basis for our further research: What are the reasons that female researchers get fewer patents granted than male researchers? Are there conditions that prevent the exploration of their full innovative potential and their complete knowledge? If so, what are the determinants and what should an organization do to tap the full potential and hence expand their sustainable knowledge pool within the organization?

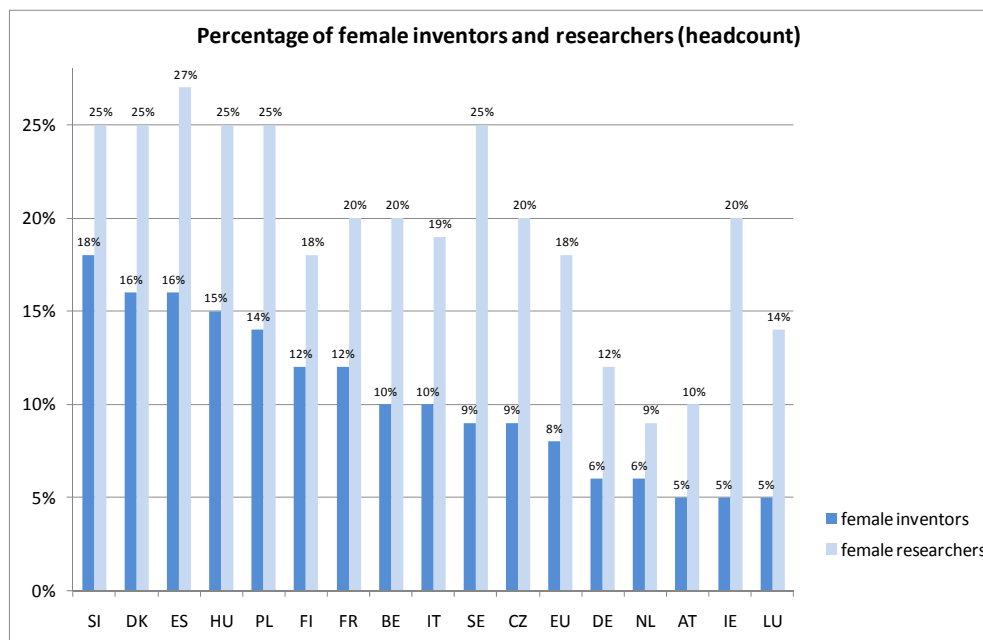


Fig. 1. Percentage of female inventors and female researchers in 2003, based on the European patent database and on EUROSTAT data (European Commission 2006a), 100% corresponds to all female and male researchers or identified inventors

5. The organizational need to nurture

The following section explains how to retain highly educated and experienced researchers within the organization in the long run. It discusses the obstacles and hurdles researchers are confronted with during their professional career, particularly with regard to work-family balance.

Especially female researchers are confronted with major life changes when they decide to start a family. Our study on the patenting- and inventing behavior of researchers shows that if organizational conditions within a R&D environment are managed badly, the inventors often cannot work according to their optimum level and are not able to use their innovative power sufficiently. The consequences of both, good and bad organizational management are revealed in this section. Furthermore, methods to optimize the researchers' conditions within the R&D department are suggested.

5.1 The communication of innovation

Our study revealed that in organizations with more than 1000 employees, there were not only a higher proportion of women in R&D departments, but also innovation systems that have more transparency, networking and support of the individual researcher. In smaller

organization of the sample, in contrast, structural measures to increase innovation are hardly existent. However, as stated by the respondents, researchers in smaller organizations have more freedom for research and creativity.

The evaluation of our expert interviews leads to two hypotheses in this specific context that are further explored in the quantitative online survey of the study. In order to establish a base for communication and knowledge transfer, the following findings of the expert interviews are further assessed.

A female researcher (heterogeneous gender balanced team) describes the situation in her company as follows: the employees in research feel well connected. There is a good working atmosphere. Networking and communication takes place as well on a formal (regular project meetings, information from the company) as on an informal level (meeting beyond working hours, spontaneous discussions, e-networking i.e. Xing). Due to the regular presentation of projects within the research department (2 hours every 2 weeks) the employees are well informed about other team projects. These meetings are also attended by part-time employees (from engineer level up).

A male scientist (homogenous male team) states that he summons a weekly meeting but apart from that a lot of spontaneous informal communication takes place in order to exchange knowledge. For this reason a personal network within the team and department is extremely important and stimulated by personal commitment.

Another female researcher (homogenous female team) describes a distinct, formalized communication system in order to encourage knowledge transfer within the company she is working for: Weekly division meetings, weekly group meetings, weekly discussion between employer and employee “jour fixe”, telephone conferences and meetings of the project teams (2-3 times per year).

While institutionalized communication structures (such as regularly scheduled team meetings) guarantee a comprehensible flow of information, communication paths among inventors are dominated by informal, spontaneous communication patterns, independent of the composition of the inventor team.

One male researcher (heterogeneous male dominated team) found it especially fruitful when theoretically oriented scientists discuss problems with practically oriented engineers and technicians. When sitting at a table together with different ways of thinking often ideas arise and thus these meetings might become quite productive. Regular team meetings also with experts from outside the project team should therefore be held regularly in order to generate knowledge.

In this context we learned from another interviewee (homogenous female team) that inventor teams are often composed of members from different project teams – “inventions happen”. According to the problem at hand an experts is called in from outside the team. The inventor team might be a subgroup of the bigger project team but its team members often originate from different departments. The average size of inventor teams is about 2-3 researchers, depending on the industrial sector. While the constellation of a project team is created for long-term teamwork (typically for at least the duration of one project, but also for several follow up projects) and is frequently determined by the organizational management, the composition of an inventor team underlies spontaneous characteristics, in

most cases issued by the inventors themselves: an “ad hoc team” is created to perform one specific task or to solve one specific problem. Once the task is completed and a patent application is filled in, the ad hoc team breaks up back into its assigned different project groups. Obviously the inventor team is not identical with the project team in most cases.

In summary it can be said, therefore, that for one thing networking, social processes and spontaneous discussions are crucial for effective knowledge transfer. For another thing formal communication structures as provided in regular meetings and presentations are equally important.

Results of the online survey regarding communication and knowledge transfer:

Having in mind what information has been given within the expert interviews regarding the importance of regular internal meetings with inventors and presentation of new inventions the answers to the online survey surprise: 72% of the researchers state that regular meetings of inventors within their organization and presentation of new inventions are not offered. Could this be an omission on the part of the organizations to stimulate the sharing of knowledge? On the other hand 77% of the researchers often (partially) make use of the freedom and tolerance for networking and informal communication during their working hours.

Corresponding to this only 47% of the respondents state that institutionalized meetings with participants during the invention process are (very) important to them. A different picture can be seen concerning the spontaneous possibility to discuss with participants (during the

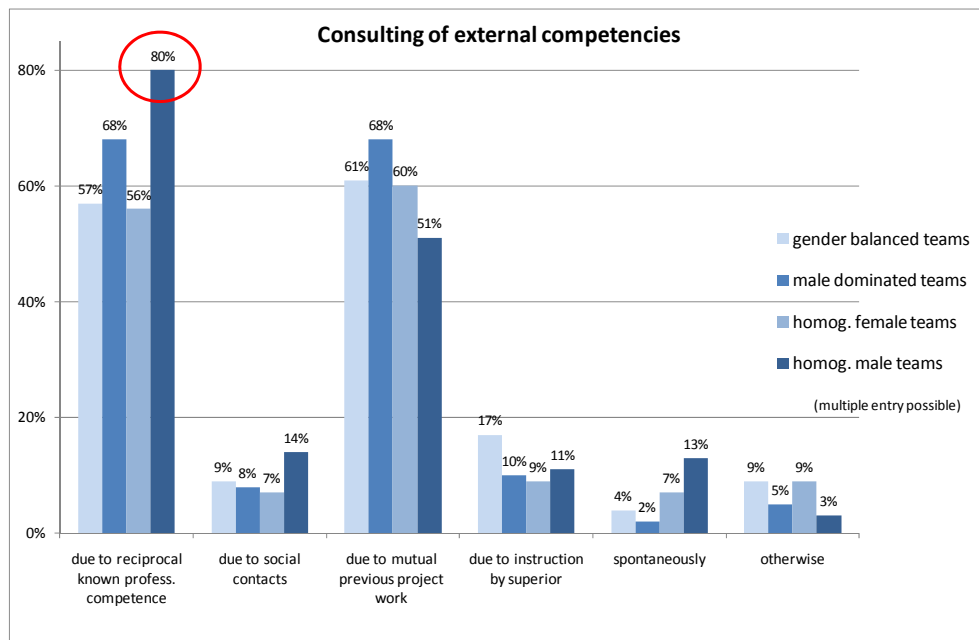


Fig. 2. Consulting of external competences for innovation, 100% corresponds to all interviewees belonging to one of the four groups

invention process): this is (very) important for nearly 100% of the respondents. These results do not show any significant gender difference. Consequently the analyses of our expert interviews have been confirmed by this.

Likewise our result from the expert interviews concerning the consulting of external "knowledge" is confirmed by the participants of the online survey: Approximately 50% of the researchers state that experts from outside the project team have been consulted during the invention process mostly because of the known professional competence and former cooperation. In most cases, this knowledge was gained by informal communication and networking "in the aisles": Researchers knew about competences of colleagues from other projects, asked them for support and later on developed the innovation and patent together. Therefore the inventor team is frequently composed differently from the actual project team (figure 2).

5.2 The participation of female inventors in communication and knowledge transfer

A female researcher (heterogeneous gender balanced team) concludes in the expert interviews that part-time work is difficult to organize: in general she handles the operative workload during the day. Time for invention needs calmness which she has at the end of the day. The company she works for offers part-time work as well as the co-financing of a daycare centre. As these options are quite recent she has only one child in order to arrange family and career.

Inventions and patents are frequently realized by overtime as the priorities during normal work hours focus on project work. Part time employees have less time flexibility (e.g. due to fixed child care hours) and thus have less time for creative brainstorming. For part time employees, it is therefore more difficult to actively participate in the innovation process.

Accordingly a male researcher (heterogeneous male-dominated team) quotes that working part-time in his team is hardly possible as much is discussed informally and spontaneously. During one year of parental leave, of course, much is missed. On the other hand technicians are used to quick changes of the market and thus have the ability to adjust. In his opinion the team only has a short-term knowledge advantage. The compensation of the returner's knowledge deficit is a question of team spirit. He states that the perfect time for returning to work is the start of a new project which is new for all participants.

There was one best practice example, however, a female scientist (homogeneous female team) describing the perfect organization in which it seems possible to work as a part-time executive in R&D and have children at the same time. All members of the inventor team, including the head of the department herself, were part-time employees. Thanks to outstanding support systems within her company this female scientist states that overtime remains the exception. Even when patenting strongly it is possible for her to work part-time. In her opinion this is the result of the following factors: specific corporate culture, support through a patenting department, assistance within and between departments, arrangements for work-life balance, child care and social counseling within the organization. This observation leads to the assumption that the innovative capability of part-time employees is deeply affected by the organization's management competences.

Another female inventor (homogeneous female team) has changed from R&D to part-time consulting for lobby work after having a child. Being head of a team requires commitment

and availability within the organization which in her opinion is not compatible with working part-time.

A similar view is held by a female respondent (heterogeneous gender balanced team) who claims that especially in innovative research industries it is most problematic to arrange children and career and not easy to find the perfect time to have children. As a consequence of this conflict she believes that professional paths diverge.

In summarizing it can be stated that male and female inventors show similar innovative potential in the beginning of their professional career. Both typically start their career and create their first patents in R&D departments as development engineers or scientists. They show the same characteristics regarding overtime and devotion to their work. Female researchers though commonly change their professional path when starting a family due to the demands of jobs in R&D and the difficulties of the compatibility of family and work. In conclusion it becomes obvious that parenthood influences the innovative performance of female inventors.

Results of the online survey regarding the participation of female inventors:

The options offered by organization for the compatibility of family and career resulting from the online survey are as follows: 75% of the respondents state that part-time is offered by their organization, 69% indicate flex-time, 45% home office whereas child day care facilities offered by organizations are only mentioned by 29% of the respondents. A wide difference can also be observed when asking by whom the children are being taken care of: 81% of the male researchers state that their spouses take care of the child whereas only 19% of the female researchers state this fact (figure 3).

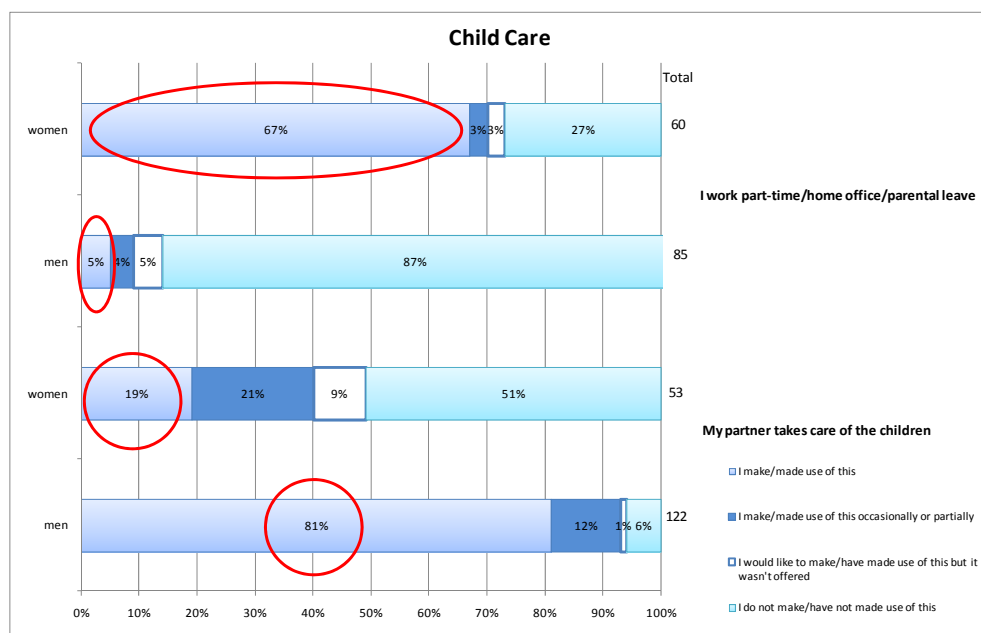


Fig. 3. Child care by female and male inventors, 100% corresponds to all male or female interviewees

Answers to our research question whether there were any gender-specific differences with regard to knowledge transfer during the innovation process show that women as well as men value informal communication and networking within their organization and project teams. Both regard the informal communication and networking as key to their professional success. As opposed to this, the importance of institutionalized meetings with participants during the invention process is very important to 19% of the homogeneous female teams while the other team constellations see this factor as less important (figure 4).

In our study, we found out that if there is a high proportion of part-time workforce the importance of formal communication through regular meetings rises. An increase of formal communication has positive impact on the integration of part-time employers as the randomness of information transfer is reduced.

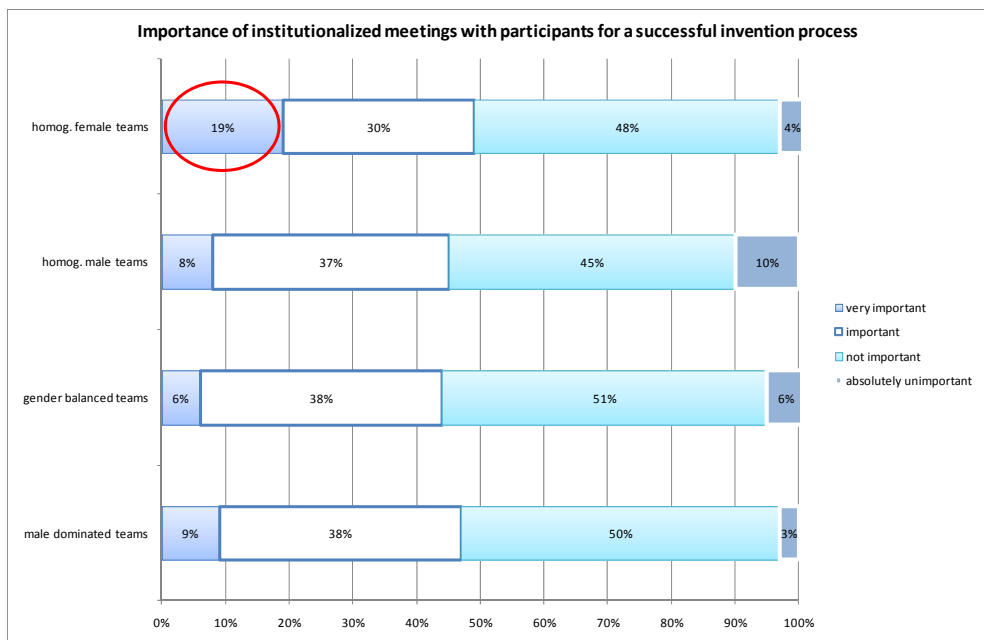


Fig. 4. Importance of institutionalized meetings, 100% corresponds to all interviewees of the respective subgroup

In our online survey, the number of men having children differs strongly from the number of children women have: while approximately half the female researchers have no children, 58% of the male researchers have 2-3 children. The question arises: do women drop out of the innovation process as soon as they become mother or do they remain childless for some reason or another. A glance at the child care situation described by the respondents of our online survey shows that 67% of the female scientists take/took parental leave, work part-time/in the Home Office while only 5% of the male scientists do so. Another important result in this context is the fact that 43% of the female researchers state that child care has a great influence on their innovativeness whereas only 13% of the male researchers feel this way.

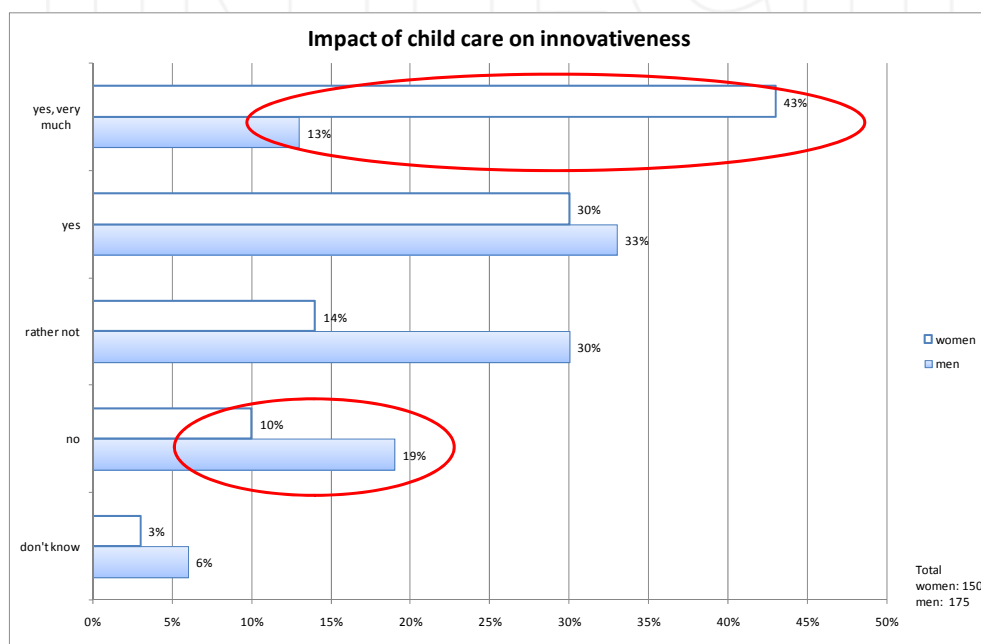


Fig. 5. Impact of child care on the researcher's innovativeness

6. Conclusion and outlook

The results of our study show that in the current innovation environment within the R&D industry, organizations suffer from the lack of sustainability in their knowledge pool. Highly skilled workforces, mainly the female inventors, do not perform to the best of their innovative potential.

The suboptimal support in the area of child care reveals a direct effect on the inventors' innovativeness, especially for female researchers. It creates pressure, whereas this energy could be directed into innovative power provided the organization offered a higher support for childcare. In some cases, it was stated that both, family life and a professional career as a researcher, could not be combined due to inflexibility of the organization or lack of daycare. Several (female) researchers decided to completely drop out of the innovation environment and sought positions in marketing or public relations that were expected to easier allow work-life balance. As a consequence, the knowledge of these highly qualified researchers has left the organization's knowledge pool irretrievably.

Part-time work is offered by several organizations and undoubtedly a successful tool to encourage the integration of highly-qualified female researchers into the organization during parental leave and to prevent them from resigning. However, part-time work reduces the working hours of the female researchers and thereby the period of time that can be used for inventions as well as their participation in networking that are important with regard to knowledge transfer and knowledge generation.

What can an organization do to improve the tapping of their knowledge pool? First of all, management needs to raise an awareness of the importance of a sustainable knowledge pool within an organization. The knowledge that researchers acquired over years during their professional career clearly represents one of the organization's greatest assets. If a researcher leaves the organization or is not able to perform according to his or her optimal level, his or her knowledge leaves the organizational knowledge pool. Oftentimes, leaving the organization is regarded as inevitable by female researchers, when they enter the family phase. Hence, measures such as support for child daycare and flexible work time regulations offered by the organization help the inventors to stay within the organization and focus on their actual research. It is therefore a key to build an organization that understands the needs of its employees and actively sets measures that support the inventors in managing their work-life balance in order to retain the researchers, their knowledge and a sustainable knowledge pool in the organization.

7. Acknowledgment

We would like to express our gratitude to the BMBF (Bundesministerium für Bildung und Forschung) for project funding and thank the following people who have contributed to the project Mr. Felix and Mr. Götzfried from Eurostat for their cooperation, assistance and methodological advice concerning database creation. Special thanks to Mr. Naldi who kindly provided us with the first name database, Mrs. Huber who assisted in technical matters of database preparation, first name analysis and data retrieval and Mrs. Esterle for her valuable support during the expert interviews and the online survey field phase. The project team would also like to thank the members of the advisory board for their valuable advice and suggestions.

Our former colleagues Mrs. Kordula Kugele and Mrs. Pascale Bruno were in charge of the expert interviews and contributed to the questionnaire. We hereby want to thank them very much for their contribution. And last not least, many thanks to all our student team members who assisted in the project.

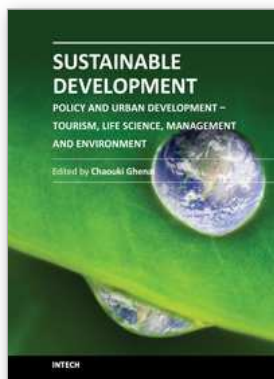
8. References

- BMBF (2010): Bildung in Deutschland 2010. Herausgeber: Autorengruppe Bildungsberichterstattung W. Bertelsmann Verlag GmbH & Co. KG
- Burris, Janet, W. (2001): The Impact of Gender Diversity on Technical Team Effectiveness; Dissertation; Ann Arbor: Bell & Howell Information and Learning Company
- Busolt, U. & Kugele, K. (2009): The gender innovation and research productivity gap in Europe, *Int. J. Innovation and Sustainable Development*, Vol. 4, Nos. 2/3, pp. 109 – 122.
- Butcher, Jane (2006): Women in Scientific Careers: Unleashing the Potential. ISBN 92-64-02537-5, OECD
- Dahlerup, D. (1988): From a Small to a Large Minority: Women in Scandinavian Politics. *Scandinavian Political Studies*, Vol. 11, Issue 4, 275–298, 1988
- Distefano & Maznevski (2000): Distefano, Joseph J/ Maznevski, Martha L. (2000), "Creating value with diverse teams in global management", *Organizational Dynamics*, Vol. 29 No 1, pp. 45-63, Elsevier Science, Inc.
- European Commission (2006a): She Figures 2006 Women and Science. Statistics and Indicators., Luxembourg
- Frink, D. D., Robinson, R. K., & Reithel, B. (2003): Gender demography and organization performance: A two-study investigation with convergence. *Group & Organization Management*, 28, 127–147
- Gratton, Lynda (2007): Steps that can help women make it to the top. *Financial Times*, Published: May 22, 2007, http://www.pleaseadjustyourset.com/pdfs/FT_May07.pdf (download: 2010, Okt. 30)
- Hirschfeld, R. R., Jordan, M. H., Feild, H. S., Giles, W. F., & Armenakis, A. A. (2005): Teams' female representation and perceived potency as inputs to team outcomes in a predominantly male field setting. *Personnel Psychology*, 58, 893–925
- Jehn, K. A. (1995): A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly*, 40, 256–282
- Kugele, K. (2010): Patents invented by women and their participation in research and development. A European comparative approach. In: Anne-Sophie Godfroy Genin (Ed.): *Women in Engineering and Technology Research. The PROMETEA Conference Proceedings*. No 1, pgs. 373-392
- Martín-Sempere, M. J., Rey-Rocha, J., Garzón-García, B. (2002): The effect of team consolidation on research collaboration and performance of scientists. Case study of Spanish University researchers in Geology. *Scientometrics*, 55, 3 (2002): 377-394
- Pearsall, M. J. , Ellis, A. P. J. & Evans, J. M., (2008): Unlocking the Effects of Gender Faultlines on Team Creativity: Is Activation the Key? *Journal of Applied Psychology*, Vol. 93, No. 1, 225-234
- Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. (1999): Exploring the black box: An analysis of work group diversity, conflict, and performance. *Administrative Science Quarterly*, 44, 1–28.
- Randel, A. E. (2002): Identity salience: A moderator of the relationship between group gender composition and work group conflict. *Journal of Organizational Behavior*, 23, 749–766.

- Schone, W. (2009): How different approaches lead to different results – an explorative case study on the innovation environment of high-tech projects, Masterthesis, Furtwangen
- Schone, W., Kellermann C, Busolt, U., Kugele K, Bruno P (2011): Improve – Innovativität für Deutschland, In print
- Witzel, A. (1996): Auswertung problemzentrierter Interviews: Grundlagen und Erfahrungen In: R. Strobel, A. Böttger (Hg.): Wahre Geschichten? zur Theorie und Praxis qualitativer Interviews. Baden- Baden. Nomos

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Wiebke Schone, Cornelia Kellermann and Ulrike Busolt (2012). Raise It, Feed It, Keep It – Building a Sustainable Knowledge Pool Within Your R&D Organization, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/raise-it-feed-it-keep-it-building-a-sustainable-knowledge-pool-within-your-r-d-organization>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Social Accounting Matrix – Methodological Basis for Sustainable Development Analysis

Sasho Kjosev

*University “Ss. Cyril and Methodius”, Faculty of Economics
Republic of Macedonia*

1. Introduction

The Rio Summit established sustainable development as the guiding vision for the development efforts of all countries. At Rio, and in later commitments, all governments undertook to establish and implement national sustainable development strategies. The strategies for sustainable development, called for at Rio, are foreseen as highly participatory instruments intended “to ensure socially responsible economic development while protecting the resource base and the environment for the benefit of future generations”.¹

In simple terms, sustainable development means **integrating the economic, social and environmental objectives of society**, in order to maximize human well-being in the present without compromising the ability of future generations to meet their needs. This requires seeking mutually supportive approaches whenever possible, and making trade-offs where necessary.

Sustainable development is not an activity that has to be left to the long term. Rather, it constitutes a set of short, medium and long term actions, activities and practices that aim to deal with immediate concerns while at the same time address long-term issues. Achieving sustainable development requires far reaching policy and institutional reforms and the involvement of all sectors at all levels. Sustainable development is not the responsibility of only government or one or two sectors of society.

However, in order to better understand the sustainable development concept, one has to develop an appropriate methodological instrument. In parallel with the introduction of the sustainable development concept, the SNA 1993 introduced the Social Accounting Matrix (where later its extensions, the SESAME and NAMEA approaches, have been developed) as a methodological basis for the sustainable development analysis.

Therefore, the following chapter will firstly present the theoretical foundations of the Social Accounting Matrix (SAM) and its extensions (SESAME and NAMEA approach), and secondly, will present possibilities to implement these approaches in the Republic of Macedonia.

¹ OECD, 2001, p. 11

2. Theoretical considerations

The development planning methodology is of highest importance for the unity, complexity and consistency of the sustainable development planning system. It should enable methodological consistency in the process of evaluation of the development conditions, problems and perspectives, perception of interests, objectives and tasks of the relevant stakeholders and their harmonization, the simultaneity of the planning process, as well as the mandatory preparation and execution of plans. Having this in mind, part 2 of this chapter will present the theoretical foundations of the Social Accounting Matrix (SAM) and its extensions (the SESAME and NAMEA approaches).

2.1 Social Accounting Matrix (SAM)

Social accounting matrix (SAM) is a technique related to national income accounting, providing a conceptual basis for examining both growth and distributional issues within a single analytical framework in an economy. It can be seen as means of presenting in a single matrix the interaction between production, income, consumption and capital accumulation.

A SAM is defined as the presentation of System of National Accounts (SNA) accounts in a matrix which elaborates the linkages between a supply and use table and institutional sector accounts. In many instances SAMs have been applied to an analysis of interrelationships between structural features of an economy and the distribution of income and expenditure among household groups. Evidently, SAMs are closely related to national accounts whereby their typical focus on the role of people in the economy may be reflected by, among other things, extra breakdowns of the household sector and a disaggregated representation of labour markets (i.e., distinguishing various categories of employed persons). On the other hand, SAMs usually encompass a somewhat less detailed supply and use table or input-output table.²

The SAM is a comprehensive, flexible, and disaggregated framework which elaborates and articulates the generation of income by activities of production and the distribution and redistribution of income between social and institutional groups. A principle objective of compiling a SAM is, therefore, to reflect various interdependencies in the socio-economic system as a whole by recording, as comprehensively as is practicable, the actual and imputed transactions and transfers between various agents in the system. The SAM has, mainly, two basic tasks:

- a. to enable presentation of information about the economic and social structure of the national economy; and
- b. to provide analytical and accounting framework as a basis for construction of macroeconomic models for analyzing the national economy and the effects from the implementation of the macroeconomic and development policy measures.

The increasing interest of recent years in the compilation of this kind of accounting system is intimately related to growing dissatisfaction with the results of growth and development policies. These disappointing results, especially as regards their distributional aspects, gave rise to questions concerning the processes and mechanisms by which the production of

² European Commission et al., 1993, 20.4

goods and services, and their distribution and redistribution relate to each other. To examine these kind of question on an empirical basis, data were required that would provide a coherent, detailed and consistent picture of all these aspects of the economic process.

The fundamental principle of SAM is balancing within the series of national accounts, whereby revenues and expenditures are presented for each individual account. SAM follows the principles of "single entry" and presents a series of accounts presented in the form of matrix. SAM consists of rows and columns marked with identical titles. The rows and columns present different accounts in the economic system. For each account, and hence, for each pair of row and column, the data in the row shows the revenue (inflow) on the account, and the data in the respective column is an expenditure (outflow) on that same account. Expenditures in one account are revenues in the other and vice versa. In sum, within each economic system, all revenues must correspond to the respective expenditures, i.e. the correspondent rows and columns must be equal. In other words, each component (data) of SAM is revenue for the account in the row, and expenditure for the account in the column (Table 1).

The above presented points to a conclusion that the SAM provides quantitative information on the following aspects of the economic process:

- the relationship between various types of production activities and various factors of production from the aspect of generation and allocation of income;
- total income received by various factors of production;
- allocation of incomes to factors of production between separate institutions via taxes, welfare, transfers;
- consumption of goods and services among certain institutions;
- total supply of goods and services from the domestic and foreign markets;
- savings and capital transfers among institutions, etc.

As a conclusion, one can point out to the following:

1. SAM successfully combines indicators of growth, allocation of income and poverty in one coherent framework. By including elements of input-output table, national accounts and other databases, SAM provides complex quantitative image suitable for macroeconomic analysis and planning;
2. SAM is a useful tool for harmonizing various sources of data and filling the gap in information received from various statistical databases, thus contributing to greater consistency and adequacy;
3. SAM proved its usefulness as an integrated statistical database suitable for preparation of macroeconomic models of the national economy to the end of better understanding and envisaging the interrelationship of the determinants of economic trends in the national economies.

2.2 SESAME approach

SESAME (System of Economic and Social Accounting matrices and Extensions) is a statistical information system in matrix format, from which a set of core economic, environmental and social macro-indicators is derived. The system is driven, to a large

accounts	goods/ services	Production	generation of income	allocation of primary income	Allocation of secondary income	use of income	capital	rest of world	total
goods/services		Intermediate Consumption				final consumption	gross capital formation	export of goods/ services	total demand
production	output and taxes on products less subsidies								total output
generation of income		<i>net domestic product</i>						compensation of employees from ROW	generated income
allocation of primary income			Compensation of employees, taxes on products and import, subsidies, net operating surplus/ net mixed income	property income				property income from ROW	total primary income
allocation of secondary income				<i>net national income</i>	current taxes on income, wealth and current transfers			current taxes on income, wealth and current transfers from ROW	total secondary income
use of income					<i>net disposable income</i>	adjustment for change in net equity of households on pension funds		Adjustment for change in net equity of households on pension funds from ROW	disposable income
capital		Depreciation				<i>net saving</i>	capital transfers and acquisitions less disposals of non-produced assets	capital transfers, funds from ROW, receivable (=) / payable (-) and acquisitions less disposals of non-produced assets from ROW	capital transfers
rest of world	import of goods/ services		compensation of employees to ROW	property income for the ROW	current taxes on income, wealth and current transfers for ROW	adjustment for change in net equity of households on pension funds for ROW	Net lending (+) / net borrowing (-) of the national economy		total outflow to ROW
total	total supply	total input	Allocation of generated income	Allocation of primary income	allocation of secondary income	Allocation of disposable income	capitalexpenditures	total inflow from ROW	

Table 1. Schematic presentation of a SAM

extent, by the kind of information required for monitoring and policy-making at the macro-level. Although it is impossible to capture socio-economic development in a single indicator, it is equally clear that a prime task of national statistical offices is to comprise the countless numbers they collect to a manageable, "executive" summary. Such a summary typically describes trends in main indicators. At the same time, for analytical purposes a more detailed data framework is required. Obviously, the communication between policy-makers and analysts is optimally served if the core macro-indicators are all derived from an integrated information system such as SESAME.³

Keuning, in his paper⁴, points out to the fact that, essentially, SESAME integrates economic, social and environmental accounts and indicators, through a conceptual and numerical linkage of related monetary and non-monetary data. It extends the SAM by integrating related information, in non-monetary units. For instance, compensation of employees by industry and labor category in the SAM is broken down into hours worked and an average hourly wage rate. In turn, these hours worked for payment are related to other time use of the employed persons concerned. Subsequently, time use of the employed persons can be combined with the time use of the other members of the same household (group), to arrive at a comprehensive linkage of (social) time use data and (economic) income figures.

Moreover, Keuning states that, in order to achieve a linkage between monetary and non-monetary data, the SAM-values are broken down into price (changes) and volume (changes). The linkages with other data are thus typically established in non-monetary units such as hours, calories, and "volume" changes. In this way, the necessary connections are made without distorting the essentially monetary system of the national accounts. A SESAME registers for all variables both the national total value and its distribution among socio-economic household groups, categories of employed persons, etc. As a next step, a range of summary indicators can be derived from such a data set (e.g. Gross Domestic Product, population size, (un)employment, inflation, balance on current account of the balance of payments, income inequality, environmental indicator(s), daily calorie intake of the poorest subgroup, average number of years of schooling). Consistent indices covering distributional aspects can also be derived for all variables included in the system. Whatever set of aggregates is preferred, they would all share two crucial features: first, every indicator is computed from a single, fully consistent statistical system, and secondly, each indicator uses the most suitable measurement unit for the phenomenon it describes.⁵

As a summary, Keuning⁶ points out to the following advantages of the SESAME approach:

- SESAME can serve as a useful extension to present-day national accounts, in two respects. First, the SAM-part of SESAME improves the compilation of national accounts, because it integrates more basic sources at a meso-level. Secondly, SESAME is useful for integrating all kinds of (non-monetary) social and environmental statistics.

³ Keuning, 1998, pp. 353-354

⁴ Keuning, 1998, pp. 353-354

⁵ Keuning & Timmerman, 1995, pp. 3-5

⁶ Keuning, 2000, pp. 289-290

- Just like conventional national accounts, *SESAME provides both core macro-indicators and an underlying information system*. In this way, it simultaneously serves two categories of user: first, the general public, media and policy makers, who want to know the main trends at a glance, and secondly, the analysts, scientists and policy-advisers, who want to disentangle causes and consequences, make forecasts and do policy simulations.
- SESAME promotes the use of uniform units, classifications, concepts, etc. throughout a statistical system; that is, not only in economic statistics, but also in social statistics. Among the advantages of such a harmonization is a much easier matching of results from different surveys. As a consequence, fewer questions per survey and perhaps even smaller samples are needed. It is likely that some groups of specialized users will prefer a different classification or concept for their specific field of interest. However, only an integrated data system can be qualified as a pure public good and therefore the compilation of data according to special purpose specifications might receive a lower priority in official statistics, or be financed to a larger extent by the beneficiaries.
- SESAME is an inherently *flexible* framework. It can readily be adapted to the specific characteristics, needs and capabilities of every country or region. In particular the accounting structure, the classifications and the kind of non-monetary phenomena incorporated can be tailor-made. Because of this modular approach, it is not necessary to include all aspects at once.
- Finally, it should be mentioned that *SESAME essentially aims at a better use, through integration, of existing statistics*. In turn, by integrating information that is already collected, official statistical agencies will increase their own value added.
- Just like present-day national accounts, SESAME is a multi-purpose information system that can be used to test any economic or social theory. It is this property that has made the national accounts the universal language of economics. SESAME may open the door to even richer insights into human welfare.

2.3 NAMEA approach

The economy is a complex system of which extraction of natural resources, production, consumption, technology, investment, imports and exports, and release of wastes (and pollution) are just a few of the many different interrelated dimensions. All these different aspects of the economy may have detrimental or beneficial effects on environmental pressures. Hence, there is a pressing need for promoting integrated economic and environmental information systems as opposed to indicators' lists in order to meet the increasing users' demand for conducting integrated economic and environmental policies. They reiterated that environmental-economic accounting would provide the necessary framework for analysing the impact of economic growth on long-term sustainable development.

The need to account for the environment and the economy in an integrated way arises because of the crucial functions of the environment in economic performance and in the generation of human welfare. These functions include the provision of natural resources to production and consumption activities, waste absorption by environmental media and environmental services of life support and other human amenities.

Having this in mind, in 1989 Statistics Netherlands started to develop a system for describing environmental aspects in conjunction with the national accounts. The system, known as the National Accounting Matrix including Environmental Accounts (NAMEA), creates a link between the national accounts and environmental statistics. NAMEA shows the relationship between a number of important economic indicators (gross domestic product, balance of payments, etc.) and the environment.

The NAMEA has been developed to systematically supplement the national accounts with environmental statistics. Its hybrid accounting structure, i.e. the combined presentation of physical and monetary accounts, indicates that in the NAMEA environmental imputations in the core national accounts framework are avoided.

Therefore, NAMEA has been developed to link environmental and economic statistics. An important characteristic of environmental accounting is that the data are consistent with the National Accounts which mean that the environmental data can be directly compared to well known macro-economic indicators such as GDP, inflation and investment rates, developed in the System of National Accounts (SNA).

The NAMEA system contains no economic assumptions; it is only descriptive. It maintains a strict borderline between the economic and the environmental aspects. It is represented in monetary units, on the one hand, and in physical units, on the other. To get a clear understanding of the interrelationships between the natural environment and the economy, we must use their physical representation. Otherwise, it is impossible to understand these relations. If the NAMEA system would contain monetary values about environmental problems, two problems would occur. Firstly, the environment must be valued in monetary units and secondly it is very complicate to differentiate between price changes and quantity changes.

Therefore, the resulting indicators are measured in physical units. The interrelationship between the economy and the environment has two perspectives, an economic one and an environmental one. The **economic perspective** contains the physical requirements in the economic processes, like energy and material and spatial requirements. The **environmental perspective** puts forward the consequences of these requirements with respect to the availability of the natural environment. Consequently, the optimal allocation of natural resources requires the consideration of both perspectives.

NAMEA is a tool to account for environmental problems combining the data from the environment with the economic data from the core of the SNA. However, no specific economic assumptions are used to compile a NAMEA. Policy-makers are free to decide which kinds of environmental themes and environmental substances should be investigated, and policy-makers should decide how they want to resolve the environmental problems. As a result, the NAMEA does not only produce aggregate indicators in a consistent meso-level information system, it also provides data in the required format for all kinds of analyses.

Two accounts for the environment have been added to the national accounts matrix in the NAMEA: a *substances account* and an *account for environmental themes*. These accounts contain observed environmental data in physical units (emissions and waste in kg and

energy use in joules). They show not only emissions (pollution originating from products and consumers), but also immissions (for example, deposition of pollutants) in the environment.

The substances account explains the relationship between the amount of environmental stress attached to current economic transactions and the amount of environmental stress that potentially threatens all properties of resident entities including economic assets, health and the national ecological heritage.

The environmental theme account is denominated in physical units and focus on the consistent presentation of material input of natural resources and output of residuals for the national economy. These inputs and outputs are the environmental requirements of the economy. In the environmental themes account, substances are grouped and aggregated in accordance to their type of environmental stress and subsequently represented in a limited number of aggregated theme indicators. Most themes correspond to national or local environmental problems and the corresponding indicators reflect the net accumulation of pollutants within the country's borders. For global environmental themes, i.e. greenhouse effect and ozone layer depletion, the indicators only review the weighted pollution generated by economic agents that belong to the national economy, representing the national contribution to these global problems. Consequently, for some of the environmental themes it is relevant and possible to determine the total amount of pressure that is put on the national environment in a single accounting period. However, the accounts do not show the actual damages that may result (now or later) from these pressures. By the presentation of the economic accounts in monetary terms and the environmental accounts in the most relevant physical units, the NAMEA maintains a strict borderline between the economic sphere and the natural environment.⁷

De Haan, in his paper⁸, points out to the following main characteristics of the NAMEA:

Firstly, the NAMEA maintains a strict borderline between the economic sphere and the natural environment, established by monetary accounts on the one hand and accounts denominated in the most relevant physical units on the other. The non-monetary accounts show the environmental requirements of an economy, which are not subject to market transactions and which are for that reason not included in the core national accounts. Similarly, the physical flows underlying commodity transactions do not enter the accounts for environmental requirements.

Secondly, the NAMEA maintains a clear distinction between physical inputs (extraction of resources) on the one hand and outputs (emission of pollutants) on the other.

Thirdly, most NAMEAs contain environmental themes account in which substances are grouped together and aggregated in accordance to the type of environmental pressure to which they are expected to contribute. In this way, a wide range of substances are represented by only a limited number of aggregated theme indicators on the basis of weighting methods.

⁷ de Haan & Keuning, 2000, pp. 3-5

⁸ de Haan, M, 2004, pp. 84-86

Finally, the NAMEA provides an institutional representation of the economy and its relationship with the environment. This implies that economic activities together with their environmental requirements are defined and subsequently recorded according to statistically observable units, *i.e.* the so-called establishments classified according to the International Standard Industrial Classification (ISIC).

3. Recommendations for the Republic of Macedonia

There is an urgent need for implementation of macroeconomic indicative planning in the Republic of Macedonia, as a transition country, where the Government should implement managerial activities in the public sector, public finances, etc. A basis for such indicative economic planning is the macroeconomic policy document of the Government, which provides instruments necessary for the realization of the predetermined medium and long-term development goals. The macroeconomic planning document of the Government should be a programme for the Government medium-term economic and social policy, with clearly specified activities for the: public investments, public enterprises, local economic development, social assistance, public revenues and expenditures, etc. This system of indicative economic planning is compatible with those already existing in the market-based economies and enables realization of the Government medium and long-term socio-economic development goals.

Hence, indicative planning methodology has a significant importance on the coherency, complexity and consistency of the national planning system in the Republic of Macedonia. It enables the consistency during the process of obtaining information about the development conditions and problems, adjustment of the policy-makers' tasks and goals, as well as the preparation and realization of the socio-economic development plans and programs.

Therefore, in order to satisfy the abovementioned, it is necessary the effort of the scientists and experts in our country to be focused on preparation of a complex analytical framework, consisting of:

- a. Preparation of a highly disaggregated Social Accounting Matrix (SAM)
- b. Preparation of a SAM extended with social indicators (SESAME approach)
- c. Preparation of a SAM extended with environmental indicators (NAMEA approach)

Consequently, the focus, in the third part of this chapter, will be put on the activities that should be carried out in order to enable implementation of an efficient process of preparation and elaboration of the abovementioned analytical and methodological documents.

3.1 Social accounting matrix (SAM) for the Republic of Macedonia

At the moment, there is no Social Accounting Matrix (SAM) for the Republic of Macedonia. But, there is time series data with a set of sectoral accounts (from the production to the capital account, for five domestic institutional sectors and rest of the world sector), as well as, a high quality time series data for the national accounts

Hence, it is due time the State Statistical Office, together with the relevant ministries in the Government and experts from the scientific and educational institutions in Macedonia, as well as with institutions and experts from the developed market economies to start the

preparation and construction of a highly disaggregated SAM for the Republic of Macedonia, based on the positive experiences of the developed market and transition economies. The SAM for the Republic of Macedonia would mainly have two basic tasks:

- a. to enable presentation of information about the economic and social structure of the national economy; and
- b. to provide analytical and accounting framework as a basis for construction of macroeconomic models for analyzing the national economy and the effects from the implementation of the macroeconomic and development policy measures.

The SAM for the Republic of Macedonia would be a matrix presentation of the transactions in the socio-economic system. The SAM is a comprehensive, flexible, and disaggregated framework which elaborates and articulates the generation of income by activities of production and the distribution and redistribution of income between social and institutional groups. A principle objective of compiling a SAM is, therefore, to reflect various interdependencies in the socioeconomic system as a whole by recording, as comprehensively as it is practicable, the actual and imputed transactions and transfers between various agents in the system. Hence, couple of activities are of significant importance for our country:

- creation, harmonization and implementation of an integrated analytic-accounting framework as a basis for planning, programming and decision-making for the future socio-economic development of the Republic of Macedonia, based on the United Nations SNA and harmonized with the system and methodology for planning, analyses and decision-making in the developed market economies;
- affirmation of the role and the importance of the SNA and the SAM for the methodology for preparation, adjustment and implementation of the macroeconomic and development policy and planning documents in the national economy;
- construction of a SAM for the Republic of Macedonia, based on a comparative analysis of the SAM construction and implementation experiences in the developed market and transition economies.

3.2 SESAME for the Republic of Macedonia

Since 1991, the Republic of Macedonia has been going through a difficult period of transition, from a command to a market economy. This process has resulted in high unemployment rates and increasing levels of poverty. Hence, it is fair to say that unemployment in Macedonia is one of the gravest and most difficult economic, social and political problems. Despite significant progress in macroeconomic stabilization, job creation has been limited, while changes in the sectoral structure of employment and labor reallocation from less to more productive jobs have been modest. This ongoing situation imposes a real necessity for the SESAME approach implementation in the Republic of Macedonia.

The above mentioned is made possible through the main socio-demographic module of the SESAME approach. The main goal of this module is to present the interaction between the economic and demographic changes in the national economy, including the quantitative

National Classification of Activities	Young (0-14)	Potential labor force (15-64)				Pensioners (over 65)	Total
		Fixed-term contracts	Open-ended contracts	Full - time	Part-time		
Agriculture, hunting and forestry							
Fishing							
Minning and quarrying							
Manufacturing							
Electricity, gas and water supply							
Construction							
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods							
Hotels and restaurants							
Transport, storage and communication							
Financial intermediation							
Real estate, renting and business activities							
Public administration and defense; compulsory social security							
Education							
Health and social work							
Other community, social and personal service activities							
Private households employing domestic staff and undifferentiated production activities of households for own use							

Extra-territorial organizations and bodies							
Social Benefits							
Unemployment subsidies							
Disability and sickness pay							
Social assistance							
Pensions							
Total							
Employment							
Social benefits							
Without income							
Population							

Table 2. Socio-demographic module in a SAM for the Republic of Macedonia

and qualitative changes of the potential labor force, as well as those changes influencing the consumption (ex.: the population age structure). This data can serve for the analysis of the impact of the demographic changes on the income distribution. A proposal for such socio-demographic module is presented in table 2. Republic of Macedonia, in our opinion, can use the socio-demographic module from the SESAME approach, by preparing several tables, using the international standards and classifications, as adopted and implemented by the State Statistical Office of the country (SNA 1993 and 2008, ESA 1995, etc.). The socio-demographic module can reveal numerous socio-economic trends existing in the Republic of Macedonia: population growth rates, average number of household members, the relation between the size of the household and its welfare, the urbanization processes, the process of decreasing size of the agricultural households, number of households depending on income transfers, the participation of women and men in the labor force, the labor force educational level, educational levels differences between the rich and the poor, etc. Hence, it is highly recommendable to use the SESAME approach in the process of macroeconomic and microeconomic policy creation and implementation in the Republic of Macedonia.

The State Statistical Office of the Republic of Macedonia, through its regular annual activities, provides substantial wealth of statistical data sets that can serve for analyzing the different aspects of the socio-economic development, as presented in the SESAME approach. These data include various characteristics and aspects of the population, health protection and social security, education, labor market, different types of revenues and expenditures, consumption and prices, etc. Moreover, substantial data are provided by the already prepared strategic documents in the Republic of Macedonia: National Poverty Reduction and Social Exclusion Strategy, National Sustainable Development Strategy, National Development Plan, etc.

As a conclusion, one must point out to the fact that the SESAME approach is a flexible approach, in which the number of satellite tables and the wealth of presented data will

depend on the goals of the research and the analysis of the development management processes in the Republic of Macedonia.

3.3 NAMEA for the Republic of Macedonia

Republic of Macedonia recognizes environmental protection and sustainable development as priorities both in their own right and as an essential part of the process leading to EU accession. Several important policy strategic documents in various environmental sectors have been adopted, defining the countries environmental policy. The existing strategic policy documents in the field of environment are the following: National Strategy for Environmental Approximation, Second National Environmental Action Plan 2006-2011, National Environmental Investment Strategy 2009-2013, Waste Management Strategy 2008-2020 and the National Waste Management Plan 2009-2015.

Other relevant framework strategies, important for the implementation of the above mentioned and tackling environmental performance of the industrial sector, are the following: National Strategy for Sustainable Development 2009-2030, Industrial Policy of Republic of Macedonia 2009-2020, Energy Efficiency Strategy until 2020, Strategy for use of renewable energy resources of Republic of Macedonia until 2020, National Strategy for development of small and medium sized enterprises 2002-2013, National Strategy on organic agricultural production 2008-2011, etc.

Environmental protection is one of the basic and priority values stated in the Constitution of the Republic of Macedonia. The establishment of the Ministry of environment and physical planning contributed to institutional capacity building of the country in the field of environmental policy creation and implementation. Moreover, the Republic of Macedonia follows the modern trends where Ministries of this type are one of the most important in the public administration system in the national economies.

All above mentioned imposes the necessity to implement the NAMEA approach in the country. In addition the above presented strategic documents in the field of environmental protection, the Ministry of environment and physical planning has established the **Macedonian Environmental Information Center**, as its organizational unit. The key functions of the Center are collecting, systematization, analysis, processing and presentation of data and information for the condition, quality and trends in the environment, as well as production of easy to understand and scientifically credible information on the environment. Such information is available to both decision-makers and the general public, thus contributing to enhanced awareness and improved decision-making process and ultimately making positive impact on the environment. As a result, the National Environmental Information System supports:

- the process of policy creation, planning and decision making;
- identifying effective measures for protecting and promoting the environment;
- on-time and reliable information for the public about the condition of the environment and active participation of the public in the environmental protection; and
- fulfillment of the requirements and the obligations for informing the national and international organizations and institutions.

Therefore, the development and coordination of unique national environmental information system is one of the key Canter's priorities. It is an electronic system for environmental data collection and management. It provides optimized flow of data between relevant institutions and integration of all data into a single operational structure. Hence, environmental indicators, provided by this Centre, are useful tool in the process of environmental reporting. Properly selected indicators, based on properly selected time-series, show the key trends and enable rapid and appropriate intervention of all stakeholders involved in the process of environmental protection. Following the European Environmental Agency concept, the Government of the Republic of Macedonia adopted 40 environmental indicators, which follow the DPISR framework: Driving forces – Pressures – State – Impact – Response, where each phase has its own meaning and significance.⁹

Hence, the data base already created by the Macedonian Environmental Information Centre will be a solid foundation for the preparation and implementation of the NAMEA approach in the Republic of Macedonia. However, in order to be able to implement this approach in the Republic of Macedonia, one should apply additional methodological solutions in the separate national accounts, namely:

- the *production account*: to include data on the activities aimed at pollution reduction (ex.: solid waste management, etc.), i.e. data on expenses related to the activities for the pollution reduction undertaken by the separate production and institutional sectors in the national economy;
- the *production account*: to include data on the value of environmental taxes paid by the separate production and institutional sectors in the national economy, as well as the value of subsidies paid to the production and institutional sectors for the activities related to decreasing the air polluting gases;
- the *capital account*: to include data on the investments in so called "clean (environmental friendly) technologies", undertaken by the separate production and institutional sectors in the national economy;
- in the *Social Accounting Matrix*: to include two additional columns and two additional rows:
 1. row/column for the most significant substances (environment polluters), which should record (in physical terms) the quantities of pollution created in the production and consumption processes in the national economy; and
 2. row/column for the natural resources, which should record data (in physical terms) on the natural resources' depletion, as a result of the production and consumption processes in the national economy.

Consequently, through such designed NAMEA approach for the Republic of Macedonia, one will connect data from the System of national accounts (SNA) and the environmental data in a systematic way (by applying uniform and standard definitions and classifications) and will enable to describe (in physical terms) the quantitative impact of the economic activities on the environment. Moreover, the NAMEA approach for the Republic of Macedonia will be a solid analytical database for preparation and

⁹ Ministry of Environment and Physical Planning of the Republic of Macedonia, www.moeppp.gov.mk

implementation of macroeconomic models for analyzing the environment protection policies and activities.

4. Conclusion

Sustainable development and sustainable development planning are complementary processes which should ultimately lead to increased well-being of the mankind. In order to better understand and implement the whole process, one should take into consideration their methodological basis, their preparation and implementation. Hence, first part of this chapter presented the theoretical foundations of the Social Accounting Matrix and its extension (SESAME and NAMEA), mainly through the work done by other authors. The second part of the paper gave practical recommendations which should, in our opinion, lead to preparation and implementation of the SAM and its extensions (SESAME and NAMEA) in the Republic of Macedonia, for the decision-making process related to creation and implementation of efficient macroeconomic and development policies in the country.

All abovementioned shows that development planning and the market are complementary mechanisms in the developed market economies, and as such should be equally the part of the new socio-economic system of the Republic of Macedonia. The successful combination of the „market's invisible hand“ and the „plan's visible hand“ will provide a more rational utilisation of the production factors and more dynamic economic development of the national economy. This will lead to a continuous improvement of the economic policy instruments, as well as the other types of planning and programming of the national economy development.

5. Acknowledgment

I dedicate this chapter to my parents, **Divna** and **Aleksandar**, for their continuous and unselfish support, understanding, sacrifice, guidance and unconditional love.

6. References

- de Haan, M. (2004). *Accounting for Goods and for Bads: Measuring Environmental Pressure in a National Accounts Framework*, Statistics Netherlands, Voorburg, the Netherlands
- de Haan, M. & Keuning, S. (2000). The NAMEA as Validation Instrument for Environmental Macroeconomics, *EVE workshop on "Green National Accounting in Europe: Comparison of Methods and Experiences"*, 4 to 7 March 2000, Milan, Italy
- European Commission - EUROSTAT; International Monetary Fund; OECD, UN & World Bank. (1993). *System of National Accounts 1993*, Brussels/Louxeembourg, New York, Paris & Washington D.C
- Keuning, S. & Timmerman, J. (1995). An information-system for economic, environmental and social statistics - integrating environmental data into the SESAME, NA-076, Statistics Netherlands, 1995, Voorburg, the Netherlands,
- Keuning, S. (1998). Interaction between national accounts and socio-economic policy, *Review of Income and Wealth*, Series 44, Number 3, September 1998

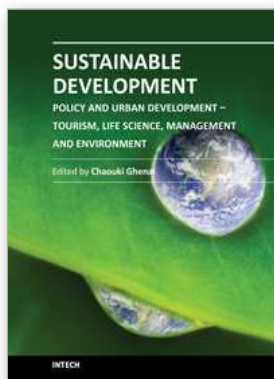
Keuning, S. (2000). Accounting for welfare in SESAME, in: *Household Accounting – Experience in Concepts and Compilation*, Handbook of National Accounting, Studies in Methods, Series F, No. 75/Vol.2, 2000, United Nations, New York

Ministry of Environment and Physical Planning of the Republic of Macedonia
(www.moepp.gov.mk)

OECD. (2001). The DAC Guidelines - Strategies for Sustainable Development, Paris, France

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Sasho Kjosev (2012). Social Accounting Matrix – Methodological Basis for Sustainable Development Analysis, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/social-accounting-matrix-methodological-basis-for-sustainable-development-analysis>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Broadening Sustainable Development in Praxis Through Accountability and Collaboration

Mago William Maila
University of South Africa, Pretoria
South Africa

1. Introduction

In discussing the four different interpretations of the moral imperative to promote sustainable development, Hattingh (2002, p.14) says in his conclusion about the importance of sustainable development, informed by critical reflexive action, that “any interpretation of sustainable development functions as normative ideas. Such a set of normative ideas can function as guidelines for personal actions and as a baseline in terms of which governments, industry, commerce, consumers and citizens can be held accountable for their actions”. As various stakeholders in this debate strive to interpret sustainable development within normative parameters, they need to ground their understanding and implementation strategies of sustainable development guidelines, in critical, reflexive processes of their practice, informed by their theory that guides their practice and action-in-practice that guides their theory. Such a process is pluralistic and collaborative and demands accountability. This chapter therefore, seeks to critically and analytically explore the grounding of sustainable development in praxis as a social, and reflexive informed process directed by collaboration and accountability imperatives.

Praxis is normally equated to practice and theory in social research investigations. A simple clarification of what practice and theory entail, is that practice involves a process-oriented action, and theory involves principles that guide action. May (2005) reaffirms the above notion about practice and theory. He sees the two concepts as simply two sides of the same coin, and he further argues that

“Theory aims at the production of thoughts which accord with reality. Practice aims at the production of realities which accord with thoughts. Therefore common to theory and practice is an aspiration to establish congruity between thought and reality (May, 2005, p. 339).”

In this chapter I theorize about the notion of grounding sustainable development in congruous aspirations of thought and reality within a broader perspective of praxis. However, I intend discussing the role of praxis in this investigation, further down in the chapter. I shall however, turn to accountability and collaboration as obligatory guidelines for both action in development and action in holding governments and civil society structures accountable to sustainability processes within their mandated portfolios.

Sustainable development initiatives need to be built on meaningful partnerships. In such partnerships, principles of accountability and collaboration are but few of the many

principles critical in development processes. According to the Catholic Agency for Overseas Development (CAFOD), (2002), the agenda for accountability should be at the foreground of all development processes and the wellbeing of people. To the CAFOD, accountability involves among other things that: the fundamental principle of good governance for a government of a country is to first and foremost be responsible to its people; formal and inclusive monitoring processes be established; and mutual accountability regarding impoverished people be built between governments and donor communities (www.cafod.org.uk/policy_and_analysis/). The crux of this principle is that an inclusive process is imperative for productive partnerships between governments, civil society groups, impoverished communities and the wider community in development initiatives if sustained and meaningful outcomes are envisaged. Needless to mention that, partnerships as collaboration, must be underpinned by commitment, ownership, mutual learning, agency and transparency. I see these underpinnings as tenets of the two principles framing the discussion of this chapter.

Accountability and collaboration call all people to acknowledge both positive and negative causes and effects of their actions, that is a call to, being able to account for one's actions – being responsible for one's doings (Thompson, 1995, p. 10). Reeves (2002) however, cautions that accountability is fraught with danger, but rife with opportunity. Danger in neglecting and marginalizing various communities' other ways of knowing; undermining environmental ethical issues and opportunity for engaging collaboration processes in sustainability matters in order to ensure economic growth that does not compromise the environment and the wellbeing of people. A positive promise by Markandya, Harou, Bellu and Cistulli (2002, p. 15) and, Fien and Tilbury (2002) is the historical document signed at Rio - Agenda 21, by nations of the world, committing themselves to promoting sustainable development through a great variety of transformative educational means, including non-formal, informal and primary and secondary education.

The Millennium Development Goals (2000), World Summit on Sustainable Development (2002), World Declaration on Education for All (1990), the Dakar Framework for Action for Education for All (2000), the Johannesburg World Summit on Sustainable Development (2002), the United Nations Decade of Education for Sustainable Development (2004) are some of the global means put in place to assist nations of the world to better the lives of all people. These global agreements and programmes meant mainly for local implementation processes are also pointers of what the world needs to do in order to address issues of sustainability and poverty eradication.

The understanding that natural resources should be used for the advancement of all people and the eradication of poverty, is founded on the ideal of a democratic world citizenry, primarily loyal to human beings the world over, and whose national, local, and various group loyalties are considered distinctly secondary (Nussbaum, 1998, p. 9). Although this view is seen by some scholars as encouraging 'laziness' and the ability to rely/depend on other people's mercy for survival (Hardin, 1990), the United Nations (UN) and other global initiatives that are worldwide focused to alleviate and eradicate poverty and health-ills through sustainable development programmes, seem to be convinced otherwise. The argument I advance in this chapter therefore, is that sustainable development is integral to economic and human development initiatives (Bell & Morse, 2003) and that it must be embedded in the work human beings do, that is in praxis (Carspecken, 2002). Reiterating the

view on the necessity of economic and human growth, Markandya, et al (2002, p. 17) maintains that the quality of economic growth should eradicate poverty over time as the ultimate criterion of sustainable development. Just note that the term sustainability is often used synonymously with sustainable development (Bell & Morse, 2003, p. 3). In this chapter these terms are also used interchangeably.

Note that this chapter starts with a brief introduction illuminating on the discussion of the chapter, followed by a critical exploration and analysis and a suggestion for a better understanding and use of the varied perspectives of sustainable development. Thereafter, I explore an illumination on the links/linkages between theory and practice, praxis and sustainability, with a view to establish and promote interconnectedness and multiplicity of knowledges and knowings, will ensue, followed by a brief discussion on how sustainability research could endeavour to ground sustainability in praxis. Lastly, the chapter discusses partnerships and collaboration processes as underscored by accountability and responsibility in/for sustainability.

2. Varied perspectives

Complex and different views advanced by various scholars about sustainable development as a global trajectory relating to social justice, political justice, trade justice, environmental justice, are contested every day. There is also skepticism when it comes to why humanity needs to develop sustainably (Neefjes, 2000, p. 44). Nations in the North seem to be suspected of using their economic power to demand compliance to issues of sustainability, when in actual fact they are eying the abounding natural resources of the South. The South is also suspected of using its inability to develop sufficiently to uplift itself out of poverty and health-ills, and using the dependency-syndrome as leverage for arguing for more donor funding (Hardin, 1990).

It is for that reason that, defining sustainable development is not simple and easy. As indicated by Neefjes (2000), sustainable development is a complex, broad and vague concept. Neumayer (1999) concurs with Neefjes' observation. Adding to this problem is the fact that sustainable development is a contextually based operationalized activity, with an internationalized mandate (Johannesburg World Summit on Sustainable Development, 2002). Hence, it is described both in terms of historic-cultural dispositions and theoretical dispositions. The complex and diverse environmental problems and risks emerging worldwide as a result of development are seen as the cause of the new approach to development – sustainable development (Hall, 2000a). Reiterating this fact Hall (2000, p. 14) argues that “past patterns of development, especially those based heavily on the use of energy-intensive inputs are destructive of soils, biota, and systems of production, so that new approaches that focus instead on the long-term maintenance of the productive system should be the goal”.

Bell and Morse (2003, p. 3) succinctly point out that sustainable development is all about an improvement in the human condition. They further distinguish sustainable development from other approaches that endeavour to improve the quality of human life, but does not emphasize economic growth, nor do they focus completely on people, “but more on the underlying philosophy that what is done now to improve the quality of life of people should not degrade the environment (in its widest bio-physical and socio-economic sense) and resources such that future generations are put at a disadvantage” (2003, p. 3).

Goodland and Daly (1996) and Markandya, et al (2002) maintain that classically sustainable development is broadly portrayed as an interface between environment, economic and social sustainability. As already mentioned that the term sustainability is often used synonymously with sustainable development (Bell & Morse, 2003) and that in this chapter these terms are also used interchangeably, hence, Markandya, et al (2002, p. 17) argue that sustainable development needs a new science of 'sustainomics – this refers to the new science of sustainable development as a trans-disciplinary and multidisciplinary approach. According to Munasinghe (1993) this approach requires a mixture of skills and disciplines.

Such an approach seems to be quite broad in its inclusion of knowledge from a diverse skills and disciplines, it projects a more neutral image which focuses attention explicitly on sustainable development, and avoids the implication of any disciplinary bias or hegemony (Markhandia et al., 2002, p. 18). Neefjes (2000, p. 49) argues that the three dimensions of which sustainable development is founded (economics, social, environment (diverse skills and disciplines) are supposed to be underpinned by environmental sustainability, which is anthropocentric in nature, primarily concerned with human welfare. However, regarding sustainability, all the scholars referred to above concur that politics is the line of the sustainable development discourse. I refer to this process as political sustainability that undergirds development.

Different intellectuals' understand development differently. Hall (2000, p. 14) points out that development means the increased exploitation of resources with the use of fossil energy, and it is by definition not sustainable, because fossil fuels are finite since they are not being made today on any important scale. Other stock resources, including especially soils and many minerals, also fossils, water, many forests, and fishes, are likewise essentially being mined and used once. By this chain of logic one might conclude that sustainable development is an oxymoron, a phrase that is internally inconsistent, such as 'jumbo shrimp'. On the other hand perhaps new technologies can decouple development from resource exploitation and the use of nonrenewable resources.

Eisgruber (1993, p. 4) contest that sustainable development is development that "... is taken to mean a positive rate of change in the quality of life of people, based on a system that permits the positive rate of change to be maintained indefinitely". *Our Common Future* (1987, p. 4) defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Again, the emphasis is not just sustaining development for the sake of consumerism and the greedy amassing of wealth tendency by those who have the power resources to do so, but development that provides opportunities and for all people to advance in their wellbeing.

Caring for the Earth (1991, p. 10) concurs with the views of Eisgruber (1993) and *Our Common future* (1987) that perceives sustainable development as that which "improves ... the quality of human life while living within the carrying capacity of supporting ecosystems". However, this view largely depends on the kind of actions that people take in the environment regarding the sustenance of their lives, and that these are critical if sustainability is to be maintained. Neefjes (2000, p. 42) argues that sustainable development "requires meeting the basic needs of all people and extending to all the opportunities to fulfill their aspirations for a better life". If the people of the world are to respond positively to halving the poverty of impoverished

masses, then it should be 'all hands on deck' as far as achieving this Millennium Development Goal. Nations that have more than enough resources should start and continue to play their role in ensuring that the environment is protected (Neefjes, 2000; Carter, 2001).

Those nations who are impoverished are not off the hook regarding their role in sustainability. They need to ensure that they do not take support for granted, but that support is to be accounted for in a transparent and responsible manner, by ensuring that graft does not undermine the goals of such support in all practices of sustainability. Since the understanding of practice as praxis is a critical strategy in the 'application' of programmes, especially initiatives that are focused to 'support', or foster development programmes, I need to discuss the central thoughts of this strategy within the notion of theory, practice, praxis and sustainability, and point out how the linkages of these can enrich sustainable lifestyles and human wellness.

3. Theory, practice, praxis and sustainability: What are the links?

Does it actually matter what comes first – theory or practice? Yes it does matter, depending whether the research action is based on a deduction or induction approach. May (2005, p. 32) argues that when we consider a general picture of social life and then research a particular aspect of it to test the strength of the theory, that is deduction research and that, theorizing comes before research (2005). On the other hand, when a researcher examines a particular aspect of social life and derives a theory (-ies) from the resultant data, that is known as induction. In this case research comes before theory and seeks to generate theoretical propositions on social life from the data (May, 2005, p. 32).

In order to understand the notion of grounding sustainable development in praxis, I must briefly explain how praxis is different than just practice, as both terms refer to action undertaken regarding a research or just a development endeavour. Some people see praxis as practice or research action. Praxis is more than just an action-in-practice, it involves the continuous reflection on one's work, understanding one's work through critical reflection in/on that work, and being critical involves scrutinizing the theories within one's practice, and the social structures that shape them (Janse van Rensburg, 1998, p. 39). Janse van Rensburg and Le Roux (1998, p. 104), reiterate that, praxis implies a conscious recognition of the relationship that exists between practice and its rationale(s), and that praxis constitutes deliberation on the 'why' question that illuminates meaningful resonance amidst the 'what' and the 'how of one's work (Janse van Rensburg & Le Roux, 1998, p. 104). In the context of a research project it involves asking why we do things the way we do, and this questioning affects what we do next (feed back into the practice). In short, this means that action-in-practice, reflection and praxiological curriculum are the constitutive elements of praxis.

Now, whether theory comes before practice or practice gives rise to theory, the crux of the matter is that the research action or practice must be informed by critical reflexive reflection and praxiological curriculum as constitutive elements of the undertaken practice. Carspecken (2002) reiterates this notion of praxis as embedded within the actions of humanity. Looking at praxis in culture, he argues that action is not determined by structure, but it is rather conditioned by cultural milieu and is always productive of new cultural forms (2002, p. 60). He further observes that, "human beings are strongly motivated to continuously produce themselves" (2002, p. 62).

According to Carspecken, Hegel's philosophy explains how human beings continuously 'produce themselves', through Geist as the agent of praxis, which is the impetus, process, and product of its own self-production. According to Marx (cf Carspecken, 2002, p. 63) self-production is located within the work humans do. This means "humans work to produce useful objects is simultaneously human work to produce themselves". All human beings need to produce themselves through praxis, or the praxis needs. However, realistically, these needs might be denied to them by the capitalist relations of production processes (Carspecken, 2002, p. 64). For praxis needs to be realized certain social conditions are mandatory. These are the control of the conceptualization of production; the control of the tools and resources used for work, and the control of the product in question (2002, p. 64). Let me now unpack this broad view of praxis as practice embedded in the actions of human beings – and how it relates to sustainable lifestyles that are meaningful for improving the quality of human life for present and future generations:

3.1 Need for human beings to produce themselves

Sustainability is a human activity. The unhealthy (overuse, over-exploitation, degradation of natural resources, etc) use of natural resources is a resultant of human beings' actions based either on accelerating profits in the name of development or simple greediness. However, sustainability that is based on engaging and focused on the participation of all people in its processes fosters a better understanding of people themselves and their actions – their practice. It is in the collaboration and engagement with sustainability processes that they see their actions. Those left out become strangers and suspicious of sustainable development.

3.2 Need for human beings to produce worthy goods

Sustainability is about ensuring a better quality of life for all. Goods and services are fundamental to all people's lives. Denying people goods and services is unethical- if people are unjustly marginalized and inhumanly treated the very goods and services produced are probably inequitably provided. So, all social injustices, be it trade injustice, social injustice, political injustice, trade injustice, environmental injustice, economic injustice, push the masses to the peripheral of sustainable development processes. The worthiness of them producing worthy goods and services is marginalized, compromised and denied. Meaning that they end up not been part of sustainable development praxis. Remember that praxis is not just practice, but it is practice that seeks informed actions based on continuous reflexive reflection and reshaped actions.

3.3 Need of human beings to overcome challenges and obstacles that deny one to realize needs of self-production

We many a time say "practice makes perfect", attesting to the fact that being involved in 'action' is better than being 'told' about the action. Those masses participating in sustainable development initiatives or programmes are better positioned in understanding the need to use resources wisely in the present (now) in order to ensure that the future will also be well taken care of.

Not only do people need to produce themselves through praxis needs but, they also need to ensure that they overcome, minimize and eradicate those factors that either deny, or diminishes their chances of realizing their praxis needs. They therefore need to consciously ensure that they understand their actions- in – practice; they need to know and understand how they want to produce themselves; they need to deliberately collaborate their actions and be prepared to be continuously informed by their critical reflections in practice. This process of praxis calls for all people to participate in sustainability actions, and to ensure that factors working against sustainable development are overcome through either minimization or eradication processes. Throughout the processes of praxis resources are critical in ensuring that desired positive outcomes are possible. Hence, resources in the sustainable development action- chain cannot be misused or grafted. Marginalizing human beings in sustainability is equal to the misuse of human resources, and it is just as bad as misusing the employed in their line of duty. Graft is bad, whether practiced by recipients of donor funds or practiced by donors themselves.

A balanced and holistic approach to uprooting these ill practices in praxis should be based on robust anti-corruption strategies, based on international agreements on issues of social justice, political justice, economic justice, environmental justice and human rights and fair practices among donor (countries) and recipients (countries). Normally the term donor refers only to overseas government/NGO/ or company donating some sum of money for a specific development project or activity. However, a broader understanding of this concept should actually refer to both local and abroad donors, be they government, NGOs or industries. Graft is 'graft' whether the money being corrupted is overseas money or local. The result of such deeds is that development is seriously compromised or undermined. The CAFOD (http://www.cafod.org.uk/policy_and_analysis/policy_papers/) policy document seems to offer a better anti-corruption strategy in this regard in order to ensure better sustainability processes:

- *Donors must complement ... initiatives to establish peer reviews by setting up independent assessment mechanisms for monitoring donor performance. The set independent body should judge donor performance against agreed upon principles of donor and recipient country accountability.*
- *Such agreed upon principles should foster local control, priority and ownership of aid programmes and enhance donor responsiveness and accountability to local parliaments, civil societies and taxpayers. Of course, donors must also be accountable to their countries abroad.*
- *Donors and governments should conduct a review of the effectiveness of anti-corruption institutions and anti-corruption conditionalities and build greater local civil society organizations participations, parliament and press in shaping the anti-corruption agenda.*
- *International anti-corruption agreements (such as the OECD Bribery Convention) must be strengthened and be supported by all governments.*
- *Binding commitments must be for the pro-active enforcement of regulations that close loopholes for bribes and open offshore bank accounts for the recovery of corruptly gained assets. Graft should not be allowed to determine the wellbeing of those who need donor support.*

- *In countries with a high incident of corruption, development assistance still has a role to play. It should by-pass corrupt institutions and support, countervailing, anti-corruption influences.*
- *There should be enhanced investment in civil service reforms that prioritize local ownership and finance adequate pay scales for civil servants.*
- *Governments should ensure that democratic and participatory guidelines are at the heart of standards of good governance.*
- *An emphasis should be placed on participatory forms of governance in budget and poverty monitoring processes.*
- *Institutions such as the World Bank and the International Monetary Fund should be reformed in order to ensure that developing countries have a greater voice and influence in the shaping of policies that impact on their lives.*

These anti-corruption strategies ideas map out a clear desire to ensure that action in praxis continues to be informed by reflexive, and collaborative decision-making processes, and less by selfish and arrogant inclined decisions. Development actions must be owned by all those meant to be assisted and supported in order to defeat and move out of their poverty status. And those with the capability should continue to ensure that necessary resources are just as mandatory to the attainment of sustainability life styles. Because corruption undermines such endeavours, all people should be called to participate with a renewed energy and determination to fight the scourge of corruption. Such a resolve is not discreet but is pluralistic, ongoing and aggressive collaboration for sustainability.

4. Embedding sustainability in praxis – Is it self explanatory?

I do not believe it is self-explanatory. This kind of action for sustainability cannot be taken for granted and be assumed. Reflexivity in sustainable development processes is supposed to be a deliberate activity, and focused on a rigorous process of improving the lives of all people through reflexive sustainability processes. For that reason, such reflexive action taking processes must be grounded in what people are 'actually-doing' to better the quality of life they want to enjoy. Such actions to be based on deliberate participation processes in matters that impact on their lives.

4.1 Praxis as informed reflexive action in sustainable development processes

Feedback is critical in informing the next step(s) of action in order to ensure maximum utilization of resources and successful achievement of outcomes. Reiterating this observation Lotz-Sisitka (2006, 20), points out that involving people in sustainable processes means that

- participatory approaches and methods are deliberately encourage and further develop in ways that are meaningful to all participants;
- integrated approaches and solutions to poverty, environmental degradation, health risks and other sustainable development challenges, are viewed as legitimate approaches just like educational practice;
- the need to involve people in questioning and critically evaluating the appropriateness of environmental and sustainability education practices is encouraged
- the need to involve people in questioning and critiquing the appropriateness of economic, political, bio-diversity sustainability education practices is mandatory

4.2 Praxis enabling participants to self-production

As a human activity, sustainability ought to engage all people in its processes in order to foster a better understanding of themselves and their actions – their practice. Whether through formal, non-formal or informal education, and whether through government and business enterprises. All people must be involved in order to actualize themselves. Otherwise, if left out, they will become ‘strangers to sustainable development’ and suspicious to sustainability programmes. According to Lotz-Sisitka (2006), and Moore and Masuku-van Damme (2002) active participatory and people-centred methodologies cannot be overemphasized in sustainability processes. Hence, dealing with complex and uncertain issues, needs people to be involved on personal care levels in order to amicably and appropriately resolve these issues.

4.3 Praxis as a producer of worthy goods and services

Goods and services are basic to all people’s lives. For that reason, all people must participate in sustainability programmes that endeavour to enable them to access resources. Unjust and inequitable processes in these programmes that marginalize impoverished communities are to be avoided at all cost. Praxis is not just the action we take in our practice, but it is practice that is based on informed continuous reflections on our actions as we participate using all resources available to us. This observation concurs with the environmental principles adopted at Rio De Janeiro (Rio Declaration 1992) that

- development should be focused on sustainable natural resources use and sound management thereof;
- security of land and resource tenure is a fundamental requirement of sustainable natural resource management;
- long-term food security depends on sustainable natural resource and sound environmental management;
- technologies that are environmentally friendly, socially acceptable should be developed and disseminated for effective use of natural resources;
- facilitating the creation of opportunities for communities and individual resource managers to manage their own natural resources and the environment sustainably should be encouraged

4.4 Praxis as ongoing reflection in sustainable development processes

As participants continue to ask the ‘why’ and ‘how’ questions of their practice, they gather information that not only helps them to shape actions, but also to be able to avoid activities and processes that will result in failure and cumbersome challenges. In this regard, I concur with Lotz-Sisitka (2006: 29) that there is great need for research to

- advance the conceptual, theoretical and methodological development of environment and sustainable development;
- strengthen and extend existing environment and sustainability education pedagogies, their relevance in society and their reality congruence;
- strengthen and extend the effectiveness and value of partnerships and networking processes;

- strengthen curriculum development approaches and implementation strategies for mainstreaming environment and sustainable development concerns into education systems;
- inform work-based learning and new approaches to training and professional development to strengthen reflexive practice;
- develop strategies that can address complexities and value based questions in the teaching and learning process in a context characterized by high levels of cultural and linguistic diversity

If praxis is action-oriented processes, then it means that participation and collaboration are inevitable, and such participation and collaboration also have to be grounded in accountability processes if meaningful outcomes are envisaged.

5. Collaboration and accountability in sustainable development

Collaboration is about various groups of NGOs, government, civil society and business coming together and deliberating on various strategies of action in/for sustainable development. Sometimes collaboration is used to refer to actions of 'conniving' and shoddy actions against individuals or operations. However, in sustainable processes, collaboration is about the coming together of various stakeholders with a view to participate at a 'broad-knowledge-base', where all participation endeavours stand to gain. The conviction is that broad-based information 'think-tank' will ensure that the views of all (governments and civil society) are represented. I must say that it is assumed that participation and representation are strategies that are useful when applied effectively. As we know, participation can be 'shallow', tokenistic, and 'endorsement type' (Maila, 2006) or can be instrumentalistic and functionalistic (Neefjes, 2000). On the other hand, representation can be (1) biased towards small, well-organized groups with few claims to represent the larger public, (2) undermined by offering opportunities for participation late in the decision-making process when proposals are already developed and accepted by the relevant agency (Tolentino, 1995, p. 142).

In order to either avoid or minimize the effects of the above types of representation through participation, Tolentino (1995) argues for not just participation in sustainable development, but for popular participation. He cites three convincing reasons why popular participation by civil society, business and government should be a requirement for development that is sustainable:

- A number of procedures in the EIA process provide opportunities for interested groups to inform agency deliberations about their concerns and preferences or to contribute formative ideas to the decision-making process.
- Sometimes, dissatisfied concerned citizens use available information to block proposals through protest or litigation.
- Suits are filed against government agencies for failure to regulate activities, which damage the environment and private industries for developing technologies in violation of environmental standards (1995, p. 142-143).

Tolentino (1995, p. 143) further cites other reasons that are constraints to the implementation of popular participation for sustainable development. These are poverty; illiteracy;

inadequacy of political mechanisms; certain agencies of governments view environmental movements as obstacles to development; sometimes the state is the stumbling-block to development itself; absence of laboratories hampers civil society proving their case against environmental degraders and; copious resources of industries can ensure that they do not own up to their environmental ills.

Participation is also integral to democratic values and principles. People cannot be denied this democratic and human right under normal circumstances. Of course, sometimes this value and principle is arbitrarily practiced by those in positions of power, in that the necessity to have people interact with policy issues is ignored. Dryzek (2000, p. 1) argues that democracy is deliberative in its nature and

"As a social process is distinguished from other kinds of communication in that deliberators are amenable to changing their judgements, preferences, and views during the course of their interactions, which involve persuasion rather than coercion, manipulation, or deception."

Of note, is that participation in governance is a democratic right, but also an ethical right. It means that it is morally wrong to deprive people the right to exercise their choices freely in decision matters that impact on their lives. Governance that is ethically correct needs to take the masses on board in decision-making processes.

Good governance relies heavily on the needs of its masses. Civil society normally desires clean governance. No wonder, people throughout the world are rejecting the notion that corruption is inevitable (States News Service, 2006). The abuse of entrusted authority for private or personal enrichment is not acceptable as this undermines all initiatives by governments and nongovernmental organizations geared towards the advancement of society. Various strategies of how to curb corruption are put in place by various governments. For example, raising public awareness on the existence of the problem; helping poor countries develop transparent contracting and audit systems; enforce corruption laws; responding speedily to reports of suspected corruption; training staff to recognize signals of corruption in governments and nongovernmental organization development initiatives (States News Service, 2006). Although all of these strategies seem to be good and focused, their weakness is that they are mainly focused on developing countries and not the developed countries; and focuses on recipients and not the donor. So, any act or doing in corruption would not necessarily be picked up in developed countries' donor agencies, but rather, would squarely be blamed on the recipient and her/his country.

In such a complex situation, the World Conservation Strategy, which proposed the nine principles in Caring for the Earth (IUCN, 1991: 12) seem to provide us with a better lifestyle based on an moral standard for living/lifestyles, and these are

- respect and care for the community of life (an ethical principles defined as duty of care for other people);
- improving the quality of human life;
- conserving the vitality and diversity of the earth;
- minimizing the exhaustion of non-renewable resources;
- keeping within the carrying capacity of the earth;
- changing personal attitudes and practices, in accordance with an ethic for sustainable living;

- enabling communities to care for their own environments;
- forming national frameworks for the integration of development and conservation;
- forming a world alliance to implement sustainability on a global scale

It must be noted however, that the success of the implementation of these principles in meaningful ways, depends on meaningful collaboration and accountability practices in sustainable development.

6. Concluding comment

Sustainable development is a universal peoples-centred policy initiated programme, mainly geared to sustain our environment, economics, and socio-cultural dimensions of life. No one is to be excluded in this programme if we are to change the lives of all people for the better. Hence, the grounding of sustainable development in praxis, continuous informed reflexive action in practice, is enabling participants to meet their praxis needs.

Sustainability initiatives cannot ignore the importance of all people participating in such initiatives. Communities must be part of collaboration initiated for sustainable development. Government, academia and business need to ensure that all participants adhere to both international and local agreed upon principles of rooting and avoiding corruption in sustainability programmes. For that reason, continuous research is imperative regarding the formative, monitoring and evaluation of sustainability processes. Theoretical knowledge and understanding of sustainable development must be a continuous process.

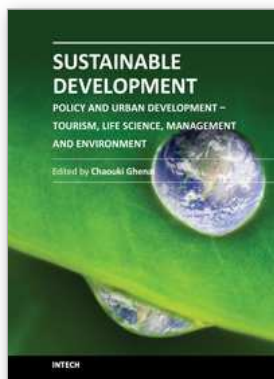
It must be continuous and be applicable to actions taken on the ground. It must direct what needs to be done. It must influence daily activities of governments and civil society and sustainability. However, conversely, it must be informed by actions that are locally, nationally and internationally situated. As sustainable development shapes actions, it is also shaped by its own actions. Therefore, sustainability programmes that marginalize the masses from participating in development initiatives are both ignorant of what they miss in sustainable development and praxis, and their actions are both irresponsible and dangerous to the environment economics, politics, socio-cultural and biodiversity enhancing lifestyles.

7. References

- Bell, S & Morse, S. (2003) *Measuring sustainability learning by doing*. London: Earthscan Publications Limited.
- CAFOD (2002) Available at: www.cafod.org.uk/policy_and_analysis/.
- Carspecken, P. F.(ed).(2002) The hidden history of praxis theory within critical ethnography and the criticism/postmodernism, edited by Y.Zou and E.T.Trueba, in *Ethnography and School: Qualitative Approaches to the Study of Education*. Lanham: Rowman & Littlefield Publishers. Pp 55-86,
- Carter, N. (2001) The politics of the environment: Ideas, Activism, Policy.
- Goodland, R & Daly, H. (1996). Environmental sustainability: Universal and Non-Negotiable, in *Ecological Applications*, 6(4), pp 102-1017.
- Cohen, G. A. . Karl Marx's Theory of History: A defense. Oxford: Oxford University Press.
- Dobson, A. (1998) *Justice and the Environment: Conceptions of Environmental Sustainability and Dimensions of Social Justice*. Oxford: Oxford University.

- Dragun, A. K & Jakobsson, K. M. (1997) *Sustainability and global environmental policy: New perspectives*. Cheltenham, UK: Edward Elgar.
- Dryzek, J.S. (2000) *Deliberative Democracy and Beyond: Liberals, Critiques, Contestations*, Oxford: Oxford University Press.
- Eisgruber, L.M. (1993) Sustainable development, ethics, and the Endangered Species. *Choices* (Third Quarter), Washington, D.C: U.S. Dept. of Agriculture, 4-8.
- Fien, J., & Tilbury, D. (2002) The global challenge of sustainability, in *Education and Sustainability*, D. Tilbury, R. B. Stevenson, J. Fien and D. Schreider (eds). Gland, Switzerland: IUCN, PP. 1-11.
- Ginther, K., Denters, E & DE Waart, P. J. I. M (eds). (1995) *Sustainable development and good governance*. Dordrecht: Martinus Nijhoff Publishers.
- Goodland, R., & Daly, H. (1996) Environmental sustainability: universal and non-negotiable. *Ecological Applications*, Vol. 6, No. 4, pp. 102-117.
- Hall, C. A. S. (2000a) The changing tropics, edited by C. A. S Hall, C. L Perez & G Leclerc, in *Quantifying sustainable development: The future of tropical economies*. San Diego: Academic Press.
- (2000b) The theories and myths that have guided development, edited by C. A. S Hall, C. L Perez & G Leclerc, in *Quantifying sustainable development: The future of tropical economies*. San Diego: Academic Press.
- (2000c). The myth of sustainable development, edited by C. A. S Hall, C. L Perez & G Leclerc, in *Quantifying sustainable development: The future of tropical economies*. San Diego: Academic Press.
- Hall, C. A.S., Perez, C. L & Leclerc, G (eds). (2000) *Quantifying sustainable development: The future of tropical economies*. San Diego: Academic Press.
- Hardin, G. 1990 *Living on a Lifeboat*, edited by A. F Falikowski, in *Moral philosophy: Theories, Skills, and Applications*. Englewood Cliffs, New Jersey: Prentice Hall.
- Hardin, G. (1990) 'Living in a lifeboat', in A.F. Falikowski (Ed.) *Moral Philosophy*, Englewood Cliffs, NJ: Prentice Hall.
- Hattingh, J. (2002) On the imperative of sustainable development: Aphilosophical and ethical appraisal. In Janse van Rensburg, E., Hattingh, J., Lotz-Sisitka, H. & O'Donoghue, R. (Eds), *Environmental education, ethics and action in Southern Africa*. EEASA Monograph. Pretoria: HSRC Press. pp. 5-16.
- IUCN/UNEP/WWF (1991) *Caring for the Earth: A Strategy for sustainable living*. The World Conservation Union, United Nations Environment Programme and World Wide Fund for Nature, Switzerland.
- Janse van Rensburg, E. 1998. *The Educational Response to the Environmental Crisi*. Unpublished Paper, Gold Fields Participatory Course in Environmental Education, Course File, Rhodes University Environmental Education Unit. Grahamstown: Rhodes University.
- Janse van Rensburg, E. & Le Roux, K. 1998. *Goldfields participatory course in environmental education: an evaluation in process*. Grahamstown: Rhodes University Environmental Education Unit.
- Johannesbuirg World Summit on nSustainable Development 2002 United Nations Educational, Scientific, and Cultural Organization (UNESCO) 2004. *United Nations decade of education for sustainable development 2005–14 Draft international implementation scheme*, October, (2004). Paris: UNESCO.

- Lotz-Sisitka, H. 2006. Participating in the UN Decade of Education for Sustainability: Voices in Southern African consultation process, in *Southern African Journal of Environmental Education*, Vol. 23 (2006):10-33.
- Maila, M. W. (2005) Environmental education as a human capability strategy for poverty reduction, Paper presented at the GRUPHEL Conference in Maseru, Lesotho, in November 2005.
- Markandya, A., Harou, P., Bellu, L. G & Cistulli, V. (2002) *Environmental Economics for Sustainable Growth: A Handbook for Practitioners*. Cheltenham: Edward Elgar.
- May, T. 2005. *Social research: Issues, methods and process*. New York: Open University Press.
- Moore, K., & Masuku-van Damme, L. (2002) The Evolution of People-and-Parks Relationships in South Africa's National Conservation Organisation, in *Environmental Education, Ethics and Action in Southern Africa*. EEASA Monograph. Pretoria: HSRC.
- Millenium Development Goals. (2000a) Paris: UNESCO.
- Munasinghe, M. (1993) *Environmental Economics and Sustainable Development*. Washington, D.C: World Bank.
- Neefjes, K. (2000) *Environments and Livelihoods: Strategies for sustainability*. Oxford: Oxfam.
- Neumayer, E. 1999. *Weak versus strong sustainability: Exploring the limits of two opposing paradigms*. Cheltenham: Edward Elgar.
- Neumayer, E. 1999 *Weak versus strong sustainability: Exploring the limits of two opposing paradigms*. Cheltenham: Edward Elgar.
- Nussbaum, M. C. (1998) *Cultivating Humanity: A classical defense of reform in liberal education*. Oxford: Oxford University,
- Reeves, D. G. (2002) *Holistic Accountability*. Thousand Oaks, California: Corwin Press.
- The States News Service (2006) 'Corruption can block economic development', Washington: States News Service.
- Thompson, D. (1995) *The Concise Oxford Dictionary of Current English*, Oxford: Clarendon Press.
- Tolentino, A.L. (1995) Guidelines for policies and programs analysis for small and medium enterprise development. Research and Programmes Development Section, Entrepreneurship and Management Development Branch, Enterprise Development, ILO. Draft 5 May.
- UNESCO. (2002) World Summit on Sustainable Development. Paris: UNESCO.
- United Nations Conference on Environment and Development (UNCED). (1992) *Agenda 21*. Rio de Janeiro: UNCED.
- WCED. 1987 *Our Common Future*. Oxford: Oxford University.
- World Declaration on Education for All. 2000a) Paris: UNESCO.
- http://www.cafod.org.uk/policy_and_analysis/policy_papers/



Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Mago William Maila (2012). Broadening Sustainable Development in Praxis Through Accountability and Collaboration, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/broadening-sustainable-development-in-praxis-through-accountability-and-collaboration>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

An Approach to Sustainable Development by Applying Control Science

Kazutoshi Fujihira
Institute of Environmentology
Japan

1. Introduction

Nowadays, humankind is facing various environmental and social problems; for example, global warming, the destruction of ecosystems, an increase of areas where water supplies are insufficient, the tight supply-demand situation for oil and metals, poverty, economic crises and conflicts. It is our ultimate goal as humans to solve or prevent environmental and social problems and achieve “sustainable development” or “sustainability.”

In order to solve or prevent such problems and achieve sustainable development, “human beings must **control** their activities appropriately,” I wrote in my books titled *An Introduction to Environmentology* (Fujihira, 1999) and *A Short Introduction to Environmentology* (Fujihira, 2001). In 2001, when I published the second book, I conceived the idea of applying the science of “control” to this ultimate challenge of humankind. “Control” is generally defined as “purposive influence toward a predetermined goal” (Beniger, 1986). Moreover, control science can be applied to all goal-oriented tasks. In fact, control science is applied to a variety of fields such as engineering, economics, agriculture, and medicine; especially control engineering has a long history and has produced remarkable results. Accordingly, it is a rational and reliable approach to apply control science to the task of achieving sustainable development.

Quickly realizing this point, I started conducting research. After that, I obtained cooperation from experts, including a leading scientist in control engineering. The finished research has shown the basic control system for sustainable development and an educational methodology for sustainable development with case studies (Fujihira et al., 2008; Fujihira & Osuka, 2009). The results of the case studies have demonstrated the validity of that basic control system as well as that educational methodology.

Recently we have aimed to show a methodology of designing practical control systems for sustainable development. Here this study, as the first step, discusses a method for promoting smooth design of such control systems. Chapter 2 again shows the basic control system for sustainable development. Chapter 3 provides the two-step preparatory work for smooth control system design. In Chapter 4, we apply this method to homes and demonstrates a case study. Chapter 5 examines the results of this case study and shows the effectiveness of this method.

2. The basic control system for sustainable development

Fig. 1 shows the basic control system for sustainable development (Fujihira et al., 2008; Fujihira & Osuka, 2009). 'Controlled objects' are human activities which cause environmental or social problems; the units of human activities are various. 'Controlled variables' are the variables that relate to the human activities and need to be controlled for solving or preventing the problems. 'Disturbances' are harmful influences on controlled objects which are caused by environmental and social problems. Examples of the disturbances are damage caused by environmental pollution, flood or landslide damage resulting from unbridled land development, and various kinds of damage caused by global warming.

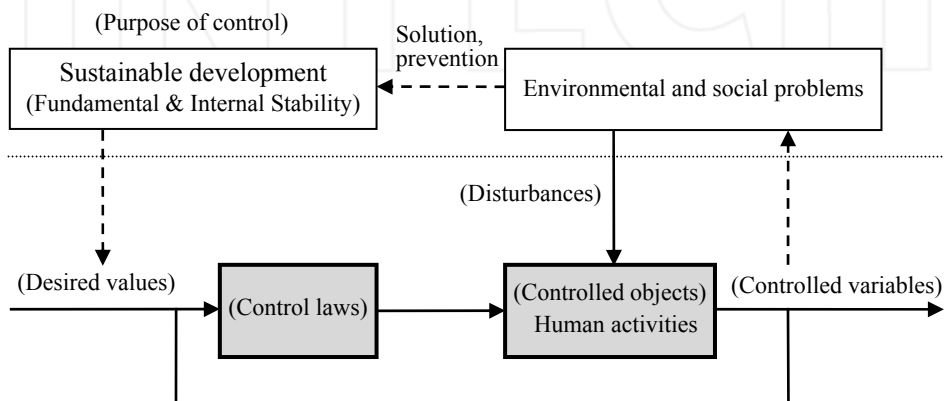


Fig. 1. The basic control system for sustainable development

Desired values are derived from the purpose of control, that is to say, sustainable development. The model of sustainable development (Fig. 2) demonstrates that sustainable development requires both 'Fundamental Stability' and 'Internal Stability,' in order to accomplish the long-term well-being of all humankind, or ultimate end, within the finite global environment and natural resources, or absolute limitations (Fujihira et al., 2008; Fujihira & Osuka, 2009). 'Fundamental Stability' means environmental stability and a stable supply of natural resources; the conditions for Fundamental Stability are environmental preservation and the sustainable use of natural resources. On the other hand, 'Internal Stability' means social and economic stability; the conditions for Internal Stability are health, safety, mutual help and self-realization, which are essential for well-being of humans. In addition, natural science, social science and human science, which are placed between Absolute Limitations, Fundamental Stability, Internal Stability and Ultimate End, are necessary to investigate the respective relationships.

The control objective is to adjust the controlled variables to their desired values. Furthermore, the control system requires designing and implementing 'control laws,' or measures for achieving the control objective.

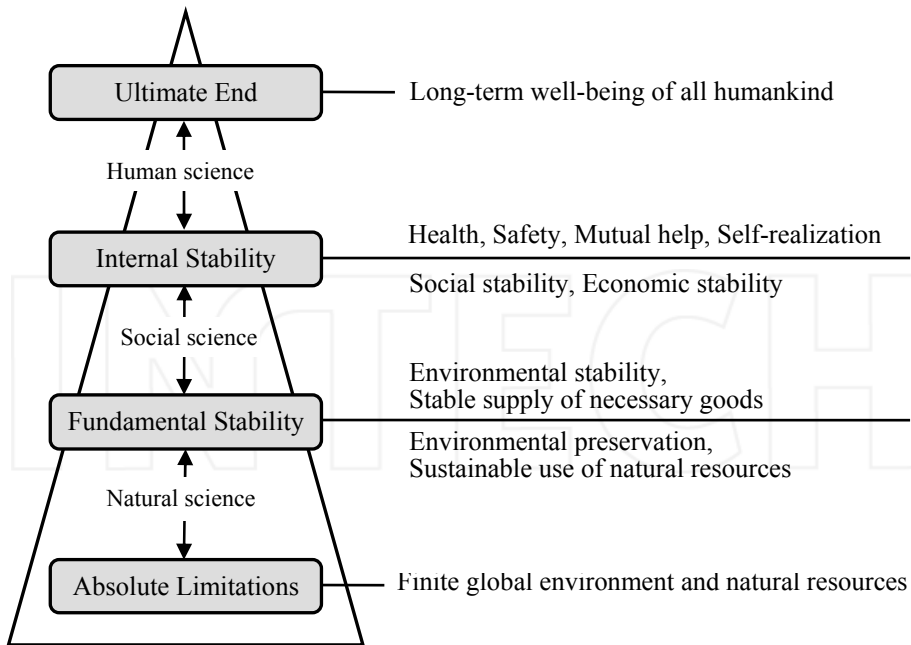


Fig. 2. The model of sustainable development

3. Two-step preparatory work for smooth control system design

There is a standard procedure that can be applied to the design of most control systems. Fig. 3 shows main steps in this procedure: 1) identifying a controlled object and control objective, 2) understanding the controlled object and control objective, 3) designing control laws, 4) implementing control laws. The first step “identifying a controlled object and control

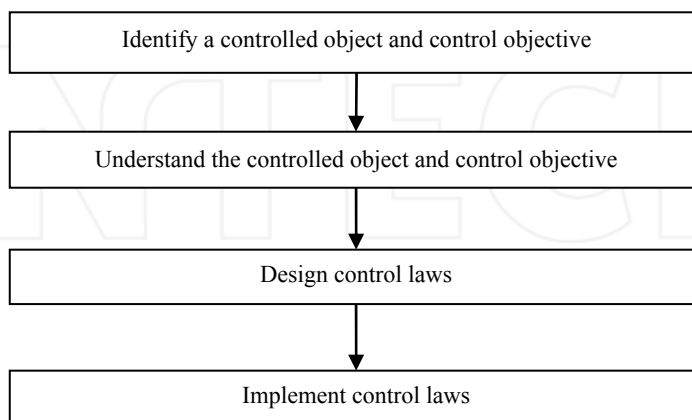


Fig. 3. Main steps in designing control systems

objective” requires designers of practical control systems for sustainable development to identify controlled variables and their desired values as well as a controlled object. Therefore, preparatory work for designing such control systems is primarily intended to identify these system components. This preparatory work consists of two steps: (1) determining the relationship between the standard human activities and sustainable development, (2) sustainability checkup on human activities as an object (Fujihira & Osuka, 2010, 2011).

3.1 Determining the relationship between the standard human activities and sustainable development

The first step aims to comprehensively determine the relationship between the standard human activities and sustainable development. The standard human activities means typical human activities among human activities which belong to one group and the same unit. Fig. 4 demonstrates the concept of this step.

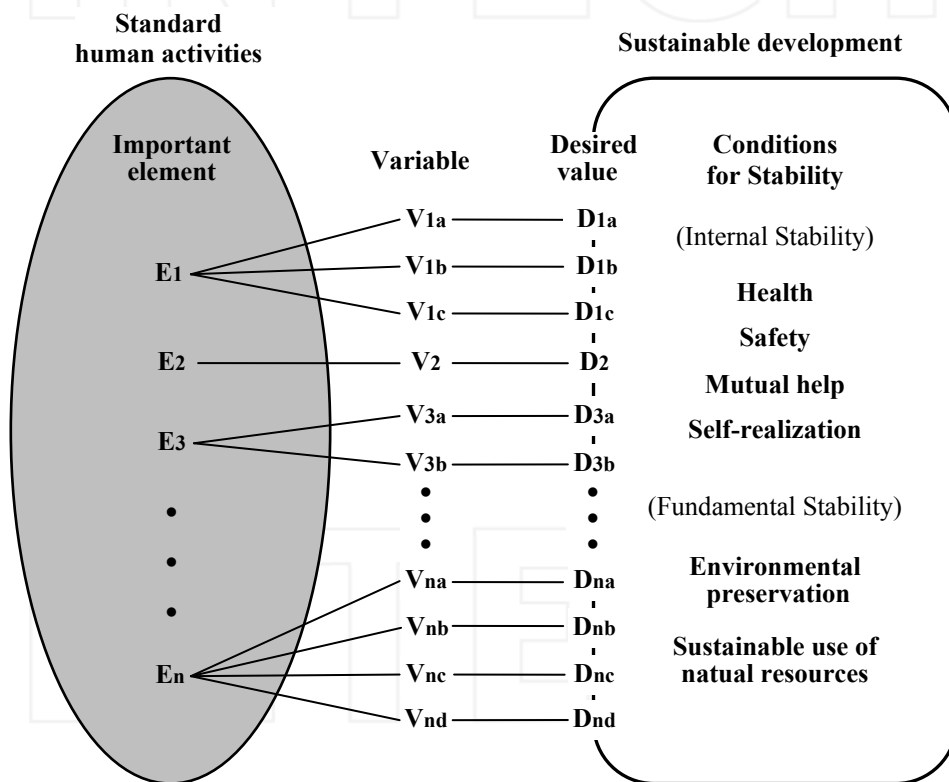


Fig. 4. The concept diagram of determining the relationship between the standard human activities and sustainable development

The first step starts with selecting important elements from the standard human activities. Human activities in one group and the same unit include almost the same elements.

Accordingly, system designers first select such common elements from the standard human activities. In this connection, if system designers find one or more factors which influence the selection, the selection work will be more efficient. In addition, the elements which are expected to closely relate to sustainable development should always be added to a set of important elements, regardless of whether such elements are common or not. For example, when the 'building' is chosen as a unit of human activities, "equipment for harnessing natural energy" should be selected as an important element, even if it is uncommon in present ordinary buildings.

After selecting important elements, system designers determine the relationship between such elements and sustainable development. This work consists of three processes: 1) considering the relationship between each element and the conditions for both Fundamental Stability and Internal Stability, such as health, safety and environmental preservation; 2) identifying variables which can indicate the degree of stability; 3) setting the desired values of the variables that can achieve stability. As shown in Fig. 4, the number of variables which connect to one element is not necessarily one, but can be many. In addition, both identifying variables and setting desired values need to be conducted on the basis of the latest scientific knowledge, technology and social conditions.

3.2 Sustainability checkup on human activities as an object

In the second step, system designers conduct a sustainability checkup on human activities as an object. To be concrete, they first measure or estimate the aforementioned variables of human activities as an object. Next, they compare the measured or estimated values with the desired values and assess the degree of stability.

After the assessment, the variables that are lower than the desired values need to be identified as "controlled variables." The variables that fall substantially below the desired values are especially required to be identified as "controlled variables." In addition, human activities as an object which include one or more controlled variables are naturally identified as a "controlled object."

In addition, this sustainability checkup is applied to both "new" and already "existing" human activities. *Oxford Dictionary of English* defines 'activity' as "a thing that a person or group does or has done" (Oxford Dictionaries, 2010). In this context, "new" human activities are equivalent to "things that people or groups do," and "existing" human activities correspond to "things that people or groups have done." When the object of a sustainability checkup is new human activities, system designers conduct it by examining the plan or blueprint for such activities. On the other hand, when the object is existing human activities, system designers conduct a checkup by inspecting the actual human activities. In the latter case, if system designers can obtain the plan or blueprint of such activities, it is desirable to examine it as well as the actual human activities. Furthermore, if both new and existing human activities are checked and controlled for sustainable development, the goal will be achieved more smoothly.

4. Case study

We have conducted a case study, selecting the home as a unit of human activities. In this case, the preparatory work consists of two steps: 1) determining the relationship between

the standard home and sustainable development, 2) sustainability checkup on a home as an object.

4.1 Determining the relationship between the standard home and sustainable development

In the first step, system designers need to select important elements of the standard home and determine the relationship between such elements and sustainable development.

4.1.1 Two factors on selecting elements of the standard home

In order to determine important elements of the standard home, we have analyzed two main factors in making our selection. They are “material” and “space,” as shown in Table 1 (Fujihira, 2011). The first factor “material” regards the home as an object which contains material elements such as framework, exterior, interior and piping. Moreover, when observing the details of such material elements, they can be broken down further into smaller material elements; for example, framework includes pillars and beams. On the other hand, the other factor “space” regards the home as an object which consists of spatial elements such as rooms and areas. If regarding the home as a mass of rooms, we can find more specific spatial elements; for instance, a living room, dining room, kitchen and bedroom.

In this case study, we have observed the standard home based on both of these factors. As a result, we have determined important elements, as shown in the central column of Table 2-1 and Table 2-2. “Material elements” are from ‘framework’ to ‘fence;’ “spatial elements” are from ‘rooms used at daytime’ to ‘garden area,’ which are demonstrated in the bottom of Table 2-2.

Factor	Material	Space
Examples of elements (details)	(a) Framework (pillar, beam, etc.) (b) Exterior (roof, outer wall, etc.) (c) Interior (floor, inner wall, ceiling, etc.) (d) Piping (water pipe, gas pipe, etc.)	(a) Room (living room, dining room, bedroom, kitchen, bathroom, etc.) (b) Area (garden area, exterior area, etc.)

Table 1. Two factors on selecting elements of the home

4.1.2 Relationship between the standard home and sustainable development

After selecting the elements of the standard home, we have determined the relationship between these elements and sustainable development. The left side of Table 2-1 and Table 2-2 shows the relationship between the elements and Fundamental Stability; the right side demonstrates the relationship between the elements and Internal Stability. Considering the relationship between each element and the stability conditions, we have identified variables which indicate the degree of stability. In addition, we have set the desired values of these variables that can achieve stability.

The rest of this section briefly describes the relationship between each element and sustainable development, in order from the top of Table 2-1.

[Material elements]

- **Framework**

Considering the relationship between “framework” and ‘sustainable use of natural resources,’ a condition for Fundamental Stability, we have identified ‘durability’ and ‘raw materials’ as variables. The desired values of ‘durability’ and ‘raw materials’ are the ‘deterioration resistance grades’ of the *Japan Housing Performance Indication Standards* (JHPIS) (Japanese Ministry of Land, Infrastructure and Transport, 2001), and the ‘assessment levels of resources saving’ of *CASBEE for Home*, or *Comprehensive Assessment System for Building Environmental Efficiency for Home (Detached House)* (Japan GreenBuild Council & Japan Sustainable Building Consortium, 2008), respectively.

On the other hand, considering the relationship with ‘safety,’ a condition of Internal Stability, we have selected ‘resistance to earthquakes’ and ‘wind resistance’ as variables, and the ‘seismic resistance grades’ and the ‘wind-resistant grades’ of the JHPIS as their desired values (Japanese Ministry of Land, Infrastructure and Transport, 2001). In Japan the strength of framework against earthquakes is regarded as extremely important since Japan is a major quake-prone country.

Furthermore, in areas of heavy snowfall, ‘resistance to snowfall’ needs to be included as a variable, although it is excluded from the table. In this way, variables and their desired values can be changed or varied with the surrounding environment.

- **Exterior**

As for “exterior,” which includes roofs and outer walls, we have selected ‘durability,’ ‘raw materials’ and ‘sunlight reflectivity’ as variables relating to Fundamental Stability. ‘Raw materials’ is excluded from the table, for reasons of space. The desired value of sunlight reflectivity has been set at ‘0.3 or over’ because good sunlight reflectivity prevents the exterior of homes from accumulating the heat of sun and leads to the mitigation of the heat island phenomenon. On the other hand, we have identified ‘fire resistance,’ ‘shape’ and ‘color’ as variables relating to Internal Stability. In order to restrain the spread of fire, the exterior needs to satisfy a high fire resistance grade. Meanwhile, the shape and color of the roof and walls are necessary to harmonize with the surrounding landscape.

- **Thermal insulation**

We have identified ‘thermal insulation performance’ and ‘raw materials’ as the variables of “thermal insulation.” ‘Raw materials,’ which relates to Fundamental Stability, is excluded from the table, for reasons of space. ‘Thermal insulation performance’ is especially significant since it relates to both Fundamental Stability and Internal Stability. An increase in thermal insulation performance leads to environmental preservation and sustainable use of natural resources through a decrease in energy usage for air conditioning and heating. Meanwhile, it also promotes the health of occupants through the stabilization of the indoor temperature. The desired value of thermal insulation performance has been set at the highest grade in the “Energy-Saving Action Grades” of JHPIS (Japanese Ministry of Land, Infrastructure and Transport, 2001). In addition, there are six area classifications for the thermal insulation standards for specific values in Japan, depending on the climate.

Relationship between the element and Fundamental Stability			Element	Relationship between the element and Internal Stability		
Stability condition	Desired value	Variable		Variable	Desired value	Stability condition
Sustainable use of resources	JHPIS Sec. 3-1: Grade 2 or over	Durability	Framework	Resistance to earthquakes	JHPIS Sec. 1-1: Grade 2 or over	Safety
Sustainable use of resources	CASBEE LR _H 2 1.1: Level 4 or over	Raw materials		Wind resistance	JHPIS Sec. 1-4: Grade 1 or over	Safety
Sustainable use of resources	JHPIS Sec. 3-1: Grade 2 or over	Durability	Exterior (roof, outer wall, etc.)	Fire resistance	JHPIS Sec. 2-6: Grade 3 or over	Safety
Enviro-preserve	0.3 or over	Sunlight reflectivity		Shape	Harmony with surrounding landscape	Health
			Color			
Enviro-preserve Sustainable use of resources	JHPIS Sec. 5-1: Grade 4	Thermal insulation performance	Thermal insulation	Thermal insulation performance	JHPIS Sec. 5-1: Grade 4	Health
Sustainable use of resources	JHPIS Sec. 3-1: Grade 1 or over	Durability	Windows & doors	Area of window openings	20% of the floor area or more	Health
Enviro-preserve Sustainable use of resources	Consideration for natural lighting	Position & Shape		Wind resistance	JIS Grade: S-2 or over	Safety
	Consideration for ventilation			Measures to prevent intrusions	CASBEE Q _H 1 2.6: Level 4 or over	Safety
Enviro-preserve Sustainable use of resources	JHPIS Sec. 5-1: Grade 4	Thermal insulation performance		Thermal insulation performance	JHPIS Sec. 5-1: Grade 4	Health
Enviro-preserve Sustainable use of resources	JIS Grade: A-3 or over	Airtightness		Sound insulation performance	JHPIS Sec. 8-4: Grade 2 or over	Health
Enviro-preserve Sustainable use of resources	CASBEE Q _H 1 1.1.2: Level 4 or over	Sunlight adjustment capability		Sunlight adjustment capability	CASBEE Q _H 1 1.1.2: Level 4 or over	Health
			Floor	Sound insulation performance	JHPIS Sec. 8-1&2: Grade 3 or over	Health
				Differences in level	No differences	Safety Health

[Note] (1) JHPIS is an abbreviation for the Japan Housing Performance Indication Standards. (2) CASBEE means Comprehensive Assessment System for Building Environmental Efficiency for Home (Detached house) – Technical Manual 2007 Edition. (3) JIS is an abbreviation for Japanese Industrial Standard.

Table 2-1. Relationship between the standard home and sustainable development

Relationship between the element and Fundamental Stability			Element	Relationship between the element and Internal Stability		
Stability condition	Desired value	Variable		Variable	Desired value	Stability condition
Sustainable use of resources	CASBEE LR _H 2 1.4: Level 4 or over	Raw materials	Interior	Formaldehyde emission	JHPIS Sec. 6-1: Grade 3	Health
Enviro-preserve	Insulated	Heat insulation	Bathtub			
Sustainable use of resources	JHPIS Sec. 4-1: Grade 3 or over	Consideration for maintenance	Piping			
Enviro-preserve	Header type	Type of piping	Hot-water piping			
Sustainable use of resources	Insulated	Heat insulation				
Enviro-preserve	90% or more	Primary energy efficiency	Water heater			
Sustainable use of resources	CASBEE LR _H 1 3.1: Level 4 or over	Water-saving functions	Water-using equipment			
Sustainable use of resources	10% or more of the total water usage	Rainwater usage	Equipment for rainwater use	Rainwater usage	10% or more of the total water usage	Health Safety (in crises)
Enviro-preserve	100% or more	Energy-saving achievement rate	Lighting fixtures & appliances			
Enviro-preserve	Energy usage of the whole home or more	Harnessed natural energy	Equipment for harnessing natural energy	Harnessed natural energy	Energy usage of the whole home or more	Health Safety (in crises)
Enviro-preserve	Indigenous species	Species	Garden plants	Fire resistance	High or mid fire resistance	Safety
Enviro-preserve	Hedge or Resources-saving materials	Material	Fence	Form	Not blocking sight line	Safety
					Not blocking communication	Mutual help
Enviro-preserve	Places receiving a lot of sunlight	Places in the home	Rooms used at daytime			
			Specified bedroom	Relation with toilet & bath	On the same floor	Health Safety
Enviro-preserve	Building close together	Places in the home	Rooms where water is used			
			Doorways	Differences in level	No differences	Safety
				Width	80cm or more	Health
Enviro-preserve	40% or more	Ratio to the exterior area	Garden area			

Table 2-2. Relationship between the standard home and sustainable development

- **Windows and doors**

We have identified a large number of items as the variables of “windows and doors,” for example, an area of window openings, sunlight adjustment capability, thermal insulation performance, and sound insulation performance. It is necessary to obtain sufficient brightness and appropriate sunlight through windows. On the other hand, windows need sufficient thermal insulation performance and sound insulation performance. In this way, windows need to meet a variety of conflicting requirements, which indicates that designing windows is extremely difficult. Furthermore, in order to meet such a variety of requirements, related elements, such as glass, eaves, awnings, blinds, shutters, and curtains, are often required to work together.

- **Floor**

“Floors” require two variables, that is, ‘sound insulation performance’ and ‘differences in level,’ both of which relates to Internal Stability. The floor of the rooms is necessary to satisfy sufficient sound insulation performance against the noise from the upper floor. The other variable ‘differences in level’ need to be removed from the floor, in order to allow elderly and handicapped people to move around safely and lead a normal life. Recently this variable has become more important in Japan due to a rapidly aging society.

- **Interior**

“Interior,” which includes a floor, wall and ceiling, requires ‘formaldehyde emission’ and ‘raw materials’ as its variables. Formaldehyde is a major harmful pollutant; therefore, the desired value of formaldehyde emission is set at the level which is harmless to the health of the occupants.

- **Bathtub**

We have attached importance to ‘heat insulation’ as a variable of the “bathtub” since insulated bathtubs can reduce heat loss of the hot water. This consideration results from a Japanese lifestyle, that is, taking a bath every day.

- **Piping**

“Piping,” including drainage pipes, water pipes and gas pipes, need ‘consideration for maintenance’ as an important variable toward a long service life. The ‘maintenance grades’ of the JHPIS, which has been identified as the desired value, requires consideration for making maintenance easier, such as not burying piping under concrete and creating openings for cleaning and inspection (Japanese Ministry of Land, Infrastructure and Transport, 2001).

- **Hot-water Piping**

We have identified ‘type of piping’ and ‘heat insulation’ as the variables of “hot-water piping,” both of which relates to Fundamental Stability. If ‘header type’ hot-water piping is used, normally the diameter of piping leading from the header to the faucets of sinks and baths can be reduced. As a result, wastage of hot water can be decreased, as compared with the front-end-branching type. Moreover, if hot-water piping is ‘insulated,’ heat loss is further reduced.

- **Water heater**

We have identified 'primary energy efficiency' as a key variable of the "water heater." The desired value of the primary energy efficiency has been set at '90% or more.' This level can be realized by utilizing high energy-efficient water heaters, including electric heat-pump water heaters.

- **Water-using equipment**

"Water-using equipment," including toilet bowls, faucets and shower heads, requires 'water-saving functions' as its key variable. The desired value, the water-saving assessment levels of CASBEE, can be satisfied if two or more water-saving efforts are adopted from the following four choices: water-saving type toilets, bathroom thermostat type water faucet plus water-saving shower head, dish washer, and other water-saving methods (Japan GreenBuild Council & Japan Sustainable Building Consortium, 2008).

- **Equipment for rainwater use**

If "equipment for rainwater use" is installed, it can reduce the quantity of water supply and contributes to sustainable use of natural resources. We have set the desired value of 'rainwater usage' at '10% or more of the total water usage.' Storing rainwater also contributes to health and safety in crises, by securing emergency water.

- **Lighting fixtures and home appliances**

Lighting fixtures and home appliances such as refrigerators and televisions need to be energy-saving devices. We have identified the variable of such appliances as the 'energy-saving standard achievement rate' and set their desired value at '100% or more.' Japan's energy-saving standard achievement rate for each appliance is open to the public in the manufacturers' catalogue and the latest "Energy Conservation Equipment Catalogue" of the Energy Conservation Center, Japan (Energy Conservation Center, Japan, n.d.).

- **Equipment for harnessing natural energy**

Concerning "equipment for harnessing natural energy" such as solar panels, we have identified 'harnessed natural energy' as a variable relating to Fundamental Stability, and 'energy usage of the whole home or more' as its desired value. This desired value means achieving self-sufficiency in energy. Equipment for harnessing natural energy also contributes to health and safety in crises, by generating emergency energy.

- **Garden plants**

We have determined 'species' and 'fire resistance' as the variables of "garden plants." If indigenous or local species of plants are selected, such selection contributes to preserving the region's ecological environment. On the other hand, highly fire-resistant plants are effective to prevent the spread of fire. In general, evergreen trees and plants with thick leaves which contain large amounts of water have high fire resistance.

- **Fence**

As for "fence," 'material' has been identified as a variable relating to Fundamental Stability, and ecological materials such as a hedge as its desired value. On the other hand, 'form' has been selected as a variable relating to Internal Stability and 'not blocking sight line' and 'not

blocking communication' as its desired values. These selections are based on the following ideas: good visibility brings 'safety' through preventing crimes and face-to-face communication leads to 'mutual help' in local community.

[Spatial elements]

- **Rooms used at daytime**

"Rooms used at daytime," which usually include a living room and dining room, should be preferentially planned in places receiving a lot of sunlight in the home. Such arrangement is effective to reduce the energy for lighting by utilizing sunlight efficiently. On the other hand, rooms used only at night-time such as bedrooms can be planned in places with little sunlight.

- **Specified bedroom**

A "specified bedroom" means a bedroom which is used or expected to be used by elderly or wheelchair users. Such a room and the bathroom area should be arranged on the same floor. This arrangement enables such occupants to use the toilet and bath easily.

- **Rooms where water is used**

"Rooms where water is used" includes a kitchen, bathroom, toilet, and washing room. If these rooms are built close together, the total length of water piping and drainage piping can be reduced. Moreover, this consideration helps reduce heat loss from hot-water piping.

- **Doorways**

A "doorway" is a space where a door opens and closes. 'No differences in level' in doorways allow elderly and wheelchair users to pass through them smoothly. On the other hand, '80cm or more,' the desired value of the 'width' of a doorway, is suitable for movement of a wheelchair.

- **Garden area**

The "garden area" is an area with plants such as trees, shrubs, herbs, grasses, and vegetables. A larger garden area is favourable for environmental preservation, including mitigation of heat island phenomenon, and a higher level of biodiversity. We determined its variable as the 'ratio of the garden area to the exterior area,' and set its desired value at '40% or more.' In addition, the garden area includes any planted area not only on the ground but also on the roof.

4.2 Sustainability checkup on a home as an object

In the second step, system designers measure or estimate the variables of a home as an object and assess them by comparing with the desired values. Table 3-1 and Table 3-2 demonstrate an example of sustainability checkup on a home as an object; Fig. 5 shows the external appearance of the home on which the checkup was done. In this case, the checkup results have been assessed in three grades: A, B and C. "A" means that the variable reaches the desired value. "B" signifies that the variable falls below the desired value. "C" means that the variable falls substantially below the desired value.

Here I view the checkup results, choosing several elements from Table 3-1 and Table 3-2. As for “framework,” two of the four variables, ‘durability’ and ‘resistance to earthquakes’ have been assessed at B because they are lower than the desired values. The ‘performance’ of the “thermal insulation” has been assessed at C since it falls substantially below the desired value. The “water heaters” used in this home are old-typed gas heaters and their ‘primary energy efficiency’ is much lower than the desired value; therefore, it has been assessed at C. The “natural energy” harnessed by “equipment for harnessing natural energy” has been assessed at C because such equipment is not installed. The two variables of “fence,” ‘material’ and ‘form,’ have been assessed at A, for hedge and resources-saving materials are utilized and the form does not block both sight line and communication. The variable of the “specified bedroom” has been assessed at A because both the specified bedroom and bathroom area are placed on the same ground floor. The variable of the “rooms where water is used” has been assessed at A since the kitchen, toilet, bath and the place for a washing machine are close together.

In the above example, the object of sustainability checkup has been an existing home. When checkup is done on existing homes, it is desirable to examine both the actual home and its design drawings. On the other hand, this checkup method can be applied to homes which are planned or designed for the future. In the latter cases, planners and designers estimate the values of variables, by examining the scheme drawings or design drawings.

After the sustainability checkup, the variables that have been assessed at B or C need to be identified as “controlled variables.” The variables assessed at C are especially required to be identified as “controlled variables.” In addition, this home has naturally been identified as a “controlled object” because it includes controlled variables. Moreover, such a sustainability checkup table enables system designers to find at a glance the following: the elements which should be controlled, controlled variables and their desired values. Therefore, it enables them to understand both what should be controlled and the courses of control.



Fig. 5. The external appearance of the home on which a sustainability checkup was done

Relationship between the element and Fundamental Stability				Element	Relationship between the element and Internal Stability			
Desired value	Ass- ess.	Measured or estima- ted value	Variable		Variable	Measured or estima- ted value	Ass- ess.	Desired value
JHPIS Sec. 3-1: Grade 2 or over	B	40 years	Durability	Frame- work	Resistance to earthquakes	JHPIS Sec. 1-1: Grade 1	B	JHPIS Sec. 1-1: Grade 2 or over
CASBEE LR _H 2 1.1: Level 4 or over	A	Domestic wood	Raw materials		Wind resistance	JHPIS Sec. 1-4: Grade 1	A	JHPIS Sec. 1-4: Grade 1 or over
JHPIS Sec. 3-1: Grade 2 or over	B	30 years	Durability	Exterior (roof, outer wall, etc.)	Fire resistance	JHPIS Sec. 2-6: Grade 3	A	JHPIS Sec. 2-6: Grade 3 or over
0.3 or over	A	0.55	Sunlight reflectivity		Shape Color	Harmony with landscape	A	Harmony with landscape
JHPIS Sec. 5-1: Grade 4	C	JHPIS Sec. 5-1: Grade 1	Thermal insulation performance	Thermal insulation	Thermal insulation performance	JHPIS Sec. 5-1: Grade 1	C	JHPIS Sec. 5-1: Grade 4
JHPIS Sec. 3-1: Grade 1 or over	B	30 years	Durability	Windows & doors	Area of window openings	18% of the floor area	B	20% of the floor area or more
Consideration for natural lighting	A	Adequate conside- ration	Position & Shape		Wind resistance	JIS Grade: S-2	A	JIS Grade: S-2 or over
Consideration for ventilation	A	Adequate conside- ration			Measures to prevent intrusions	CASBEE Q _H 1 2.6: Level 3	B	CASBEE Q _H 1 2.6: Level 4 or over
JHPIS Sec. 5-1: Grade 4	C	JHPIS Sec. 5-1: Grade 2	Thermal insulation performance		Thermal insulation performance	JHPIS Sec. 5-1: Grade 2	C	JHPIS Sec. 5-1: Grade 4
JIS Grade: A-3 or over	A	JIS Grade: A-3	Airtightness		Sound insulation performance	JHPIS Sec. 8-4: Grade 1	B	JHPIS Sec. 8-4: Grade 2 or over
CASBEE Q _H 1 1.1.2: Level 4 or over	B	CASBEE Q _H 1 1.1.2: Level 3	Sunlight adjustment capability	Floor	Sunlight adjustment capability	CASBEE Q _H 1 1.1.2: Level 3	B	CASBEE Q _H 1 1.1.2: Level 4 or over
					Sound insulation performance	JHPIS Sec. 8-1&2: Grade 1	C	JHPIS Sec. 8- 1&2: Grade 3 or over
					Differences in level	No dif- ferences	A	No differences

[Note] (1) JHPIS is an abbreviation for the Japan Housing Performance Indication Standards. (2) CASBEE means Comprehensive Assessment System for Building Environmental Efficiency for Home (Detached house) – Technical Manual 2007 Edition. (3) JIS is an abbreviation for Japanese Industrial Standard.

Table 3-1. An example of sustainability checkup on a home as an object

Relationship between the element and Fundamental Stability				Element	Relationship between the element and Internal Stability			
Desired value	Ass- ess.	Measured or estimated value	Variable		Variable	Measured or estimated value	Ass- ess.	Desired value
CASBEE LR _H 2 1.4: Level 4 or over	A	CASBEE LR _H 2 1.4: Level 4	Raw materials	Interior	Formalde- hyde emission	JHPIS Sec. 6-1: Grade 3	A	JHPIS Sec. 6- 1: Grade 3
Insulated	C	Not insulated	Heat insulation	Bathtub				
JHPIS Sec. 4-1: Grade 3 or over	B	JHPIS Sec. 4- 1: Grade 2	Consideration for maintain	Piping				
Header type	C	Front-end- branching	Type of piping	Hot-water piping				
Insulated	C	Not insulated	Heat insulation					
90% or more	C	50%	Primary energy efficiency	Water heater				
CASBEE LR _H 1 3.1: Level 4 or over	C	CASBEE LR _H 1 3.1: Level 2	Water-saving functions	Water- using equipment				
10% or more of the total water usage	C	0 (Zero)	Rainwater usage	Equipment for rain- water use	Rainwater usage	0 (Zero)	C	10% or more of the total water usage
100% or more	C	60 – 85%	Energy- saving achi- evement rate	Lighting fixtures & appliances				
Energy usage of the whole home or more	C	0 (Zero)	Harnessed natural energy	Equipment for natural energy	Harnesse d natural energy	0 (Zero)	C	Energy usage of the whole home or more
Indigenous species	A	Indigenous species	Species	Garden plants	Fire resistance	High & mid fire resistance	A	High or mid fire resistance
Hedge or Resources- saving materials	A	Hedge & Resources- saving materials	Material	Fence	Form	Not blocking sight line Not blocking com- munication	A A	Not blocking sight line Not blocking com- munication
Places recei- ving a lot of sunlight	A	Receiving a lot of sunlight	Places in the home	Rooms used at daytime				
				Specified bedroom	Relation with toilet & bath	On the same floor	A	On the same floor
Building close together	A	Building close together	Places in the home	Rooms where water is used				
				Doorways	Difference in level Width	No differences 72cm	A B	No differences 80cm or over
40% or more	A	45%	Ratio to the exterior area	Garden area				

Table 3-2. An example of sustainability checkup on a home as an object

5. Discussion

This study has shown a method for smooth design of practical control systems for sustainable development with a case study. In Chapter 3, we have provided the method, that is, the two-step preparatory work for designing such control systems: (1) determining the relationship between the standard human activities and sustainable development, (2) sustainability checkup on human activities as an object. Chapter 4 has demonstrated a case study, applying this method to homes. This chapter discusses the results of the case study from three viewpoints: (1) the effects of the method on control system design, (2) the value of the case study itself, (3) future work.

5.1 The effects of the method on control system design

The results of the case study have shown that the two-step preparatory work facilitates control system design in three ways, as shown in Fig. 6 (Fujihira & Osuka, 2011; Fujihira, 2011). First, as I intended at the beginning, this method can identify a controlled object, controlled variables, and their desired values. Therefore, it enables system designers to ‘identify a controlled object and control objective.’

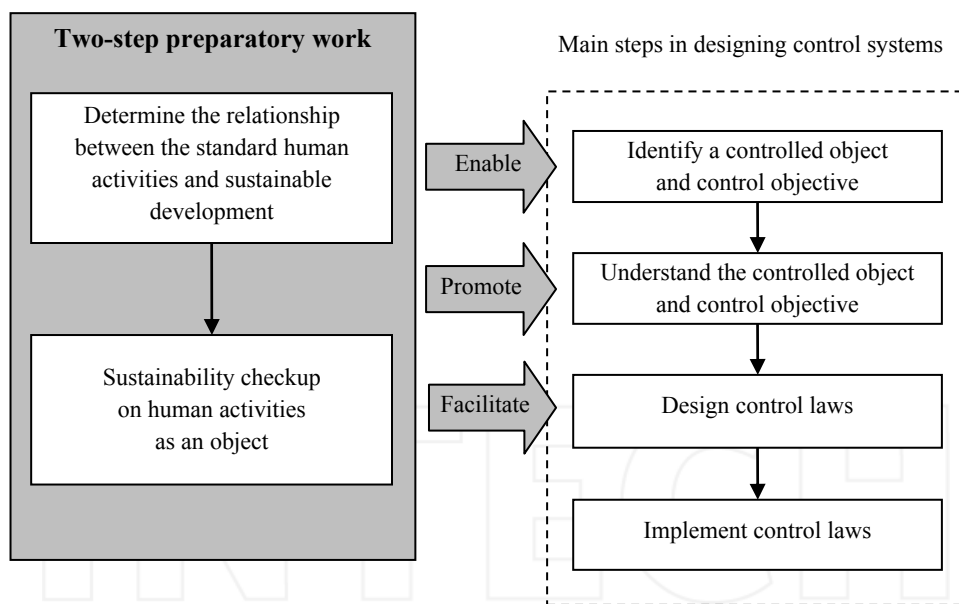


Fig. 6. The effects of the two-step preparatory work on control system design

In addition, this method also promotes ‘understanding the controlled object and control objective.’ Through sustainability checkup, system designers can comprehensively understand the relationship between important elements of an object and sustainable development. As a result, they can obtain overall and balanced understanding about the controlled object and control objective.

Moreover, this method also facilitates ‘designing control laws.’ Sustainability checkup enables system designers to understand both what should be controlled and the courses of control so that they can easily design control laws.

5.2 The value of the case study itself

This section examines the value of the case study itself, by comparing it with existing assessment systems for sustainable homes which are used in Japan and the world.

In Japan, the *Japan Housing Performance Indication Standards (JHPIS)* and *Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) for Home (Detached House)*, both of which I mentioned in Chapter 4, are used as public performance assessment systems for homes. Japanese Ministry of Land, Infrastructure and Transport provided JHPIS in 2001, aiming to improve housing conditions and sustainability of the built-environment (Building Center of Japan, 2009). JHPIS assesses and indicates housing performance from a variety of angles: structural stability, fire safety, mitigation of degradation, measures for maintenance, thermal environment, indoor air environment, luminous and visual environment, acoustic environment, consideration for the aged and others, security against intrusion (Japanese Ministry of Land, Infrastructure and Transport, 2001). Meanwhile, CASBEE was developed by a committee set up in the Institute for Building Environment and Energy Conservation under the initiative of Japanese Ministry of Land, Infrastructure and Transport. *CASBEE for Home*, one of CASBEE tools, assesses the environmental performance of detached houses from two viewpoints: ‘environmental quality (Q)’ and ‘environmental load (L).’ Each of Q and L has three assessment categories: comfortable, healthy and safe indoor environment (Q1), ensuring a long service life (Q2), creating a richer townscape and ecosystem (Q3), conserving energy and water (L1), using resources sparingly and reducing waste (L2), consideration of the global, local and surrounding environment (L3) (Japan GreenBuild Council & Japan Sustainable Building Consortium, 2008).

Other countries of the world are also promoting such assessment systems, including *EcoHomes* of BREEAM in the United Kingdom, *LEED for Homes* in the United States, and *Green Star* in Australia. BREEAM, or Building Research Establishment Environmental Assessment Method, is one of the most comprehensive and widely recognized measures of a building’s environmental performance (BREEAM, 2010a). *EcoHomes*, a version of BREEAM for homes, assesses the performance of homes in the following areas: energy, transport, pollution, materials, water, land use and ecology, health and well-being, management (BREEAM, 2010b). LEED, or Leadership in Energy and Environmental Design, is an internationally recognized green building certification system (U.S. Green Building Council, 2011). *LEED for Homes*, a home version of LEED, measures the overall performance of a home in eight categories: innovation and design process, location and linkages, sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, awareness and education (U.S. Green Building Council, 2008). *Green Star*, which was developed by the Green Building Council of Australia, is a comprehensive, national, voluntary environmental rating system for buildings. Green Star tools, which include Multi Unit Residential, assess nine categories: management, indoor environmental quality, energy, transport, water, materials, land use and ecology, emissions, innovation (Green Building Council of Australia, 2011).

The above public assessment systems contain a variety of essential information; therefore, we referred to them when conducting this case study. On the other hand, as compared with these existing assessment systems, generally, the method in this case study has the following advantages (Fujihira, 2011).

1. Simplicity and clarity

Table 2 is easy to understand because it simply and clearly shows the relationship between the standard home and sustainable development.

2. Systematic

Table 2 systematically demonstrates the relationship between the material and spatial elements of the standard home and both the natural environment and humans' well-being. Accordingly, it provides balanced and comprehensive understanding of such relationship.

3. Ease of use

All of the elements shown in Table 3 are equivalent to real parts of homes. Therefore, when conducting a checkup on a home by using a checkup sheet like Table 3, designers simply check the home's parts which correspond to the elements. As a result, they can easily assess the variables of the elements.

4. Ease of finding measures for improvement

The results of a sustainability checkup like Table 3 show the elements which should be controlled, controlled variables, and their desired values, all at the same time. Therefore, such checkups enable designers to understand both what should be improved and the courses of improvement and help to find measures for improvement.

The above advantages show that the case study itself has sufficient practical use. Moreover, these advantages indicate the superiority of the method, or the two-step preparatory work for smooth control system design.

5.3 Future work

Our future work includes the following three tasks: (1) further research on sustainable homes, (2) direct support methods for designing control laws, (3) further case studies.

1. Further research on sustainable homes

Table 2 has successfully demonstrated the essence of sustainable homes, by determining the relationship between important elements of the standard home and sustainability conditions. However, this table probably has a room for improvement. We need to continue making efforts to improve this table through further research on sustainable homes.

In addition, it is also necessary to update this table, as occasion arises. The elements, variables, and their desired values which are shown in Table 2 can be changed or varied, in response to developments in related sciences, innovations in related technologies, and changes in social conditions. Therefore, we need to update this table, responding to such developments, innovations and changes.

2. Direct support methods for designing control laws

The two-step preparatory work enables system designers to identify and understand a controlled object and control objective as well as helps design control laws. However, our final goal is to establish a methodology of designing control systems for sustainable development. For this purpose, it is also necessary to show methods for supporting the design of control laws more directly.

3. Further case studies

In this study, we have conducted a case study, selecting the home as a unit of human activities. In order to increase reliability of this method, it is necessary to conduct further case studies. In the future case studies, we should select other units of human activities; for example, the city or town.

6. Conclusion

This study has shown the two-step preparatory work for smooth control system design for sustainable development with a case study. Chapter 3 has provided the two-step method: (1) determining the relationship between the standard human activities and sustainable development, (2) sustainability checkup on human activities as an object. Chapter 4 has applied this method to homes and demonstrated a case study. First, after selecting important elements of the standard home on the basis of the two factors, material and space, we have determined the relationship between such elements and sustainable development. Next, as the second step, we have conducted a sustainability checkup on a home as an object. The results of the case study have demonstrated the effectiveness of this method, for it enables system designers to identify and understand a controlled object and control objective as well as helps them design control laws. Furthermore, the usefulness of the case study itself has also indicated the effectiveness of this method. Our future work includes further research on sustainable homes, showing direct support methods for designing control laws, and further case studies.

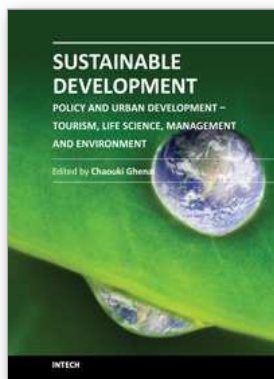
7. Acknowledgement

I would like to thank Mr. Vance Carothers for his valuable advice and suggestions on the English expression of this paper.

8. References

- Beniger, J.R. (1986). *The Control Revolution - Technological and Economic Origins of the Information Society*, Harvard University Press, ISBN 0-674-16986-7, Cambridge, Massachusetts, USA
- BREEAM (2010a). What is BREEAM?, In: *BREEAM*, 03.10.2011, Available from: <http://www.breeam.org/page.jsp?id=66>
- BREEAM (2010b). EcoHomes, In: *BREEAM*, 03.10.2011, Available from: <http://www.breeam.org/page.jsp?id=21>
- Building Center of Japan (2009). Publication in English, In: *The Building Center of Japan*, 03.10.2011, Available from: <http://www.bcj.or.jp/en/services/publication.html>

- Energy Conservation Center, Japan (n.d.). Information on Energy-Saving Products (in Japanese), In: *Energy Conservation Center, Japan*, 03.10.2011, Available from: <http://www.seihinjyoho.jp/index.php>
- Fujihira, K. (1999). *An Introduction to Environmentology*, Nihon-Keizai-syuppansha, ISBN 4-532-14743-3, Tokyo, Japan (in Japanese)
- Fujihira, K. (2001). *A Short Introduction to Environmentology*, Kamogawa-syuppan, ISBN 4-87699-626-1, Kyoto, Japan (in Japanese)
- Fujihira, K. (2011). An Approach to Sustainable Homes by Applying Control Science, *Advanced Materials Research*, ISSN 1022-6680, online available since 2011/Nov/29, DOI: 10.4028/www.scientific.net/AMR.403-408.2087, Trans Tech Publications, Switzerland
- Fujihira, K. & Osuka, K. (2009). An Educational Methodology for Sustainable Development, *ICCAS-SICE 2009 Final Program and Papers*, ISBN 978-4-907764-33-3, Fukuoka, Japan, August 18-21, 2009
- Fujihira, K. & Osuka, K. (2010). How do we synthesize control systems for sustainability?, *Proceedings of Society of Environmental Science Annual Convention 2010*, p. 56, Tokyo, Japan, September 16-17, 2010 (in Japanese)
- Fujihira, K. & Osuka, K. (2011). An Approach to Designing Control Systems for Sustainable Development, *Proceedings of SICE Annual Conference 2011*, ISBN 978-4-907764-38-8, Tokyo, Japan, September 13-18, 2011
- Fujihira, K.; Osuka, K.; Yoshioka, T. & Hayashi, N. (2008). An Educational Methodology for Sustainable Development Applying Control Theory and Confirming its Validity, *Environmental Education*, Vol. 18-1, pp. 17-28, 2008 (in Japanese)
- Green Building Council of Australia (2011). What is Green Star?, In: *GBCA*, 03.10.2011, Available from: <http://www.gbca.org.au/green-star/green-star-overview/>
- Japanese Ministry of Land, Infrastructure and Transport (2001). *Japan Housing Performance Indication Standards*, Japanese Ministry of Land, Infrastructure and Transport (in Japanese)
- Japan GreenBuild Council & Japan Sustainable Building Consortium (2008). *Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) for Home (Detached House)– Technical Manual 2007 Edition*, Institute for Building Environment and Energy Conservation, Tokyo, Japan
- Oxford Dictionaries (2010). *Oxford Dictionary of English Third edition*, Oxford University Press, ISBN 978-0-19-957112-3
- U.S. Green Building Council (2008). LEED for Homes Rating System, In: *USGBC*, 03.10.2011, Available from: <http://www.usgbc.org/ShowFile.aspx?DocumentID=3638>
- U.S. Green Building Council (2011). What LEED Is, In: *USGBC*, 03.10.2011, Available from: <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988>



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Kazutoshi Fujihira (2012). An Approach to Sustainable Development by Applying Control Science, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from:

<http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/an-approach-to-sustainable-development-by-applying-control-science>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Embedding Sustainable Development in Organizations Through an Integrated Management Systems Approach

Miguel Rocha¹ and Cory Searcy²

¹ITESM Campus Querétaro

²Ryerson University

¹México

²Canada

1. Introduction

The concept of sustainable development (SD) was popularized by the publication of the World Commission on Environment and Development's (WCED) report *Our Common Future* in 1987 (WCED, 1987). There has been considerable debate regarding the meaning of SD since the publication of *Our Common Future*. However, the definition provided in that report remains the most widely-cited definition: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Building on that definition, there have been many efforts to elucidate the key components of SD. The WCED suggested that SD involved the simultaneous pursuit of economic, environmental, and social goals. These three areas are commonly referred to as the "three pillars" of sustainable development. Gladwin et al. (1995) proposed five principal components of SD: inclusiveness, connectivity, equity, prudence, and security. Additional conceptions on the key principles of SD are widely available in the literature (see, for example, Dresner, 2002).

Although early efforts focused on applying SD to the national and regional levels, it is increasingly being applied at the organizational level (Shrivastava, 1995). Several theoretical frameworks have been used to explore why organizations commit to SD. For example, Bansal (2005) demonstrated that both resource-based (Barney, 1991) and institutional (DiMaggio and Powell, 1983) factors influence SD at the corporate level. Perhaps the most widely-used theoretical framework for explaining organizational SD is stakeholder theory (Freeman, 1984). Stakeholder theory recognizes that organizations have obligations to many individuals and groups, including (but not limited to) shareholders, customers, employees, and the wider community. Building on these theories, several authors have sought to clarify why organizations would operate in environmentally- (Bansal and Roth, 2000) or socially-friendly (Campbell, 2007) ways. These motivations have provided a basis for research on the business case for SD (Salzmann et al. 2005).

Recently, research on organizational SD has begun to shift from why SD should be implemented at the organizational level to how this can be accomplished. In this light, there is a growing stream of research on standardized management systems for SD. The literature

highlights that one possibility is developing a stand-alone standard for SD. Singh et al. (2007) provide an example of how this may be accomplished. The literature also highlights the possibility of integrating the principles of SD with existing management system standards (MSS), such as ISO 9001, ISO 14001, and OHSAS 18001, among others. This research builds on wider research on integrated management systems (IMS). Examples are provided by Rocha et al. (2007) and Oskarsson and Malmberg (2005), among others. However, while much research has been conducted on how SD can be implemented at the organizational level, work remains.

This paper contributes to these efforts. The paper argues that an IMS-based approach can be used to embed SD in organizations. The focus on IMS is in recognition of the point that existing MSSs, such as ISO 9001 and ISO 14001, may provide needed leverage points for integrating SD with mainstream organizational issues. It also recognizes that SD should not be seen as a stand-alone initiative, which may be encouraged through the development of a separate MSS focused on SD. An IMS approach provides opportunities to explicitly link SD with existing organizational goals, policies, programs, processes, procedures, and resources. However, research on the application of an IMS-approach to organizational SD is still in its relatively early stages. While several IMS models have been proposed in the literature, they have not been systematically evaluated with respect to their potential to embed SD in organizations.

2. Literature survey

The concept of IMS initially emerged about 15 years ago. Early efforts focused on the integration of ISO 9001 and ISO 14001, though other MSS are increasingly being taken into account in the IMS literature. An increasing body of knowledge is available in the specialized literature containing information about the potential benefits and limitations of IMS; IMS models; and empirical results of implementing IMS in specific organizations (see, for example, Wilkinson and Dale, 2001; Karapetrovic and Willborn, 2002; Scipioni et al., 2001; Rocha et al., 2007; Asif et al., 2009). Further details on the concept of integration, models, methodologies, potential benefits, and lessons learned are provided below.

2.1 The concept of integration

There are many different definitions of IMS in the literature. These differences reflect different approaches and strategies for integration. The differences start with the concept of “integration” and the possible equivalent use of the terms “alignment” and “merge”. For instance, integration was defined as the “degree of alignment or harmony in an organization - whether different departments and levels speak the same language and are tuned to the same wavelength” (Garvin, 1991). Alignment has been at the center of the ISO approach in developing updated versions of ISO 9001 and ISO 14001. It has been noted that this has in turn created additional opportunities for an aligned Environmental + Quality MS (Scipioni et al. 2001). Integration through the merging of two standards into one has been explored in the integrated auditing guidelines provided in ISO 19011:2002. However, recent efforts on industry specific standards, such as ISO/TS 16949 for the auto industry or ISO 22000 for food safety, indicate a further proliferation of individual standards rather than a move towards a consolidated set of standards. In recognition of this trend, a comprehensive approach for integration has been developed around the concept of systems theory. In their

seminal work on IMS, Karapetrovic and Willborn (1998) defined integration as “linking two systems in a way that results in a loss of independence of one or both means that these systems are integrated” (Karapetrovic and Willborn, 1998). In a similar manner, Bernardo et al. (2008) explained that integration is “a process of linking different standardized MSs into a unique MS with common resources aiming to improve stakeholders’ satisfaction”. Thus, recent research has generally focused on the integration of management systems, rather than management standards. This is a key distinction.

According to Jonker and Karapetrovic (2004) two elements are required to integrate MSs: (1) a model describing the MS elements and their relevant interactions and (2) a roadmap or methodology showing the process for implementing the model. Although this may seem obvious, relatively few papers actually describe a model for integration of MSs (Karapetrovic and Willborn, 1998; Scipioni et al. 2001; Wilkinson and Dale, 2001; Rocha et al. 2007; Asif et al. 2009; Lopez-Fresno, 2010) and fewer still elaborate proposals for the second requirement (Lopez-Fresno, 2010; Asif et al. 2009; Rocha and Karapetrovic, 2006). These issues are briefly explored in further detail below.

2.2 IMS models

One stream of research on IMS focuses on the development of IMS models. The underlying emphasis on IMS models is generally on achieving integration that goes beyond the development and use of a unique MS manual and supporting documentation system towards the integration of selected functional requirements into the organization structure. To accomplish this, IMS models generally focus on identifying and building on the key management systems elements that are common to all of an organization’s initiatives. These elements vary by model. For example, Karapetrovic and Willborn (1998) focused on a systems approach organized around three key elements: goals, processes, and resources. Wilkinson and Dale (2001) proposed a total quality management approach structured around seven key elements: policy, leadership, resources, processes, culture, goals, and stakeholders. Rocha et al. (2007) proposed a model organized around the following elements: stakeholders, resources, leadership, processes, values, objectives, and results. Additional examples are available in the literature. In any case, all models must be able to accommodate the inclusion of current and new MSS, harmonize differing requirements of MSS, and support IMS implementation and improvement.

IMS models are usually designed with a specific scope in mind. The most common starting point for an IMS is using an ISO 9001-compliant QMS that is already in place. This is sensible since more than 1,200,000 organizations worldwide have implemented a QMS based on this standard. According to empirical research done in different countries, EMS and OHSMS have been selected as the preferred MSs to be integrated with QMS (Harjeev et al., 2010; Griffith and Bhutto, 2009; Zutshi and Sohal, 2005; Beckmerhagen et al. 2003; Lopez-Fresno, 2010). There is increasing interest in including social-focused MSSs into the integration mix. ISO 26000, AA1000 and SA8000 have been mentioned as potential candidates for companies willing to tackle the needs of their community (Rocha et al. 2007).

2.3 IMS methodologies

Another stream of research focuses on the development of IMS methodologies. As Karapetrovic (2003) notes, a generic methodology would address (as a minimum) model

selection, standard(s) selection, IMS implementation, and IMS audits. Rocha and Karapetrovic (2006) have further noted that having a methodology may increase the attractiveness of integration to companies but more detail is required to address “how to” questions such as: flexibility to cover different starting points (MSs already in place), differences on organizations final scope (QMS/EMS/OHSMS + others), links to overall business strategy, and culture change required for assimilating new roles, among others. As noted above, relatively few papers explicitly address these issues. For example, published methodologies include a PDCA-based implementation process developed by Scipioni et al. (2001); a flexible three-phased IMS implementation process (Rocha and Karapetrovic, 2006); and an implementation process for the PEDIMS model designed by Asif et al. (2009). In any case, all methodologies must be able to illustrate how to put a function-specific MS together while allowing for differing initial organizational conditions and objectives. However, none of the published methodologies have been implemented; thus, they remain unproven. Empirical evidence from experiences of Spanish and Australian companies indicated that IMS implementation requires top management commitment through an appointed integration champion, training to reduce anticipated problems, and the deployment of essential resources (Zutshi and Sohal, 2005). Furthermore, a cellular-like implementation pilot project helps to reduce uncertainty and increase efficiency, while risk assessment enables a reduction of potential problems (Lopez-Fresno, 2010)

2.4 Potential benefits of integrating MSs

Initially, the literature tended to emphasize operational efficiency and effectiveness as the main factors in the promotion of IMS. Over the last several years, additional benefits have been discussed in theoretical and empirical papers. Table 1 shows a summary of the potential benefits of integrating quality, environmental, occupational health and safety management systems, and other management systems. As Table 1 illustrates, the benefits of IMS have been organized in this paper around the three pillars of SD: economic, social, and environmental benefits. A fourth category, operational benefits, was added to include those benefits that serve as enablers for improved performance in those three dimensions.

Economic Benefits	Social Benefits	Environmental Benefits	Operational Benefits
• Reduction in duplication of policies, procedures and work instructions • Time savings • Reduced operational costs	• Increased transparency • Enhanced internal communication • Facilitation of cultural change in the organization • Potential image benefits	• Increased prominence of environmental issues in organizational management • Increased emphasis on compliance with applicable regulatory requirements	• Increased synergy between MSS • Reduced audit fatigue • Explicitly shows how the MSS relates to the rest of the business • Clarification of responsibilities • Improved information flow

Adapted from Zutshi and Sohal (2005); Lopez-Fresno (2010); Harjeev et al. (2010); Griffith and Bhutto (2009)

Table 1. Illustrative Summary of Key Benefits of an IMS Approach

2.5 Lessons learned for integrating MSs

It is important to acknowledge that an IMS approach is not a cure for all problems facing an organization. When integrating MSs organizations may face new obstacles that go beyond their previous experiences with isolated MSs. For example, employees may see an increase in workload and responsibilities. Some of the other key barriers to implementing an IMS include the different nature of individual systems, employee resistance, lack of resources, post implementation difficulties, and organizational culture aspects (Asif et al. 2008, Zutshi and Sohal, 2005, Griffith and Bhutto, 2009).

3. Evaluation of IMS models with respect to sustainable development

The notion of applying an IMS approach to organizational SD has been recognized by a number of authors, including Rocha et al. (2007), Jorgensen (2008), Oskarsson and Malmberg (2005), and Fresner and Engelhardt (2004). This is in recognition of the point that the infrastructure provided by the existing MSS provides opportunities to structure the implementation of SD at the organizational level. However, not all of these papers proposed a specific model for IMS. Nonetheless, the literature survey shows that several IMS models have been developed. The objectives of these models range from the original IMS goal of operational efficiency improvement to current views where SD, corporate responsibility and labor rights are added in an effort to reflect a fast-paced sustainable-oriented market. The IMS models that were found to include a summarized version of key elements and their interactions include: (1) the "Systems approach" developed by Karapetrovic and Willborn (1998, 2001); (2) the "Total quality approach" designed by Wilkinson and Dale (2001); (3) the EQOHSMS model presented by Scipioni et al. (2001); (4) the "Rotor" model developed by Rocha and Karapetrovic (2005, 2006); (5) the "Airline applied" IMS model shown by Lopez-Fresno (2010); and (6) the "Systems approach to integration" model developed by Asif et al. (2010). For a summary of these models see Table 2. To date, no systematic evaluation of the ability of these models to address organizational SD has been conducted.

3.1 The concept of integration

To analyse the ability of these IMS models to embed the principles of SD in organizations, a set of criteria was developed. The criteria were designed assuming a need to be concise and to meet current and future needs of organizations employing an IMS approach to SD. The criteria were divided into two broad categories: management requirements and SD requirements. It should be noted that it is recognized that modifications to the criteria are possible. Additional criteria could be developed and additional questions to guide the analysis could also be created. Nonetheless, the criteria do provide a starting point for structuring the analysis of the existing IMS models with respect to organizational SD. With that in mind, the criteria are introduced below.

1. **Management requirements:** Criteria in this category were focused on ensuring that the IMS model was capable of addressing the diverse requirements of standardized MSSs. The clarity of the model was also an overarching emphasis in this category. With that in mind, several questions were used to guide the assessment of these criteria: Does the IMS model accommodate the requirements of current MSSs? Are the IMS elements clearly explained? Is the scope of the model clear? Does the IMS model provide linkages

to overall business strategy? How do the IMS elements interact to produce the planned objectives? Does the model accommodate different degrees of integration? What lessons have been learned from the application of the model in practice (if applicable)? Does the model address the need for MSs to evolve over time?

To structure both management and integration of MS requirements the criteria were organized around the ISO quality management principles outlined in ISO 9000:2005.

Models (Authors, year)	Key elements	Integration approach
<i>The Systems approach</i> Karapetrovic & Willborn (1998, 2001)	Goals, processes and resources	A generic system connected by a flow of resources transformed by processes to accomplish objectives.
<i>Total quality approach</i> Wilkinson and Dale (1999)	Leadership, stakeholders, integrated processes, resources, goals, infrastructure	A generic system calling for full integration of resources, processes and structure. Special emphasis on cultural issues as foundation for the IMS
<i>The EQOHSMS</i> Scipioni <i>et al</i> , (2001)	Structure similar to ISO 9001:2008: Management responsibility; resource management; product realization; measurement analysis and improvement	A system based on ISO 9001:2008 tenets such as processes and systems. Scope limited to Quality, environment and Occupational Health & Safety
<i>The Rotor model</i> Rocha <i>et al</i> (2005, 2006)	Stakeholders providing resources to processes and directed by leadership producing results (rotor movement)	Using a dynamic system where results and stakeholder engagement are included integration is achieved for quality, environment, social and other functions
<i>The Airline applied model</i> Lopez-Fresno (2010)	Global framework and function-specialized modules. The global framework contains: Organisation and policies; planning; resource management; process and activity management; activity evaluation; continuous improvement; Relationship with the authorities	Integration is done at high level processes as described in global framework. However, specific objectives can be managed through specialized programs such as maintenance.
<i>The Systems approach to integration</i> Asif <i>et al</i> (2010)	Stakeholders, requirements, business strategies, management subsystems, documentation, operations, feedback	Integration is achieved at high and low levels on stakeholder requirements and business strategies. Flexibility is provided through management sub-systems.

Table 2. Summary of relevant IMS models

These were chosen due to their wide applicability to MSSs and the inclusion of both the process and the systems approaches, which are the foundation for true integration (Karapetrovic, 2003). Seven of the eight ISO quality principles formed an evaluation category, namely: leadership, systems focus, process approach, human resources focus, building partnerships, factual decisions, and continual improvement. The associated evaluation criteria were further developed based on the literature, particularly that focused on existing MSSs (such as ISO 9001, ISO 14001, OHSAS 18001, SA8000, and AA1000), business excellence models (MBNQA and EFQM), and empirical studies focused on the implementation of MSSs (see, for example, Bernardo et al. 2007). For example, the first principle “leadership” deals with the role of a proactive and dynamic top management leadership. To test how each IMS model deals with this sub-category there are questions focused on issues such as if the model is actually linked to organizational strategic planning; if leadership sets up an integrated policy; if leadership commitment is provided and, if so, how this is done. Integration at this level is vital for the IMS to succeed thus the questions also seek to explore the degree of integration in establishing policies and objectives as well as planning and reviewing the system’s performance. The complete set of evaluation criteria for management requirements are provided in Table 3.

2. **Sustainability requirements:** Criteria in this category were focused on ensuring that the IMS model was capable of accommodating the principles of SD at the organizational level. The models’ explicit focus on SD was an overarching emphasis in this category. With that in mind, several questions were used to guide the assessment of these criteria: Does the model provide a basis for addressing the key principles of SD? Does the model emphasize the importance of transparency? Does the model explicitly acknowledge the importance of stakeholder participation in the IMS? Does the model accommodate different degrees of stakeholder interaction? Does the model provide a basis for balancing organizational objectives in the decision making process? Is the application of the model to organizational SD discussed?

To provide a structure for addressing these questions, the criteria were organized around three sub-categories: environmental, economic, and social responsibilities. These categories build on the key requirements for SD outlined by the WCED and are closely linked with the “triple bottom line” of organizational SD. They were selected due to their widespread association with SD and their general applicability. The sub-categories and associated evaluation criteria were further developed based on the literature, particularly literature focused on stakeholder theory and corporate sustainability. For example, the social responsibilities sub-category deals with the need to set relevant objectives, to develop indicators to measure progress towards those objectives, to meaningfully consult with stakeholders, and to emphasize the importance of transparency in organizational decision making. The complete set of evaluation criteria for SD requirements are provided in Table 4.

1. Leadership actions

Does the model

- 1.1. Encourage linking the IMS to the overall business strategic planning?
- 1.2. Require a balanced and integrated policy?
- 1.3. Require a leadership system to set up and deploy IMS objectives?
- 1.4. Ask for a system owner or champion?
- 1.5. Integrate and balance IMS goals?

1.6. Require top management to provide and deploy needed resources and infrastructure?
2. Systems focus <i>Does the model</i> 2.1. Have explicit boundaries? 2.2. Include elements other than processes and activities? 2.3. Show interactions among the model elements? 2.4. Show sub systems and meta-systems? 2.5. Show type and degree of integration between functional MSs?
3. Process approach <i>Does the model</i> 3.1. Require identifying the organizational processes for realizing products and services? 3.2. Follow the main organizational processes along the supply chain (from supplier to customer passing through stakeholders)? 3.3. Include supporting processes such as finance, sales, IT and others? 3.4. Deploy IMS objectives along regular processes without the need for “special programs” when possible? 3.5. Follow the PDCA cycle to deploy IMS processes? 3.6. Integrate documentation and activities along the processes?
4. Human resource focus <i>Does the model</i> 4.1. Address the need for a skilled human resource through recruitment and training? 4.2. Require the workforce to become aware of stakeholders needs? 4.3. Establish the need for roles, responsibilities and authorities for HR? 4.4. Integrate roles and responsibilities along process roles and responsibilities?
5. Building partnerships <i>Does the model</i> 5.1. Include suppliers as part of the IMS? 5.2. Encourage construction of working relationships with related stakeholders including customers and suppliers? 5.3. Include two-sided communication paths with relevant stakeholders?
6. Factual decision <i>Does the model</i> 6.1. Require a documentation sub system for recording relevant information? 6.2. Establish a performance measurement sub system aligned to the IMS goals? 6.3. Include information analysis requirement and possibly a knowledge management sub system? 6.4. Integrate preventive and corrective actions as regular IMS elements? 6.5. Provide guidelines for balancing goals in the decision making process?
7. Continual improvement <i>Does the model</i> 7.1. Require a feedback loop for continual improvement? 7.2. Integrate continual improvement in a balanced manner for IMS goals? 7.3. Require a systematic top management /review of the system performance?

Table 3. Evaluation set of criteria for IMS completeness

1. Environmental responsibilities <i>Does the model</i> 1.1. Explicitly seek to minimize or eliminate negative environmental impacts from organizational activities? 1.2. Allow flexibility to choose relevant and specific environmental objectives? 1.3. Deploy environmental objectives into IMS elements? 1.4. Encourage identification, communication and partnership with environmental-based stakeholders?
2. Social responsibilities <i>Does the model</i> 2.1. Establish specific social requirements both internal and external to organizations? 2.2. Cover specific social indicators or give flexibility to do so? 2.3. Integrate social-focused objectives into IMS elements? 2.4. Require identification, communication and partnership with social-based stakeholders?
3. Financial responsibilities <i>Does the model</i> 3.1. Explicitly establish financial responsibilities for both organizations and community? 3.2. Allow a flexible range of financial responsibility indicators? 3.3. Integrate financial-focused objectives into IMS elements? 3.4. Require identification, communication and partnership with social-based stakeholders?

Table 4. Evaluation set of criteria for SD

3.2 Evaluation and information analysis

Each of the six identified IMS models was evaluated on the basis of the criteria with respect to their ability to act as a potential platform for implementing SD in organizations. A summary of the evaluation is presented in Tables 5 and 6. Table 5 provides an evaluation of the IMS models focused on the total quality approach (Wilkinson and Dale, 2001), the rotor model (Rocha et al. 2007), and the systems approach to integration (Asif et al. 2010). Table 6 provides an evaluation of the IMS models focused on the systems model (Karapetrovic and Willborn, 1998, 2002), the airline model (Lopez-Fresno, 2010), and the EQOHSMS model (Scipioni et al. 2001).

The evaluation of the IMS models provides a general view of the adequacy of the models as a platform for embedding SD into organizations. It is important to emphasize that the evaluation focuses on the features of an IMS model that may enable deployment of SD in organizations. For example, it focuses on the integration of an array of stakeholder requirements into organizational objectives, as well as the characteristics that may hinder that endeavor. The evaluation does not focus on identifying the “best” IMS model for the implementation of SD. With that in mind, some of the key observations from the evaluation are discussed below.

IMS DESIGN	Total Quality approach (Wilkinson & Dale, 2001)	The “rotor” Model (Rocha et al, 2007)	Systems approach to integration (Asif et al, 2010)
1. Leadership	Starts with leadership as a driver for resources, aims and objectives. A single policy is mentioned. No information is given about details on how leadership should be exerted.	Leadership determines organizational values and objectives for processes. An integrated policy is deployed as leadership activity. Also it requires a management representative for the system. No information is given about the definition of a balanced array of goals as a leadership element.	This model draws business strategies from identification of stakeholders’ requirements. Goals and business strategy are integrated but at the tactical and operational level the model still shows several MSs, as many as different stakeholders’ requirements. No mention is made establishing a policy, management representative and a balanced goal oriented performance measurement.
2. System focus	The entire organization is the system’s boundaries. The model includes links with environment and elements such as organizational culture. Processes are integrated around a PDCA based cycle.	The model has a flexible boundary depending on each organization: from two MSs to several and from one location to an entire corporation. The model includes stakeholders as important elements. Full integration is encouraged since no functional sub systems are kept.	The system scope is the entire organization, where stakeholders are the main driver for strategy of “n” management sub systems. Integration of management sub systems happen at the operational level: a single manual and integrated procedures.
3. Process approach	PDCA based processes are at the center of the model. No information is given about the role of supporting processes. Objectives are a single input for the processes with actual outputs as the result. No info about documentation, activities, or programs is included.	PDCA based processes are at the core of the IMS model. The processes follow the supply chain structure too. No special programs are required to isolate stakeholders’ needs. Documentation reqs. are deployed as a necessary process supporting subsystem.	Processes are the operational core of the IMS. It seems that only operational processes are included in the system. More detail is required to show how processes are deployed from each management sub system. Procedures and manual are integrated.
4. Human resource focus	No information about HR requirements within the model, however, it does include organizational structure and culture to promote people involvement.	They are included as a subset of the system resources and also as relevant stakeholders. They need to be recruited and trained to fulfill their roles, responsibilities and authorities (shown by the deployed ISO clauses).	No mention is made HR

IMS DESIGN	Total Quality approach (Wilkinson & Dale, 2001)	The “rotor” Model (Rocha et al, 2007)	Systems approach to integration (Asif et al, 2010)
5. Building partnerships	Stakeholders are included as receivers of processes outputs although is left unspecified about the type of stakeholders. No specific communication paths are shown	Stakeholders are explicitly included in two roles: drivers and receivers of the system. Engagement is considered mandatory. Communication is paramount and partnership is sought by inclusion into the system.	Although stakeholders are included in the model no partnership is sought. Rather, stakeholders seem to be solely customers from the system.
6. Factual decision	Measuring, improving and auditing elements are at the center of the processes. No information about documentation or decision making process is found in the model.	Implementation and measurement process steps are dedicated to documentation subsystem. Measurement is a subsystem of product and process performance. No information on decision making process is provided	Composite records are required for the model but no action other than feedback is explicitly included. Information analysis or a performance measurement system are also missing in the model.
7. Continual improvement	The entire system has a continual improvement loop which is also found at the processes core. No details on specific improvement elements are included.	Improvement of processes is included in the Act component of the PDCA cycle. System results are also compared with stakeholder needs and expectations.	To improve the system performance two coordination directions exist: horizontal covering the system scope and vertical taking care of the deployment of stakeholders needs. A feedback loop is also included but no details are provided.
SUSTAINABLE DEVELOPMENT			
8. Environmental responsibilities	Similar to ISO 14001, organizations can define relevant environmental objectives. No information on how the environmental objectives are deployed into IMS elements. Similar case for stakeholders partnership	Similar to ISO 14001 organizations can define relevant environmental objectives. Identified processes are analyzed to identify and implement environmental requirements. Similar case for stakeholders partnership	Similar to ISO 14001 organizations can define relevant environmental objectives. The communication line seems to be one-sided top down as a customer with no partnership required.
9. Social responsibilities	The model’s social scope includes solely for worker health and safety. CSR, labor rights and other social responsibilities are out of the model scope.	The model’s social scope includes health and safety of workers, CSR and labor rights as defined by MSSs such as OHSAS 18001, AA1000, SA800 respectively.	Ethics, sustainability, and health and safety are included as stakeholders’ requirements. However, it is unclear how these requirements are actually deployed and stakeholders are included as part of the system rather than just being system clients.

IMS DESIGN	Total Quality approach (Wilkinson & Dale, 2001)	The “rotor” Model (Rocha et al, 2007)	Systems approach to integration (Asif et al, 2010)
10. Financial responsibilities	Not included in the model	Not included in the model	The model enlists an unlimited number of stakeholders; owners, stockholders, and community. However, no information as to how these requirements may actually be deployed into IMS elements is provided.

Table 5. IMS evaluation results

IMS DESIGN	The “systems model” for IMS (Karapetrovic & Willborn, 1998, 2002)	The “airline applied” IMS model (Lopez-Fresno, 2010)	The IMS model - E/Q/OHS (Scipioni et al, 2001)
1. Leadership	Goal management is the starting point of the model. Linkage with business strategies is missing. Integration happens for policy and targets. Elements missing are: system ownership; balance goal, and leadership tasks.	The system sets organization and policies as set in its global framework, addressing strategic planning from the corporate view. No details about leadership system, system ownership and tasks are included in the model.	Management responsibility is driving the model, including sub elements as described in ISO 9001. Links to business strategy and goal balance are missing from the model.
2. System focus	Boundaries are defined by organizations but the example is limited to QMS/EMS. The system includes goals, processes and resources in a closed loop. No mention about single management subsystems.	The model defines the whole airline corporation as the system. It contains system elements cluster in a global framework + functional sub systems such as maintenance, flight, and security due to the legal relevance.	The system boundaries are quality, environment and health and safety requirements. The structure is highly based on ISO 9001 integrating all requirements around them. The organization is not recognized as the meta system.
3. Process approach	Planning, designing and implementing processes are at the systems core. No discrimination about types of processes is included. In the 2002 version also control and improvement is incorporated, showing deployment of documentation requirements.	Inside the global framework management of processes and activities are included following a PDCA cycle. A corporate single complemented by a number of specific functional manuals exist covering the whole organization.	Processes are found in “product realization” element from design to delivery. As ISO 9001 processes follow a PDCA cycle. No detail is given as to how IMS requirements are deployed into the set of processes.
4. Human resource focus	It is included in resources management. Allocation and deployment are required where training	The model description states that resource management includes HR. The system manual	A single clause for human resource is found similar to the requirement shown in ISO 9001. No detail is

IMS DESIGN	The "systems model" for IMS (Karapetrovic & Willborn, 1998, 2002)	The "airline applied" IMS model (Lopez-Fresno, 2010)	The IMS model - E/Q/OHS (Scipioni et al, 2001)
	and roles + responsibilities are defined.	establishes corporate and functional responsibilities.	provided for the way HR is ready for an array of requirements beyond quality.
5. Building partnerships	Stakeholders are included in the 2002 model. However, no partnership is explicitly sought. Communication lines are setup only for goal management.	No detail is provided about stakeholders beyond compliance with regulatory requirements. Suppliers and other stakeholders are not explicitly included in the model.	Stakeholders are considered only as systems customer but no real partnership is required.
6. Factual decision	Control and improvement is done according to ISO 9001 requirements. No guidelines for balancing goals in the decision making process is included.	Documentation is spread in global framework and specific modules. Given the nature of the air transportation sector preventive and corrective actions are included in the model. No goal balance strategy is provided.	Documentation is maintained as required in ISO 9001 helping to take decisions for corrective, preventive and improvement actions.
7. Continual improvement	The system has a closed feedback loop that assumes continual improvement approach. Management review is performed following ISO 9001 requirements. No mechanism for goal balance is provided.	Continual improvement is engraved into the global framework. No detail on how this is done and whether or not applies to functional modules.	Continual improvement requirement is included in the model. However, no detail is provided on the mechanism to balance this assorted array of performances.
SUSTAINABLE DEVELOPMENT			
8. Environmental responsibilities	Environmental objectives as mentioned by ISO 14001. Processes are used as guidelines to identify and implement environmental requirements. Similar case for stakeholders partnership.	Environmental objectives as mentioned by ISO 14001 which are regulatory for this industry sector. Encourage close relationship with authorities.	Environmental objectives as mentioned by ISO 14001. No information is provided for communication and partnership with environmental stakeholders.
9. Social responsibilities	Although indicated as possible no requirements are shown for social accountability and health and safety of workers.	Air safety is considered as a system objective. No other social requirement is mentioned in the model.	Social responsibilities are reduced to health and safety at the workplace. No detailed information is provided on how safety requirements are deployed into the IMS
10. Financial responsibilities	Although indicated as possible no requirements are shown for financial responsibilities whatsoever.	Not included into the model.	Financial responsibilities are not included. Lateral impact from quality efforts for customer satisfaction and cost reduction.

Table 6. IMS evaluation results (cont)

a. Strong features of the models for SD:

From the evaluation of the management requirements, it was found that most of the IMS models call for strong leadership to drive the system. In all six of the IMS models evaluated, leadership is exerted by setting up integrated policies and objectives, which led in turn to the allocation and deployment of required resources into appropriate structures (Quinn & Dalton, 2009). The models also require top management to define the system scope according to the organizations' needs and evolution. To ensure management commitment, IMS models typically require the assignment of a management representative capable of working across organizational, national and international boundaries to achieve stated objectives.

To varying degrees, all six IMS models employed a systems approach to develop the holistic vision that sustainability requires to be successful (Goel, 2006). Most of the IMS models have a flexible scope that depends on the current organizational needs and possibilities. However, IMS models also call for scope expansion towards the whole organization and increasing stakeholders' requirements (Karapetrovic & Willborn, 1998; Rocha et al., 2007; Lopez-Fresno, 2010). However, as mentioned by Senge et al (2007), "systems thinking can be messy and uncomfortable". Inclusion, relationship building and true engagement of stakeholders, as done at different depth levels in all six IMS models, is a direct result of systems thinking and an enabler for sustainability (Roome and Bergin, 2006; Senge et al, 2007; Pepper and Wildy, 2008; Quinn and Dalton, 2009)

Within their system requirements, all IMS models have processes as the building blocks for fully deploying stakeholder requirements in both operational and supporting activities. As mentioned by Lueneburger & Goleman (2010) sustainable development needs a "specific set of business processes geared to manage previously unquantified risks and capture new opportunities". All processes may be organized according to the PDCA cycle, which is common in IMS frameworks. Such an approach emphasizes planning as an important activity before taking any substantive action. As pointed out by Quinn and Dalton (2009) sustainability requires timing and readiness in their activities; an organization that does plan according to the opportunities and positive outcomes has a better chance to succeed.

The IMS models generally emphasize the importance of skilled human resources that are aware of an assorted array of functions (such as quality, environment and so on). Employees are a key stakeholder that must be engaged in collaborative action along the processes mentioned above (Senge et al, 2007; Pepper & Wildy, 2008). Partnerships with stakeholders are included in the IMS framework however at different levels; only the "Rotor" Model explicitly includes stakeholders as part of the system by providing resources (Rocha et al. 2007). Other models include stakeholders, but only as a receiver of the system outputs. Engagement with stakeholders has been identified by several authors as an essential element for sustainability (Roome and Bergin, 2006; Senge et al, 2007; Pepper & Wildy, 2008; Quinn & Dalton 2009).

Driving sustainability throughout an organization requires a deep knowledge of sustainability (Pepper & Wildy, 2008). IMS models can help facilitate a process of embedding sustainability in organizations through enhanced training in SD issues, process documentation, and measurement and analysis of processes outputs. All together these elements help enable factual-based decision making and an increased body of knowledge for SD within the organizations.

From the evaluation of the SD requirements, it is evident that environmental responsibilities are largely accounted for through the explicit incorporation of ISO 14001 into the IMS. Social requirements are also included in several of the IMS models, though this is generally to a lesser degree than environmental issues. Social accountability, occupational health and safety, labor rights and decent work are the most common social requirements included. All of these issues have international standards that facilitate their inclusion into the IMS models.

b. Weak aspects of the models for SD:

From the management side the analysis shows that, although an IMS does have *leadership* requirements to drive sustainability, it still falls short of the level required to succeed. Most of the IMS models lack of guidelines for objectives that balance priorities between financial, social and environmental dimensions. To make sustainable development sustainable Quinn & Dalton (2009) indicate that there are two options: organizations should look for “solutions both sustainable and economically profitable” or change the objective measurement from economic based to sustainability based. Either way SD requires a strong integrated performance measurement which is non-existent in all six models. Furthermore, sustainable development requires being part of the strategic planning of the organization (Pepper & Wildy, 2008); nonetheless only two models, the “airline applied” and the “systems approach”, explicitly include strategy planning as part of the IMS elements.

Due to their integrative nature, IMS models encourage synergy and holistic vision. However, sustainability goes beyond companies’ walls and even suppliers and customers to include more active relationships with stakeholders into the system (Roome & Bergin, 2006; Quinn & Dalton, 2009). In all six IMS models more detail as to how IMS elements (e.g. processes, documentation, and measurement) are integrated into a unique system is required. Two models, the “airline applied” and the “system approach”, describe modules for particular functions, thus allowing certain flexibility, yet more detail on how they are integrated is required.

An element that needs to be integrated into the system is the set of supporting processes (finance, marketing, IT) which helps in engaging internal and external stakeholders. All analysed IMS models include “processes” at the general level, leaving open to interpretation which processes are included in the search for sustainability. IMS models also show a fragile structure for sustainability in their integration of human resources (as partners) and other stakeholders into the system. Most of the IMS models consider stakeholders just as system clients yet their role as enablers, resource providers and doers is not included or at least diminished. Several authors emphasize the importance of stakeholders’ integration as partners as an essential element to accomplish sustainable development (Roome and Bergin, 2006; Senge et al, 2007; Pepper & Wildy, 2008; Quinn & Dalton 2009).

Broadly speaking, the IMS models still need to address similar issues as those highlighted in empirical studies: obtaining real top management commitment, aligning with business strategies, focusing on training, integrating around processes rather than divisions, and the creation of new functions. It is interesting to note similarities between the suggested improvements for the IMS models and the results from empirical studies on SD implementation. For example, Luenerburger & Goleman (2010) mention identification of risk and opportunities as a first step of a proposed methodology for SD implementation.

Quinn & Dalton (2009) emphasize the need for implementation processes based on positive outcomes and focusing on areas where early success would facilitate more stakeholders participating in the SD process.

Overall, the evaluation of the SD requirements highlighted the lack of emphasis on economic issues in the context of an IMS. Two models indicated the need to develop financial indicators, however, no detail was given as to how they are going to be used in the overall IMS. It is possible that the lack of MSSs on financial management has contributed to this gap. This is a possible concern given the widely held view that financial objectives typically overshadow social and environmental requirements (Roome and Bergin, 2006; Senge et al, 2007; Pepper & Wildy, 2008; Quinn & Dalton 2009). From the two remaining SD dimensions, namely environmental and social issues, the IMS models go no further than briefly stating requirements that the system must address. There is no indication of a management element that helps to prioritize this array of requirements without leaving any of them unattended. A performance measurement system set with a balanced emphasis on the triple bottom line may be part of the answer to help address these issues.

4. Conclusions

A growing number of organizations around the world have made commitments to apply the principles of SD to their operations. Becoming an organization focused on sustainable principles necessitates addressing specified social, environmental and economic objectives. These objectives must be pursued in an integrated manner while drawing on a common pool of resources. For more than 20 years, organizations have employed MSS, such as ISO 9001 and ISO 14001, to meet a portion of these objectives. The infrastructure provided by the existing MSS may be leveraged to help implement SD at the organizational level. Insight into how this may be accomplished is provided by the growing literature on IMS. The concept of an IMS was created to build synergy among MSS, optimizing resources and focusing on meeting an array of different objectives. There are several models available in the literature and an increasing body of knowledge related to their implementation and operation. However, more research is needed on how an IMS approach may be applied in the context of organizational SD.

The purpose of this paper was to explore how existing IMS models can be used to leverage the implementation of organizational SD. Six prominent IMS models were analyzed with respect to their potential to help embed SD in organizations. An original two-prong set of criteria were developed to help guide the analysis. The analysis showed that the existing IMS models do provide a useful starting point in implementing SD in organizations. However, there are numerous opportunities to strengthen the existing models, particularly regarding their application in practice.

The defined set of criteria explored two dimensions of the IMS: first, it analysed the IMS models for management system strength and coherence; second, it evaluated the feasibility to cover SD principles. For the first category (management requirements), seven sub-categories modeled on the quality management principles in ISO 9000 were employed. Each principle was divided into four to six questions that focused on the depth of the management system elements, their interaction, and their level of integration. For the second dimension (SD requirements), the criteria were divided into three categories closely

associated with SD, namely environmental, economic, and social issues. Each responsibility was deployed into questions focusing on the ability of the IMS to address triple bottom line issues and stakeholder requirements.

In general, IMS models were found to be a useful platform to develop SD within an organization. The “process” and “system” approaches that organizations are already familiar with create a mindset for integration and synergy that is necessary for the diverse set of requirements SD demands. In the models, “leadership” is exerted by top management by following the PDCA cycle for the entire system and by allocating and deploying resources needed for processes to operate. Decisions are increasingly taken based on facts and analysis; methods such as lean thinking, six sigma, performance measurement systems and others are all based on “factual decision” principles and thus complement the IMS model. The decision making process is solidly focused on “continuous improvement” which should be deployed to the entire organization. However, while these elements provide a basis for integrating SD into an organization’s core infrastructure, areas of improvement were also found in this analysis. One key issue was the lack of MS elements to build partnerships with employees, the community, customers, suppliers, and other stakeholders. Until organizations realize partnering is not a choice but a necessity, SD may prove to be an elusive goal. The IMS models recognized human resources as an important resource, but partnership needs to be built into them more explicitly. Another area of improvement is the identification, maintenance, control and improvement of processes, not only those with direct impact on product realization, but also on those supporting the operation such as sales, finance, and marketing. Lack of integration of these processes into the IMS would leave an isolated IMS with small resources and impact on the company’s strategy.

Current IMS frameworks have quality, environmental, health and safety and social responsibility within their scope; meaning that two thirds of the TBL range may already be largely (if not comprehensively) covered. However, little emphasis on economic issues was found in the models. This is a significant oversight, which may contribute to the general lack of application of the models in practice. From the environmental side, the widespread requirement for including ISO 14001-compliant MS elements provides a strong base in the existing IMS models for moving towards more explicit recognition of SD. Social responsibilities in the existing IMS models were addressed to varying degrees. The most common approach was to include solely health and safety at the workplace. Social issues such as CSR, labor rights, and social accountability are other established options, but only one third of the models reviewed considered these as possible requirements. Finally, more detail on how requirements are deployed and controlled in ongoing organizational processes is needed in all models. These will help clarify issues such as the importance of requirements, the risks of not meeting objectives, and the evaluation of employees, among other issues.

5. Recommendations for future research

This paper provided the first systematic review of IMS models and their potential to embed SD in organizations. It is anticipated that the results will be of interest to both academics and practitioners in organizational SD and IMS. However, it is recognized that additional research is necessary. As Bernardo et al. (2009) state, more evidence-based research is necessary to better understand the application of IMS models in practice and how to

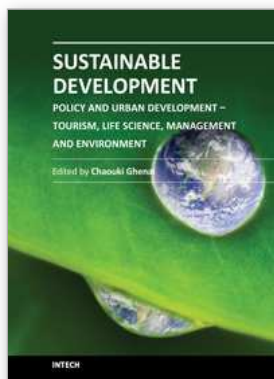
manage the various degrees of integration. Only five empirical studies were found in the literature and all of them were solely based on surveys, thus limiting the objectivity of results. As seen in quality audits, answers from management may not correspond to the real situation or the perception of people working directly on organizational processes. Based on empirical results, better models for IMS can be developed, thus making them more appealing to organizations. The development of standards or frameworks for financial management and their possible integration in IMS models is another area for future research. Due to the fast-paced, economic-focused market that organizations are facing nowadays, the lack of economic-oriented MS limits the practice of IMS in the real world. Finally, deployment of SD requirements into an IMS will require enhanced performance measurement systems capable of dealing with an increasing array of diverse objectives. This system should facilitate employees working directly in the process to deploy social, environmental, and economic issues into operational objectives.

6. References

- Asif. M., de Bruijn, E., Fisscher, O., Searcy, C., Steenhuis, H. (2009), "Process embedded design of integrated management systems ", *International Journal of Quality & Reliability Management*, Vol. 26, No. 3, pp. 261-282.
- Bansal, P. (2005), "Evolving sustainably: a longitudinal study of corporate sustainable development", *Strategic Management Journal*, Vol. 26, No. 3, pp. 197-218.
- Bansal, P. and Roth, K. (2000), "Why companies go green: a model of ecological responsiveness", *Academy of Management Journal*, Vol. 43, No. 4, pp. 717-736.
- Barney, J. (1991), "Firm resources and sustainable competitive advantage", *Journal of Management*, Vol. 17, No. 1, pp. 99-120.
- Beckmerhagen, I., Berg, H., Karapetrovic, S., Willborn, W. (2003), "Auditing in support of the integration of management systems: a case from the nuclear industry", *Managerial Auditing Journal*, Vol. 18, No. 6, pp. 560-568.
- Bernardo, M., Casadesus, M., Karapetrovic, S., Heras, I. (2009), "How integrated are environmental, quality and other standardized management systems? An empirical study", *Journal of Cleaner Production*, Vol. 17, No. 8, pp. 742-750.
- Campbell, J. L. (2007), "Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility", *Academy of Management Review*, Vol. 32, No. 3, pp. 946-967.
- Daub, C.H. (2007), "Assessing the quality of sustainability reporting: an alternative methodological approach", *Journal of Cleaner Production*, Vol. 15, pp. 75-85.
- DiMaggio, P.J. and Powell, W.W. (1983), "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, Vol. 48, pp. 147-160.
- Dresner, S. (2002). *The principles of sustainability*, Earthscan, London, UK.
- Elkington, J. (1998), "Cannibals with Forks: the Triple Bottom Line of 21st Century Business", Capstone Publishing, Oxford, MA
- Freeman, R.E. (1984), *Strategic management: a stakeholder approach*, Pitman, Boston, MA.
- Fresner, J. and Engelhardt, G. (2004), "Experiences with integrated management systems for two small companies in Austria", *Journal of Cleaner Production*, Vol. 12 No. 06, pp. 623-631.

- Gladwin, T.N., Kennelly, J.J., and Krause, T-S. (1995), "Shifting paradigms for sustainable development: implications for management theory and research", *Academy of Management Review*, Vol. 20, No. 4, pp. 874-907.
- Gloet, M (2006). "Knowledge management and the links to HRM - Developing leadership and management capabilities to support sustainability", *Management Research News*, Vol. 29 No. 7, pp. 402-413
- Griffith, A and Bhutto, K. (2009), "Better environmental performance. A framework for integrated management systems (IMS)", *Management of Environmental Quality*, Vol. 20, No. 5, pp. 566-80.
- Harjeev, K., Laroia, S., Sharma, D. (2010), "Integrated management systems in Indian manufacturing organizations", *The TQM Journal*, Vol. 22, No. 6, pp. 670-686.
- Hart, S.L. (1995), "A natural-resource-based view of the firm", *Academy of Management Review*, Vol. 20, No. 4, pp. 986-1014
- Jennings, P. and Zandbergen, P. (1995), "Ecologically sustainable organizations: an institutional approach", *Academy of Management Review*, Vol. 20, No. 4, pp. 1015-1052
- Jønker, J., and Karapetrovic, S., (2004), "Systems thinking for integration of management systems", *Business Process Management Journal*, Vol. 10 No. 6, pp. 608-615.
- Jørgensen, T.H. (2008), "Towards more sustainable management systems: through life-cycle management and integration", *Journal of Cleaner Production*, Vol. 16 No. 10, pp. 1071-1080.
- Karapetrovic, S. (2003), "Musings on integrated management systems", *Measuring Business Excellence*, Vol. 7 No. 1, pp. 4-13.
- Karapetrovic, S. and Willborn W. (1998), "Integration of quality and environmental management systems", *The TQM Magazine*, Vol. 10 No. 3, pp. 204-213.
- Lueneburger, Ch. and Goleman, D. (2010), "The Change Leadership Sustainability Demands", *MIT Sloan Management Review*, Vol. 51, No. 4, 49-55
- Lopez-Fresno, P. (2010), "Implementation of an integrated management system in an airline: a case study", *The TQM Journal*, Vol. 22, No. 6, pp. 629-647.
- Muhammad Asif, Erik Joost de Bruijn, Olaf A.M. Fisscher, Cory Searcy, (2010) "Meta-management of integration of management systems", *The TQM Journal*, Vol. 22 Iss: 6, pp.570 - 582
- Oskarsson, K. and Malmborg, F. V. (2005), "Integrated management systems as a corporate response to sustainable development", *Corporate Social Responsibility and Environmental Management*, Vol. 12, No. 3, pp 121-128.
- Pepper, C. and Wildy, H (2008). Leading for sustainability: is surface understanding enough?, *Journal of Educational Administration*, Vol. 46, No. 5 pp. 613-629
- Quinn, L. & Dalton, M. (2009), "Leading for sustainability: implementing the tasks of leadership". *Corporate Governance*, Vol. 9 No. 1 pp. 21-38
- Rocha, M. and Karapetrovic, S. (2006), "A Modular Three-Phased Alternative for E-IMS Implementation", *Proceedings from 8th International Conference on ISO 9000 & TQM*, National Quality Institute, Montreal, Canada
- Rocha, M., Searcy, C., and Karapetrovic, S. (2007), "Integrating sustainable development into existing management systems", *Total Quality Management and Business Excellence*, Vol. 18, No. 1/2, pp. 83-92.

- Salzmann, O., Ionescu-Somers, A. and Steger, U. (2005), "The business case for sustainability: literature review and research options", *European Management Journal*, Vol. 23, No. 1, pp. 27-36.
- Scipioni, A., Arena, F., Villa, M., Saccarola, G. (2001), "Integration of management systems", *Management of Environmental Quality*, Vol. 12, No. 1/2, pp. 134-135.
- Searcy, C. (2009), "Setting a course in corporate sustainability performance measurement", *Measuring Business Excellence*, Vol. 13, No. 3, pp. 49-57.
- Senge, P., Lichtenstein, B., Kaeufer, K., Bradbury, K. and Carroll, J. (2007). Collaborating For Systemic Change, *MITSloan Management Review*, Vol. 48, No.2, pp. 44-53
- Seuring, S. and Muller, M. 2008, "From a literature review to a conceptual framework for sustainable supply chain management", *Journal of Cleaner Production*, Vol. 16, No. 15, pp. 1699-1710.
- Shrivastava, P. (1995), "The role of corporations in achieving ecological sustainability", *Academy of Management Review*, Vol. 20 No. 04, pp. 936-960.
- Singh, R. K., Murty, H. R., and Gupta, S. K. (2007), "An approach to develop Sustainability Management Systems in the steel industry", *World Review of Entrepreneurship, Management and Sustainable Development*, Vol. 03, No. 1, 90-108.
- Wilkinson, G, and Dale, B.G. (2001), "Integrated management systems: a model based on a total quality approach", *Managing service quality*, Vol. 11, No. 5, 318-330.
- World Commission on Environment and Development (WCED), 1987, *Our Common Future*. Oxford University Press, Oxford, U.K.
- Zutshi, A. and Sohal, A. (2005), "Integrated management system: the experiences of three Australian organisations", *Journal of Manufacturing Technology Management*, Vol. 16, No. 2, pp. 211-32.



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Miguel Rocha and Cory Searcy (2012). Embedding Sustainable Development in Organizations Through an Integrated Management Systems Approach, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/embedding-sustainable-development-in-organizations-through-an-integrated-management-systems-approach>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Sustainable Development as an Aspect of Improving Economic Performance of a Company

Tereza Kadlecová and Lilia Dvořáková

¹*Institute for Sustainability*

²*University of West Bohemia in Pilsen*

¹*United Kingdom,*

²*Czech Republic*

1. Introduction

The contemporary world, especially its developed part, has been driven by consumerism that is apparent in both the consumption and production. Individual national economies and businesses are under ceaseless pressure for economic growth which goes hand in hand with many negative factors, environmental degradation being one of them.

Over the last twenty years, many of the world's developed economies, public and academic bodies, and industrial corporations, having become more conscious about the unsustainability of current development in terms of the physical capacity of our world, have conceived a range of concepts and models for the sustainable development.

Successful implementation of the sustainable development concept is, however, fundamentally dependent on individual companies. In business practice the concept of sustainable development is applied through **Corporate Social Responsibility (CSR)**. The CSR concept is based on three interrelated pillars - economic, environmental, and social.

This chapter deals with the economic and environmental pillars of CSR, or more precisely it looks to examine the nexus between economic and environmental performance of a company. Both aspects of a company's performance intermingle in the **Eco-efficiency** concept applied in the business practice through **Voluntary Environmental Instruments**.

The Eco-efficiency concept and related voluntary environmental instruments (proactive strategy) go beyond the legal framework (reactive strategy) and fall fully within the competence of company management.

Needless to say, companies would only buy into the concept of sustainable development and the related environmental responsibility if they were cognisant of the economic benefits of such approach. It is therefore crucial to convince businesses of the advantages and benefits of proactive environmentally responsible behaviour and motivate them to adopt it.

A proactive approach to environmental protection, applied in practice through the voluntary environmental instruments, features not only the expected positive impact on the environment, but, as practice shows, results in a range of financial (reducing operating costs, increased revenues) and non-financial benefits contributing to business value creation.

2. Eco-efficiency

2.1 The eco-efficiency concept

Eco-efficiency is a management philosophy that challenges businesses to pursue environmental improvements yielding concurrently economic benefits (Lehni, 2009). This concept, entailing a change in production and consumption patterns, promotes innovation and leads therefore to economic growth and enhanced competitiveness. The term eco-efficiency was coined in 1992 by the **World Business Council for Sustainable Development** (WBCSD) in the 'Changing Course' publication. Eco-efficiency is based on the principle of generating larger amounts of products while consuming fewer resources and therefore creating less waste and pollution. (International Institute for Sustainable Development, 2007). In this context, the prefix eco stands for both environment and economics.

Eco-efficiency falls within a broader concept known as **Sustainable production and consumption** introducing change in production and consumption patterns, and leading therefore to sustainable consumption of natural resources. Businesses play an important role in this concept, both as consumers of raw materials and manufacturers of products. Eco-efficiency focuses on three broad sets of objectives (Lehni, 2009):

- Reducing consumption of resources
- Reducing impact on the environment
- Increasing product value

Opportunities for eco-efficiency

Eco-efficiency can be practically implemented into business processes mainly through search for innovation opportunities particularly in the following areas (Lehni, 2009):

- Re-engineering of processes
- Cooperation with other enterprises
- Redesign of products
- Searching for new ways to meet customer needs

2.2 Eco-efficiency indicators

Currently several approaches are known that enable measurement of eco-efficiency applied in production and business operations.

WBSCD

According to WBSCD, eco-efficiency can be formulated as a ratio of a product value (economic performance) to its environmental impact (environmental performance). WBSCD developed a framework for reporting company data relating to eco-efficiency that distinguishes three levels of information - Categories, Aspects and Indicators (Verfaillie & Bidwell, 2000).

UNCTAD / UN-ISAR

Unlike WBSCD, UNCTAD / UN-ISAR regards eco-efficiency as an environmental burden (environmental performance) per unit of economic value (economic performance). Similarly to WBSCD, UNCTAD/UN-ISAR proposed a framework for reporting company data relating to eco-efficiency consisting of three levels of information - Elements, Items and Indicators - as a performance measure of company specific aspects (Müller & Sturm, 2001).

At this point it might be useful to recall the key concepts of economic and environmental performance that will be encountered in the course of this paper.

2.3 Economic performance – BSC

Immense number of methods has been developed to measure economic performance of a company. Some of them focus purely on an assessment of company financial statements while others consider other aspects of a company's life. These multi-criteria methods analyse financial results in the context of wider non-financial achievements.

In our research, Balanced Scorecard (BSC), one of the models for multi-criteria decision making and valuation of economic performance, has been employed to represent the economic pillar of the eco-efficiency. BSC method was developed by Robert S. Kaplan and David P. Norton and published in 1992.

Within BSC, business objectives are classified into four perspectives - financial, customer, internal business processes, and learning and growth (potential) - that are intended for complex measurement and control of a company's performance. Objectives in these individual perspectives are interconnected with 'cause - effect' relations that are depicted by arrows (Kaplan & Norton, 2002).

2.4 Environmental performance

On the broad level, environmental performance (also profile) reflects the general achievement of a system (product, process, company) concerning cut-down on negative impact on the environment. ISO 14001 defines the environmental profile of a company as *"measurable results of the environmental management system, related to an organization's control of its environmental aspects, based upon its environmental policy, objective and targets."* Similarly, ISO 14031 defines environmental performance as *"an organization's success in managing the relationships between its activities, products, or services, and the natural environment."*

To assess the environmental profile of a system, Environmental Performance Indicators (EPI) are used as measures for Environmental Performance Evaluation (EPE). Over the last twenty years, several concepts have been developed to evaluate the environmental performance of a company.

2.4.1 ISO 14031

ISO 14031 defines two general indicator categories for environmental performance evaluation:

- Environmental Performance Indicators (EPI) - which are further divided into:
 - Management Performance Indicators (MPI)
 - Operational Performance Indicators (OPI)
- Environmental Condition Indicators (ECI)

2.4.2 The Global Reporting Initiative

In 2000 the Global Reporting Initiative (GRI) issued its first guidelines on sustainability reporting. Environmental reporting is organized into nine groups called the evaluation criteria which are structured in such a fashion to ensure easy evaluation of inputs (Criteria:

energy, water, materials), outputs (Criteria: emissions, waste water and waste) and impacts on the environment (Criteria: e.g. Products and services, Transport) (GRI, 2006).

2.4.3 Research foundation of Norway (Oestdold Research Foundation)

In his work from 1999, Johan Thoresen, a member of the Norwegian Research Foundation Oestdold, developed three categories of EPI indicators (Thoresen, 1999):

- Category 1 - Performance of a product lifecycle
- Category 2 - Environmental performance of selected process technology
- Category 3 - Environmental performance of operations

3. Analysis of voluntary environmental instruments

3.1 Preventive vs. reactive strategy for environmental protection

A range of preventive and reactive strategies for the protection of the environment are used in the manufacturing. As the name indicates, preventive strategies aim to preclude origin of environmental damage through searching for and minimising sources of pollution and waste. Reactive strategies, on the contrary, do not anything that goes beyond what is necessary to comply with the environmental regulation. The reason why reactive strategies are not so effective and promising is the fact that they do not focus on the causes of environmental damage, they only try to mitigate the negative consequences of production. Among these “end-of-pipe” technologies are, for example, refuse compactors, collection containers and vehicles, waste heat recovery systems, air pollution filters, noise abatement investments and sewage treatment plants. As a result the quantity of toxic agents drops in one environmental domain, but rises in another one.

A fundamental disadvantage of the reactive type of control strategy is that the end-of-pipe technology can never reach 100 % efficiency. Then obviously despite taking corrective measures, that are often very expensive, with an increasing number of pollution sources environmental degradation rises concurrently. Another problem is that the stated emission limits may not be sufficient given the fate of substances in the environment - all forms in which a substance released into the environment can convert and through subsequent reactions, the so-called secondary effects, impact on humans and ecosystems - cannot be confidently determined (Czech Ministry of Environment, 2003).

Freons (CFCs) eroding the ozone layer represent a classic example of ignorance of the fate of substances in the environment. These materials were originally considered to be almost perfectly non-reactive gases, and therefore used as a carrier gas in spray cans and refrigerators.

All these above mentioned flaws of reactive strategies clearly demonstrate that the only solution to sustain a healthy environment is to focus on preventive elimination of damage sources rather than addressing problems already arisen.

As practice has shown, the preventive strategy has a positive impact on the environment and leads to financial savings, economic profit, cost reductions and enhancement of the competitive advantage at the same time. Preventive strategy is therefore considered a double profit strategy: environmental and economic - a ‘win-win’ strategy. The preventive strategy to the environmental protection can be practically applied through a range of voluntary environmental instruments.

3.2 Eco-efficiency tools

The following text gives overview of selected management tools - voluntary environmental instruments - that help companies maximize their efficiency, product quality and profit through improved corporate environmental profile.

Environmental management systems (EMS) - EMS represent a systematic management and control of particular business areas that are posing risk to the environment. Within EMS companies set environmental goals to ensure continuous improvement of corporate environmental profile in the future. Currently, there are two commonly used standards for implementing an EMS:

- Technical standards of ISO 14001
- EU regulation Eco-Management and Audit Scheme (EMAS)

Environmental management accountancy (EMA) - EMA allows a company to identify and manage its environmental costs and achieve therefore a reduction in total company costs. Within EMA both financial and material information is tracked and analysed.

Cleaner Production - The concept of cleaner production is being connected with the integral preventive strategy which is applied especially to the sector of production (Remtová, 2003a). The aim of this strategy is to eliminate or reduce sources of environmental degradation with the use of technical and nontechnical solutions (e.g. more efficient use of raw materials and energy, elimination or reduction of toxic and hazardous materials, prevention of waste and pollution at source). Within cleaner production all material and energy flows in a company are monitored in order to identify the sources of undesirable waste.

Ecodesign - Ecodesign incorporates requirements for environmental protection into product design and development. Currently there is no unified definition of ecodesign. In general, ecodesign can be defined as a systematic process of product design and development which puts emphasis not only on common product features like economics, safety, ergonomics, technical feasibility, aesthetics, but that also pursues a minimum negative impact on the environment (e.g. reducing quantity and toxicity of materials, product demountability for easier reuse and/or recycling at the end of its useful life) (Remtová, 2003b).

Life Cycle Assessment (LCA) - LCA is a tool for assessing the overall environmental impact of a product in its entire life cycle. Withing LCA all material and energy flows relating to any life phase of a particular product are analysed. This tool is widely used during a product design (see Ecodesign).

Eco-labeling - Eco-labelling is a certification system for products and services that are friendlier to the environment than substitute products. This system is directed by a third party that has to be independent. Currently there are three different Eco-labeling systems that a company can opt for:

- Ecolabeling - Environmental Declaration (Type I)
- Self-declared Environmental Claim (Type II)
- Environmental Product Declaration (Type III)

3.3 Comparison of voluntary environmental instruments

Comparison of voluntary environmental instruments is not a straightforward and simple task to do. On the contrary, even when comparing the benefits and implementation

requirements for the same instrument the final conclusions can differ immensely due to the specific situation of investigated companies. Period of return on investment as well as the subsequent financial benefits of the individual voluntary environmental instruments can be significantly different when compared among companies.

Voluntary environmental instruments can be compared from different perspectives (see Table 1). While some instruments are focused on product environmental performance, others help streamline business processes or influence the management and operation of a company as a whole, i.e. the entire corporate system.

Voluntary environmental instruments also vary in terms of so-called external collaboration. Some instruments can only be used if an appropriate background has been created for them

Comparison criterion	Voluntary methods and instruments						
	EMAS	EMS/ ISO 14001	EMA	Ecodesign	LCA	Cleaner Production	Eco- labelling
Purpose	Regula- tive	Regulative Educative	Informative	Regula- tive	Informa- tive	Informa- tive	Regula- tive
Focus	Systems	Systems	Processes	Products	Products	Processes	Products
Normalization	Yes	Yes	No	No	Yes	No	Yes
Necessary external collaboration	Yes	Yes	No	No	No	No	Yes
Preventive strategy	Yes	Yes	No	Yes	Yes	Yes	can be
Financial requirements associated with an implementation	Yes	Yes	No	Yes, conside- rable	Yes, conside- rable	No	Yes
Labour input intensity	No	No	Yes	Yes, conside- rable	Yes, conside- rable	Yes	No
Economic benefits	Yes, partly	Yes, partly	informative benefits more likely	Yes	No	Yes – conside- rable	uncertain
Intended for	All company types	All company types	All company types	Manufac- turing compa- nies	All company types	All company types	Company with products/ services included in existing product categories
Logo/ certificate	Yes	Yes	No	No	No	No	Yes

Table 1. Comparison of a selection of voluntary environmental instruments, Source: authors

to be implemented. Among the key activities that cannot be carried out by a company itself and are compounding this background are inspection, certification and registration. These activities need to be provided by another entity (e.g. an independent third party, a state body). There are of course financial expenses related to the necessary external collaboration (e.g. costs associated with consultations, advisory on EMS or application fee for eco-labeling) that distinguish significantly from one instrument to another. Voluntary instruments differ also hugely regarding benefits for a company and costs required for their application. While some of the voluntary environmental instruments are generally considerably beneficial in terms of operation costs reduction (e.g. Cleaner production) the contribution of other instruments is mainly informative (e.g. LCA).

Table 1 provides an overview and comparison of a selection of voluntary environmental instruments with regard to different perspectives.

3.4 Classification of environmental benefits of voluntary instruments

On the basis of a thorough analysis of the individual voluntary environmental instruments, a generic classification of their benefits was created. These benefits were divided into two major groups, financial and non-financial. Within our research we then elaborated a catalogue with benefits for each one of the voluntary environmental instruments.

a) Financial benefits

The financial benefits stemming from implementation of the voluntary environmental instruments in a company consist mainly in:

- Operating costs savings as a result of energy saving measures, water and materials efficiency programmes, and a decline in fees and taxes related to environmental damage
- Increased revenue as a consequence of access to new markets, increased demand of existing customers or sale of a new product, e.g. waste materials
- Obtaining state aid or subsidies

b) Non-financial benefits

Similarly, application of the voluntary environmental instruments is associated with a number of non-financial benefits that however ultimately affect the financial benefits for a company. We have proposed the following eight groups to which the non-financial benefits can be allocated:

- Business benefits - improved corporate image, growth of "brand equity" and related customers satisfaction
- Employee relations - increasing morale and involvement of employees as a result of increased employee satisfaction and related retention of key employees
- Public relations - enhanced corporate credibility and overall public functioning, improved position of in negotiations with public authorities
- Risk management - emergency preparedness and reducing the likelihood of environmental accidents;
- Compliance with environmental, health and safety legislation and standards - regular monitoring of legislation ensuing in ability to predict possible legislative changes and prepare for them

- Company management - establishment of order in company operations and documentation, improved internal communications, streamlined production processes and increased product quality
- R & D - stimulating innovative thinking
- Environment, Health & Safety (EHS) - Improved quality of working environment and related betterment of safety and health conditions for employees resulting in decreased absenteeism and increased employee productivity

4. Corporate environmental profile index

Corporate Environmental Profile Index (CEPI) was designed for internal business purposes for the multi-criteria analysis and assessment of a company's environmental performance. CEPI is composed of four broad set of categories that are further divided into a number of criteria. The four categories are as follows:

- RC - Resource Consumption
- ERL - Environmental Releases
- ER - Environmental Remediation
- CO - Compliance (with environmental legislation)

The four index categories were deliberately defined broadly to cover all potential environmental aspects of business operations. For each category neither specific criteria nor their number were determined for the general model (see chapter 5).

The importance of the index categories and criteria, in terms of their contribution to the overall environmental profile of a company, is expressed by weights (v_i for each criterion and V for a given category). The weights can take values from 1 to 5 with the following meaning:

1. Very low importance
2. Low importance
3. Intermediate importance
4. High importance
5. Very high importance

As a result, the importance of an individual criterion in terms of the final index value is not only given by their own weight but also by weight of the category to which they belong.

Each criterion within those four categories is further evaluated with a score (s_i) which expresses the qualitative criteria evaluation in the range:

1. Very good
2. Good
3. Average
4. Bad
5. Very bad

The score represents a formal quantification of the performance evaluation, where each criterion is objectively assigned a score value according to the interval that corresponds with its specific criteria performance.

In general, scores can be determined:

- With regard to a specific target for individual criteria
- With regard to a trend of development of individual criteria

Mathematical expression of CEPI

When employing the input parameters described earlier the CEPI can be calculated as follows: For each category a category score is computed according to the equation (1) shown below, which mathematically represents a weighted average of individual scores of all criteria in the particular category.

$$\bar{w} = \frac{\sum_{i=1}^n s_i v_i}{\sum_{i=1}^n v_i} \quad (1)$$

Where

$\bar{w}$ Category score

s Criterion score, for which $s \in S, S = \{1,2,3,4,5\}$

v Criterion weight, for which $v \in V, V = \{1,2,3,4,5\}$

As a next step, each category score needs to be multiplied with a specific category weight, see the equation (2).

$$W = \bar{w}V \quad (2)$$

The final CEPI value then corresponds to a weighted average of scores for all categories, as calculated in the formula (3).

$$CEPI = \frac{W_{RC} + W_{ERL} + W_{ER} + W_{CO}}{V_{RC} + V_{ERL} + V_{ER} + V_{CO}} \quad (3)$$

Where

$W_{RC}, W_{ERL}, W_{ER}, W_{CO}$ Weighted score of each category

$V_{RC}, V_{ERL}, V_{ER}, V_{CO}$ Weight of each category

Using the input parameters of this method the formula for determining the CEPI is as follows:

$$CEPI = \frac{\left(\frac{\sum_{i=1}^n s_{RCi} v_{RCi}}{\sum_{i=1}^n v_{RCi}} V_{RC} \right) + \left(\frac{\sum_{i=1}^m s_{ERLi} v_{ERLi}}{\sum_{i=1}^m v_{ERLi}} V_{ERL} \right) + \left(\frac{\sum_{i=1}^o s_{ERi} v_{ERi}}{\sum_{i=1}^o v_{ERi}} V_{ER} \right) + \left(\frac{\sum_{i=1}^p s_{COi} v_{COi}}{\sum_{i=1}^p v_{COi}} V_{CO} \right)}{V_{RC} + V_{ERL} + V_{ER} + V_{CO}} \quad (4)$$

Given the specified range of weights and scores the final CEPI can take any value in the range of $<1,5>$. The resulting CEPI value can be therefore classified into one of the four below intervals assessing the level of company environmental performance:

- $<1,2>$ excellent environmental performance

2. <2, 3) good environmental performance
3. <3, 4) poor environmental performance
4. <4, 5> unsatisfactory environmental performance

5. B2En Performance Development model

5.1 Introduction

In chapter 2, dealing with the Eco-efficiency concept, the interconnection was highlighted between economic and environmental performance or more specifically between environmental and economic results of a company. Selected voluntary environmental instruments have been characterized in chapter 3 as specific examples of application of the eco-efficiency principles in business practice. From chapter 3 it is obvious that implementing eco-efficiency principles in a company not only results in costs savings and increased sales; but that environmentally proactive behaviour, closely associated with innovative thinking, drives a range of non-financial benefits which in the end contribute significantly to the financial bottom line. In our research we went even further and created a conceptual model integrating environmental and economic performance as two interrelated aspects of business activities, enabling effective management and control of both performance areas.

To put it in a different way, the model shows the interdependence between environmental prevention and protection actions on one side, and achievement of business economic objectives on the other side. The name B2En Performance Development indicates that a proactive behaviour in terms of environmental responsibility has a direct impact on improving a company's economic performance. The main aim of the B2En model was to identify interrelations between environmental and economic performance of a company. For the economic component of our model it was necessary to select a suitable method for measuring and managing economic performance.

For the purposes of the model, it was essential to choose such management method that would:

- consider financial as well as non-financial factors (see the nature of the voluntary environmental instruments benefits)
- allow for integration of the environmental perspective
- enable identification of cause-effect relations between environmental and economic performance

Model Balanced Scorecard (BSC), as a comprehensive management method cutting across the entire business, meets all three above conditions and was therefore selected as an economic component of the conceptual B2En model.

As already mentioned, the B2En model is based on the eco-efficiency concept that lies around the principle of generating more products while consuming less resources and therefore producing less waste and pollution. As described in chapter 2, this is achieved especially through innovation in terms of new production and consumption patterns leading to separation (decoupling) of economic growth from resource consumption.

According to the eco-efficiency principle, environment and economics are two interrelated and therefore interacting aspects of a business. For this reason B2En model was designed in

such a way that the environmental perspective is integrated into all four original perspectives of BSC (Fig. 2), forming so the interaction between environmental and economic performance of a company.

Category	Criteria				Weight (V)	Weighted Category Score (W)
	Name	Score (s _i)	Weight (v _i)	Weighted Score (w _i)		
Resource Consumption RC	Criterion 1				V _{RC}	W _{RC}
	Criterion 2					
	Criterion 3					
	⋮					
	Criterion n					
	Total					
	Category Score $\bar{w}_{RC}$					
Environmental Releases ERL	Criterion 1				V _{ERL}	W _{ERL}
	Criterion 2					
	Criterion 3					
	⋮					
	Criterion n					
	Total					
	Category Score $\bar{w}_{ERL}$					
Environmental Remediation ER	Criterion 1				V _{ER}	W _{ER}
	Criterion 2					
	Criterion 3					
	⋮					
	Criterion n					
	Total					
	Category Score $\bar{w}_{ER}$					
Compliance CO	Criterion 1				V _{CO}	W _{CO}
	Criterion 2					
	Criterion 3					
	⋮					
	Criterion n					
	Total					
	Category Score $\bar{w}_{CO}$					
				Total		
				CEPI		

Table 2. Corporate Environmental Performance Index

5.2 Model structure

For the B2En model three different diagrams were created that represent different levels of approximation:

- Level 1 (Fig. 1) - General concept - displays the very essence of the B2En model consisting in integration of the environmental perspective into the original four perspectives of BSC model (economic perspective);
- Level 2 (Fig. 2) - Structure of the model - provides more detailed information on individual components of the model and mutual relations between them;
- Level 3 (Fig. 3) - Identification of relations - offers a detailed look at the cause-effect relation between environmental and economic perspectives.

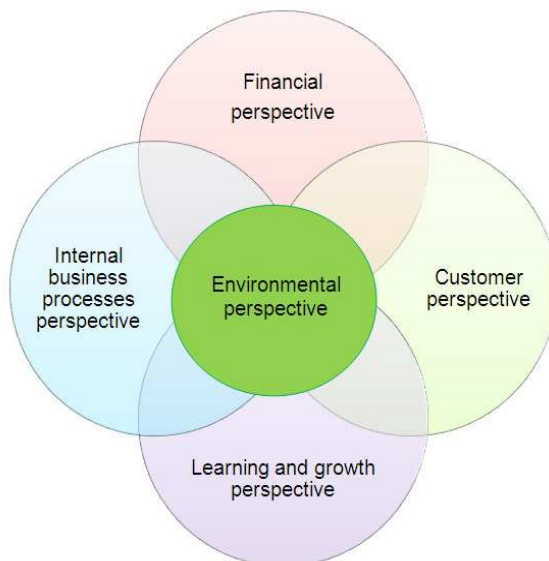


Fig. 1. General Concept of the B2En Performance Development model

When looking closer, B2En model consists of three components: Environmental Perspective (I.), Balanced Scorecard (Economic Perspective) (II.), and Eco-efficiency indicators (III.), which are interconnected by logical links (see Fig. 2). Environmental Perspective of the B2En model comprises the following three components:

1. Environmental performance - presents four broad categories of environmental objectives: resource use, environmental releases, environmental remediation, compliance with environmental legislation;
2. Environmental Performance Indicators (EPI) - these are used as metrics for environmental objectives evaluating a company's environmental performance.
3. Voluntary environmental instruments - enable application of the eco-efficiency concept in business practice. In B2En model voluntary environmental instruments are divided into four groups representing a management level to which they relate: products, processes, systems and strategies.

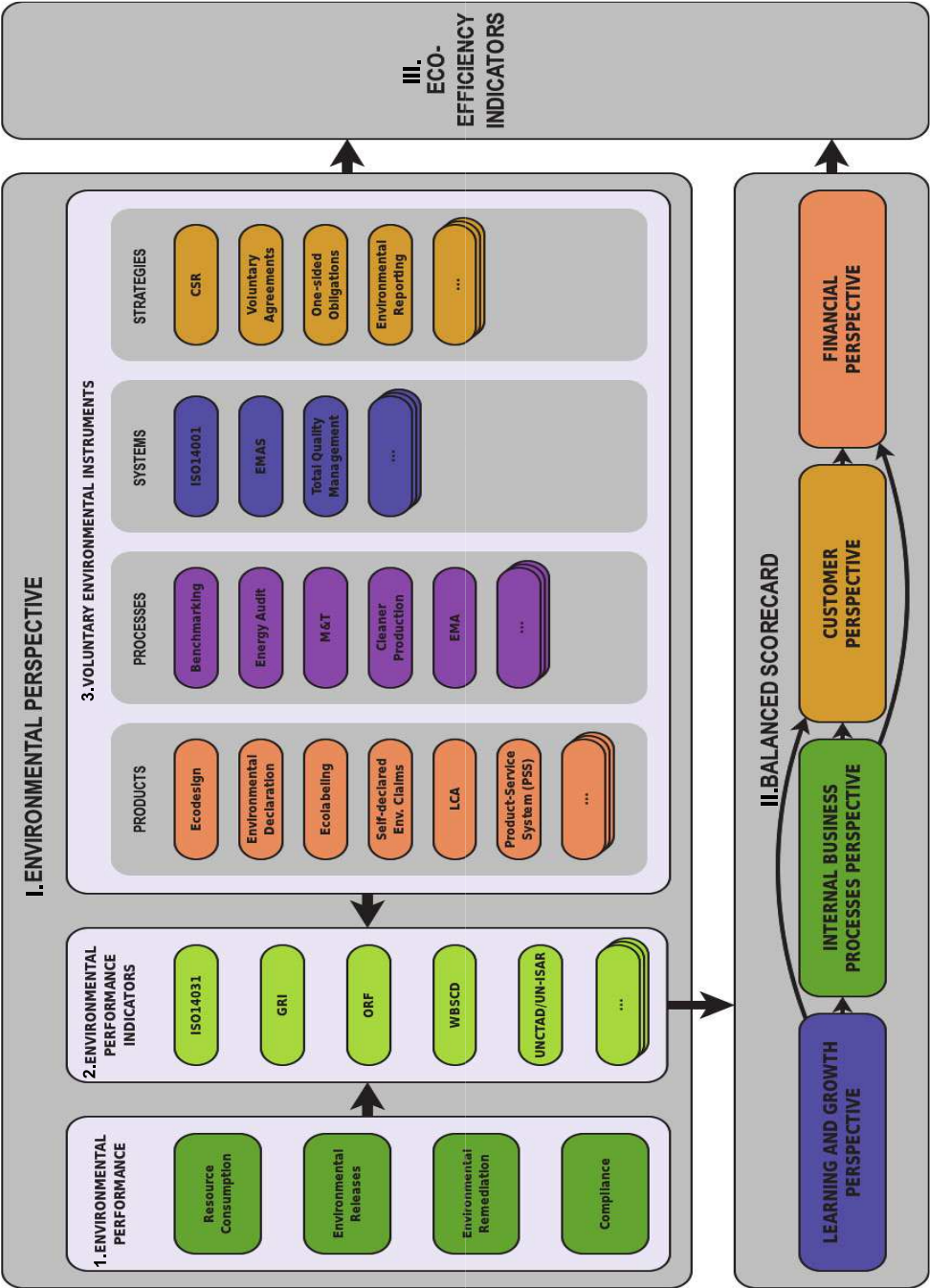


Fig. 2. Components of the B2En Performance Development model

Links and connections between the respective components of the model are expressed by arrows and the principle of the scheme is as follows. A company sets environmental objectives and priorities within the four categories in order to improve its own environmental performance. Once the objectives are set appropriate metrics (EPI) need to be identified and allocated to each of them to measure achievement of these objectives. Voluntary environmental instruments serve as means to influence a specific EPI and achieve those environmental objectives.

Given the nature of the voluntary environmental instruments based on the elimination of waste and pollution prevention at source, achievement of the environmental objectives has a positive effect on one or more perspectives of the BSC. Voluntary environmental instruments hereby ultimately impact on the financial perspective of the BSC model and therefore contribute to the financial performance of a company. Achieving environmental objectives is therefore positively reflected in the economic perspective of business performance which refers to a win-win or a double victory situation.

Fig. 3. provides a detailed look at the cause - effect relationship which interconnects the environmental and economic perspective (representing four original perspectives of BSC) at the level of an individual environmental objective of a company. As the arrows indicate, achievement of an environmental objective has a positive impact on the key economic performance indicators (KPIs).

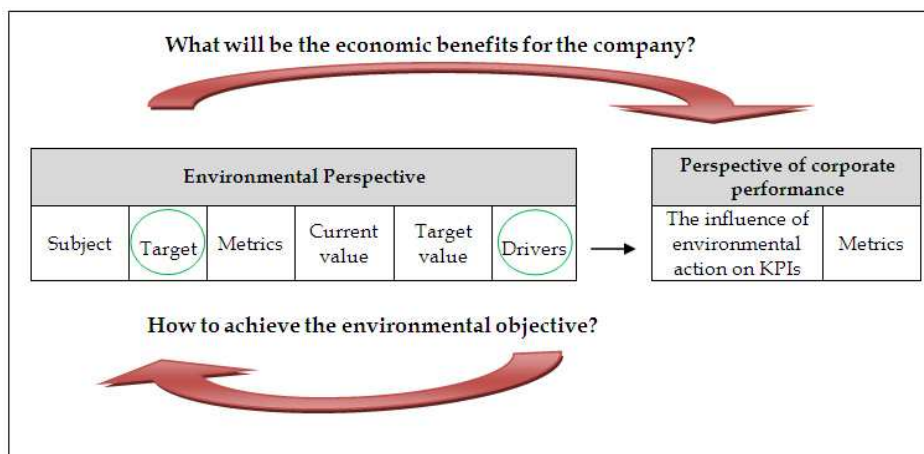


Fig. 3. Cause-effect relationship between environmental and economic perspectives

For each environmental objective, not only the way (drivers - voluntary environmental instruments) to its achievement needs to be identified, but also economic consequences resulting from this accomplishment. Managing eco-efficiency is therefore a two-fold task consisting in reaching the stated environmental objective and achieving the greatest economic benefits, both financial and non-financial. Mutual relationship and linkages between the environmental perspective and individual perspectives of the BSC will be addressed in the following text and the diagram in Fig. 3 will be elaborated for the individual perspectives in greater detail (see table 3).

Environmental perspective						Economic perspective	
Subject	Target	Metrics	Current value	Target value	Drivers	Impact of the environmental action on KPIs	Metrics
GHG emissions	Reduction of GHG emissions in the process / product or for the company as a whole	Tons of CO ₂ equivalent per 1 million sales Energy consumed (EUR/GJ) per number of employees			Energy efficiency programmes (CP, EMS) Using renewable energy	Cost savings on emissions charges Saving energy costs Revenues from sales of surplus emission allowances	Operating costs (EUR) Turnover (EUR)
Eco-label	Over the next 12 months an eco-label for two key products to be obtained	Eco-label certificate			Environmental specialists to be involved in the technical development teams	Product features and image Acquiring new customers in the European market	% contracts from new customers in targeted EU segments
Waste	Reduction of solid waste in the process / product or for the company as a whole	Disposed waste (volume, weight, or EUR) per added value			Waste prevention programs (CP, EMS) Programmes to increase material efficiency Reuse of waste	Cost savings associated with the efficient handling of production materials	Operating cost efficiency
Consumption of toxic substances	Cut down on the volume of toxic substances in the process / product or for the company as a whole	The volume of toxic substances (l) per number of products The volume of toxic substances per added value			Change in Technology Change of major raw materials Change in consumables	Reduced absenteeism due to workplace accidents and illness	Average absenteeism measured as missed working days per 1 employee
Financial Perspective							
Customer perspective							
Internal business processes perspective							
Learning and growth perspective							

Table 3. Links between environmental and BSC perspectives

For whom is the B2En model intended?

The B2En model was designed mainly for internal business purposes to enable efficient management and control of environmental and economic performance with the aim to achieve a win-win situation. In principle, the B2En model can be implemented in all businesses regardless of size and industrial sector. However, for the B2En model to be implemented, the BSC model needs to be applied to certain extent in business practice. Due to this fact and the potential scale, the model is envisaged to be implemented particularly in medium and large companies, whether at the corporate level, individual departments or for a specific product. The win-win principle resulting from a proactive business approach to environmental protection - basic idea of the B2En Performance Development model - is of course essential for the change in general attitude of business community towards environmental responsibility and relating rethinking of the consumption and production patterns. The proposed model is therefore clearly important even for small businesses, although it will not be applied in the proposed form.

5.3 Relationship and interdependencies between the economic and environmental perspective of the B2En model

5.3.1 Financial perspective vs. environmental perspective

In this chapter-part, relationship and interconnection will be scrutinised between the environmental perspective and the individual BSC perspectives. Environmental activities applied in a company through respective voluntary environmental instruments have a wide scope to all levels of business. In the following text, specific areas will be identified in which environmental activities are directly impacting on long-term financial objectives of a company.

a) Increased sales

The increase in business turnover is influenced, among others, by introduction of a new product, new customer acquisition and new market penetration. Many voluntary environmental instruments have the potential to positively affect the growth in turnover of a company through searching for new opportunities, as they offer a different perspective for business decision making.

New Customers - Many enterprises confirm increased sales as a result of implementing EMS - a systematic approach to environmental protection in all aspects of business. An environmentally responsible company with an EMS certification gets new opportunities in commercial sector.

New Product - Waste represents another field of opportunities for further growth in sales. Selling waste as a secondary resource or for recycling, rather than landfilling, constitutes another source of sales. Also, environmental instruments (e.g. Ecodesign, LCA and Eco-labelling) may positively affect the marketability of products.

New markets - Environmentally responsible behaviour improves overall corporate reputation and positively impacts on public perception of a company. This is very important nowadays, especially if a company aims to penetrate or retain foreign markets. An EMS certification or a product eco-label is often an entrance card for companies to export their products to foreign markets.

b) Cost reductions / productivity improvements

Prevention of waste - Environmentally responsible behaviour is primarily associated with savings in operating costs. Preventive voluntary instruments, such as cleaner production, EMS, and Ecodesign seek to minimize waste as a non-product output with a negative or zero market value.

Compliance - A company that comply with environmental legislative requirements is spared fines, fees, denials of permits, closures and other unpleasant consequences of contravening applicable laws. Within EMS, a company is obliged to monitor current environmental laws and regulations on a regular basis to stay ahead of them.

Environmental Risk Management - Through proactive management of environmental risks the likelihood of environmental accidents, leakages, and oil stains can be minimized. Preventive measures, applied through e.g. cleaner production or EMS, can reduce costs associated with repairing damages and penalties for failure to comply with legislation.

5.3.2 Customer perspective vs. environmental perspective

Within the customer perspective, companies in particular strive for growth in the market share and sales in targeted customer segments. These objectives are closely linked to retaining existing and acquiring new customers, and increasing their satisfaction. Among the many aspects influencing customer satisfaction are product features, good relations with customers, and business image.

Product Features - Products manufactured in accordance with the eco-design principles or eco-labelling criteria are easy to disassemble, provide greater security, and can be sometimes purchased at lower prices as a result of recycling some sub-components. Voluntary environmental instruments enable improved product quality in terms of reliability, longevity and ease of maintenance and repair.

Customer Relations - Many customers nowadays aim to improve their own environmental performance and require therefore environmentally friendly products from environmentally responsible suppliers. Voluntary instruments enable inter-company cooperation focused on reducing negative environmental impact across respective supply chains. Industrial symbioses represent another example of such cooperation. Within these clusters, waste of one company becomes raw material input for another one and a closed/ continuous loop is achieved.

Business image and reputation - Environmentally responsible behaviour enhances corporate reputation, positively affects public perception of a company and increases business credibility which is essential when dealing with banks, insurance companies, municipalities and other public institutions.

5.3.3 Internal business processes perspective vs. environmental perspective

An internal value chain consists of three different levels - innovation processes, operational processes and after-sale services (Kaplan & Norton, 2002). Voluntary environmental instruments not only significantly impact on innovative solutions aiming to manage environmental and economic performance at the same time, but they also contribute to streamlining business processes.

Innovation Processes

The Eco-efficiency concept boosts innovativeness through challenging companies to find creative solutions leading to enhanced environmental and economic results. Companies have a plethora of opportunities to innovate, among the most obvious being

- New markets or new customers in existing markets (e.g. Industrial Symbiosis)
- Products innovations (e.g. Eco-design)
- Technological innovations focused on energy and material efficiency

Business Processes

At an operational level, a company should look to 'do more with less', as explained in chapter 2 on eco-efficiency. This does not relate only to economic efficiency, rather the aim is to mitigate harm (emissions, waste, leakages, consumption of material and energy) to the environment when generating more products and services and improving economic benefits. As to resource consumption, eco-efficiency is focused mainly on:

- Streamlining production processes
- Cutting down on resource consumption
- Restriction of hazardous materials
- Reducing unwanted by-products

5.3.4 Learning and growth perspective vs. environmental perspective

Intangible assets of a company represent a prerequisite for flexible and efficient internal processes oriented on achieving objectives of the customer and financial perspectives. A company should also strive to nurture its employees' satisfaction as this is an essential factor in securing customer satisfaction.

Competence of staff

A company can only achieve outstanding results in mitigating negative environmental impact of its business processes, if necessary competence and skills are secured for its employees. However, the excellent performance of employees is not only given by their knowledge and skills, but is significantly influenced by such soft factors as motivation and work attitudes.

Employee Satisfaction

As a result of improved working environment, stemming from an environmentally responsible behaviour of a company, a drop in absenteeism due to illness, fewer workplace accidents, and increased productivity can be expected.

Company image constitutes another factor affecting job satisfaction. A company characterized by environmental responsibility and safe working environment is likely to be more successful in attracting and retaining good employees with a positive environmental attitude.

5.3.5 Colligation of environmental perspective with individual perspectives of BSC

From the above text a clear relationship between environmental management and economic benefits, whether it be financial or non-financial, is obvious. As explained, voluntary

preventive environmental approach not only benefits the environment but is connected with a range of positive impacts on all levels of business.

Table 3 was designed as a template for examining the interrelationship between environmental actions and economic performance of a company as a direct consequence of these actions. In the original research, these interrelationships were scrutinised for each BSC perspective in greater detail. Within this chapter only one example is presented for each BSC perspective. These examples are illustrative only; each company will choose its own objectives, metrics and KPIs according to its individual needs.

6. Eco-efficiency Statement

The Eco-efficiency Statement was developed by the authors to assess the impact of a company's environmental activities, more precisely its environmental profile, on its economic performance. The Statement enables evaluation of the relationship between the environmental and economic results achieved within a specific time period.

As displayed in table 4, information included in the proposed Eco-efficiency Statement is classified into three groups:

- Under the **Key economic performance indicators** key items are shown from the profit and loss statement and financial analysis, that get most affected by the environmental profile of a company. The economic indicators include:
 - a) Key indicators of Profit and loss statement
 - Indicators relating to business operation: e.g. Sales, Operating income, Operating expenses, Gross profit, Value added
 - Key profit categories: e.g. EBITDA, EBIT, Profit after tax
 - b) Key indicators of financial analysis: e.g. ROCE, ROE, ROI; EVA, CFROI
- **Key environmental performance indicators** give an overview of core indicators identified in the GRI guidelines that have the greatest impact on the environmental profile of a company. However, it is necessary to add that the Eco-efficiency Statement is by no means meant to replace the full environmental performance reporting, that is far more comprehensive and gives thorough overview of the total environmental profile of a company. The environmental indicators include:
 - a) Input indicators: e.g. Materials or energy used
 - b) Output indicators: e.g. Emissions released, water discharge
 - c) Impact indicators: e.g. Fines and sanctions
- **Eco-efficiency indicators** represent the third group of indicators included in the Eco-efficiency Statement. These indicators are particularly important as they document the performance of a company and its trend, help identify and prioritise improvement opportunities, and identify cost savings and other eco-efficiency related benefits. Eco-efficiency indicators can also testify that, in a specific business area, there are only limited opportunities for improvement and requirements posed by stakeholders are impossible to achieve. In this Statement, the UNCTAD's approach to eco-efficiency (see chapter 2.2) was applied.

Eco-efficiency Statement								
Key indicators of economic performance	Unit	I.	%	II.	%	III.	%	IV.
Key indicators of profit and loss statement								
Sales	thousand EUR							
Operating income								
Operating expenses								
Gross profit								
Value added								
EBITDA								
EBIT								
Profit after tax								
Key indicators of financial analysis								
ROCE	%							
ROE	%							
ROI	%							
Dividend per share (gross)	EUR/share							
Operational CF	thousand EUR							
EVA	thousand EUR							
CFROI	%							
Key indicators of environmental performance according to GRI								
EN1: Materials used by weight or volume	thousand tons							
EN3: Direct energy consumption by primary energy source	GWh							
EN8: Total water withdrawal by source	thousand m3							
EN16: Total direct and indirect greenhouse gas emissions by weight	CO2 tons equivalent							
EN19: Emissions of ozone-depleting substances by weight	CFC-11 tons equivalent							
EN20: Nox, SOx, and other significant air emissions by type and weight	tons							
EN21: Total water discharge by quality and destination	thousand m3							
EN22: Total weight of waste by type and disposal method	thousand tons							
EN24: The amount of hazardous waste	thousand tons							
EN28: Monetary value of significant fines and total number of non-monetary sanctions for noncompliance with environmental laws and regulation	EUR							
Key eco-efficiency indicators								
Energy efficiency (energy consumption / sales)	Calculation							
Consumption of water in relation to added value	GWh/sales							
Waste in relation to the added value	m3/value added							
	tons/value added							
CO2 emissions in relation to sales	tons/sales							
Leakage of toxic substances into the atmosphere in relation to sales	tons/sales							

Table 4. Eco-efficiency Statement

Eco-efficiency Statement enables an assessment of correlation between environmental results (e.g. energy consumption) and economic outcomes (e.g. operating expenses, EBIT). For achieved results to be interpreted, it is especially important to consider time series data and indexes (increase / decrease compared to last year). Again, the content of the Eco-efficiency Statement was not meant to be fixed. Companies will need to adhere to the proposed structure but should include such key indicators that are essential for their specific business situation and accounting standards. An example of the Eco-efficiency Statement is introduced in the table 4.

7. Methodology for B2En performance development model implementation

Phase 1 – Setting objectives for improving environmental profile

Internal analysis

Identification of current and potential business impacts on the environment should be the starting point for any environmental action and effort for improving environmental performance. The multi-criteria index CEPI (see section 4) is a useful tool for identifying problem areas of the environmental profile of a company.

Feedback from external and internal stakeholders

Over and above the results gained during the internal analysis, a company should also consider views of its external and internal stakeholders, as this can be an invaluable source of information. A company should not rely solely on the results obtained from the internal analysis. It is always invaluable to consider opinions of a company's external and internal stakeholders. Through e.g. regular questionnaire surveys, a company should identify and assess business environmental issues important for its stakeholders. Based on the results from internal analysis, opinion polls and analysis of stakeholders' views, an environmental manager sets targets and objectives for improving company's environmental performance.

Phase 2 – Identification of eco-efficiency opportunities

Once a company has a good understanding of its business actions and production processes and their impact on the environment, it can start identifying the eco-efficiency opportunities leading to enhanced business value through an improved environmental profile. It is crucial that each environmental objective is attained with the best economic outcome. The scheme outlined in table 5 can be used as a selection mechanism for business priorities considering both, their environmental and economic importance. Once respective areas for environmental improvements and value creation opportunities are identified, they need to undergo a prioritization process and be allocated into the following groups:

- High priority issues (H)
- Medium priority issues (M)
- Low priority issues (L)

Phase 3 - Application of voluntary environmental instruments

After goals for improving environmental performance have been set and links to the various perspectives of economic performance have been identified, chosen voluntary environmental instruments can be rolled out.

Priority in terms of environmental performance	H			
	M			
	L			
		L	M	H
Priority in terms of economic performance				

Table 5. Prioritization of proposed actions

Phase 4 - Objectives assessment

During the application of voluntary environmental instruments all results need to be constantly monitored, not only at the end of the project but throughout the entire implementation process. All significant deviations from forecast need to be thoroughly analysed and appropriate corrective actions need to be implemented. The Eco-efficiency Statement (see chapter 6) can be used to evaluate the overall success of the voluntary environmental instruments application.

Phases 5 - Demonstration and communication of results

Demonstration and communication of results achieved through application of selected voluntary environmental instruments follows as the final phase of deployment of the B2En Performance Development model. The economic and environmental benefits ensuing from implementation of individual voluntary instruments shall be communicated to various interest groups in different ways. This process comprises both, internal and external communications.

8. Case study - 3M Corporation

At the end of our research we undertook a case study to verify the functionality of the proposed B2En Performance Development model and its implementation methodology.

The model was applied, in line with the proposed methodology, on real environmental and economic data and targets of 3M Corporation¹ (3M). For the purposes of this paper only a summary of the full case study is introduced.

8.1 Definition of goals for improving environmental performance

3M is characterized by its proactive approach to environmental issues and implementation of preventive solutions. Based on thorough analysis 3M set and prioritised the following goals for the period 2005 and 2010:

- Energy efficiency improved by 20%
- Production of waste materials reduced by 20%
- 800 projects of pollution prevention completed
- Emissions of volatile compounds reduced by 25%

8.2 Application of voluntary environmental instruments

3M apply their responsibility towards the environment mainly through

- Use of Environment, Health and Safety (EHS) management systems (e.g. EMS, Cleaner production)
- Application of product life cycle management systems for permanent protection of the environment, health and safety (e.g. LCA, Ecodesign, Eco-labeling)
- Prevention of environmental pollution through development of new technologies and products.

¹ http://solutions.3m.com/wps/portal/3M/en_US/3M-Sustainability/Global/

8.3 Evaluation of achieving stated objectives

8.3.1 Environmental results

Energy - Since 2005, 3M has achieved energy savings to the tune of 37 million USD, especially through implementation of 1400 projects proposed by its staff.

Waste - In 2008, 616 pollution prevention projects were completed, which prevented 55.5 thousand tonnes of waste representing savings of nearly 91 million USD.

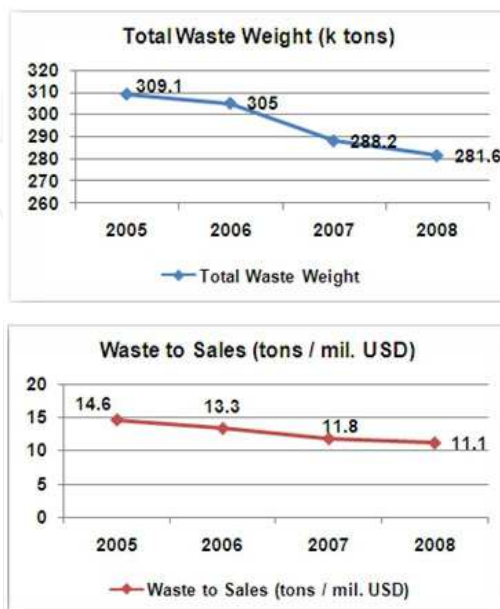


Fig. 4. Total waste production and waste production in relation to sales in years 2005-2008

Emissions - Through a range of energy efficiency programmes, 3M managed to reduce emissions of greenhouse gases by 16% in 2008 compared to 2006 and 69% compared to 1990.

Water - Total water withdrawal, similarly as total water use in relation to sales, showed a negative trend between 2005 to 2008. This was mainly due to introduction of a programme for monitoring and controlling water consumption in 2005 at the corporate level.

8.3.2 Economic results

Operations (See Fig.5.) - Long-term application of programmes for energy efficiency and waste prevention has proved to be particularly important in conditions of surging and fluctuating prices of raw materials. Other positive consequences of these programmes included a decline in recorded work accidents by 7% compared to 2007, with the associated 3.8% decrease in time loss.

Employees - There are many non-financial aspects having direct impact on 3M's employee satisfaction, among the most significant being improved workplace safety, internal

communication, motivation, and the overall business image. These factors have been therefore closely linked with the lower turnover of 3M employees.

Customers (See Fig.5.) - 3M's economic success is mainly based on building long-term business relationships with customers who appreciate the world-famous brand of 3M products representing quality, innovation, reliability and sensitivity towards the environment. Since 2003, demand for 3M's products has been growing, with an average growth rate of 6.1% from 2005 to 2008.

Financial results (See Fig.5.) – Due to controlled growth of operating costs and the positive trend in sales, there was a positive trend in 3M's profit in the period from 2005 to 2007. The decline occurred in 2008 due to global economic crisis. This decrease, however, was not so devastating for 3M, again thanks to implemented programmes for energy efficiency and waste prevention. 3M's business results are also translated into interesting gains for investors. In years 2003-2008, the net profit per share rose by 69.8% with an average growth of dividends per share of 51.5%.

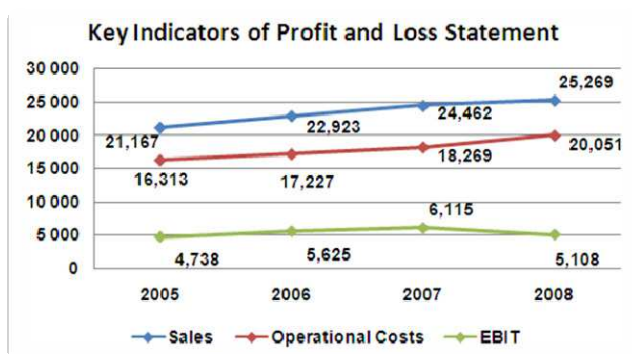


Fig. 5. Trend of key operational business indicators in years 2005-2008

Indicators of eco-efficiency

3M has been successful in improving its eco-efficiency, respectively in reducing the ratio of resource consumption /production of waste and achieved sales.

9. Conclusions

In the current business environment, there is still plethora of companies spurning their environmental responsibility that, as they believe, only represents another financial burden and is in contradiction with economic profit. Therefore, the aim of our research was to testify and demonstrate the positive impact of environmentally responsible behaviour on economic performance of a company. Within our research we undertook a questionnaire survey of some 200 companies in the Czech Republic, carried out an inventory of current environmental performance concepts and tools, and analysed benefits stemming from voluntary environmental instruments applied in business and production processes. Having been cognisant of the contemporary situation, we started developing a conceptual model to

illustrate the interrelation between environmental and economic performance of a company. The B2En Performance Development model proposed by the authors, as presented in this book chapter, links the Balanced Scorecard model with the Eco-efficiency concept. The proposed model, comprising multi-criteria index CEPI, Eco-efficiency Statement, and a spread sheet based software tool, enables identification of relations between environmental objectives and KPI of individual BSC perspectives and demonstrates so a positive impact of proactive environmental actions on business performance. The developed model is essential for a complete attitude change of business-community towards environmental responsibility and re-thinking production and consumption patterns, playing therefore an important role in theory and practice of economic performance.

Given the breadth and depth of this topic, however, there are still significant research gaps that need to be addressed, e.g. modification of the B2En model for application in small companies, application of the model on a specific process or product, or detailed look at correlation of links between the environmental and economic perspective at the level of a specific environmental objective.

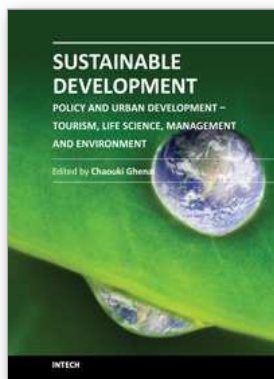
10. References

- Czech Ministry of Environment. (2003). *Eco-labelling*, Czech Ministry of Environment, Retrieved from
<[http://www.mzp.cz/osv/edice.nsf/FD52821067CF70CFC1256FF9003D4A7D/\\$file/Ecolab-final.pdf](http://www.mzp.cz/osv/edice.nsf/FD52821067CF70CFC1256FF9003D4A7D/$file/Ecolab-final.pdf)>
- GRI. (2006). *Indicator Protocols Set Environment (EN)*, Global Reporting Initiative, Retrieved from <http://www.globalreporting.org/NR/rdonlyres/2FB8358D-293C-4F13-85B6-668292487667/0/G31EnvironmentIndicatorProtocols.pdf>
- International Institute for Sustainable Development. (2007). *Eco-Efficiency*, In: *Business and Sustainable Development*, 26.4.2010, Available from
<http://www.bsdglobal.com/tools/bt_eco_eff.asp>
- Kaplan, R.; Norton, D. (2002). *The Balanced Scorecard: Strategic business performance measurement system* (3rd edition), American Management Association, ISBN 80-7261-063-5, New York
- Lehni, M. (2009). *Eco-efficiency - creating more value with less impact*, World Business Council for Sustainable Development, Retrieved from
<http://www.wbcsd.org/web/publications/eco_efficiency_creating_more_value.pdf>
- Müller, K.; Sturm, A. (2001). *Standardized Eco-efficiency Indicators: Report I – Concept Paper*, Ellipson AG, Retrieved from
<http://www.ellipson.com/files/studies/EcoEfficiency_Indicators_e.pdf>
- Remtová, K. (2003a). *Cleaner Production*, Czech Ministry of Environment, Retrieved from <http://www.env.cz/osv/edice.nsf/e26dd68a7c931e61c1256fbc003a4ee/820af3233682e83ec1256fc0004eaf10?OpenDocument>
- Remtová, K. (2003b). *Ecodesign*. Czech Ministry of Environment, Retrieved from
<<http://www.env.cz/osv/edice.nsf/da28f37425da72f7c12569e600723950/7907a38f19e1d57ec1256fc0004fe74d?OpenDocument>>

- Thoresen, J. (1999). Environmental Performance Evaluation - Tool for Industrial and Improvement. *Journal of Cleaner Production*, Vol.7, No.5, (October 1999), pp. 365-370, ISSN 0959-6526
- Verfaillie, H.; Bidwell, R. (2000). *Measuring Eco-efficiency: a guide to reporting company performance*, World Business Council for Sustainable Development, Retrieved from <http://www.wbcsd.org/web/publications/measuring_eco_efficiency.pdf>

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Tereza Kadlecová and Lilia Dvořáková (2012). Sustainable Development as an Aspect of Improving Economic Performance of a Company, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/sustainable-development-as-an-aspect-of-improving-economic-performance-of-a-company>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Innovative Sustainable Companies Management: The *Wide Symbiosis* Strategy

Francesco Fusco Girard
Seconda Università Degli Studi di Napoli
Italy

1. Introduction

The **main objective** of this paper is proposing a theoretical and innovative approach for companies' sustainable strategy development from the *private* point of view and according to a best-practices approach focused on very new market trends.

Nowadays the scientific community widely accept that one of the main pillars for sustainable development effective implementation is the "closed loop economy" objective: energy and material processes shifting from linear (open loop) systems - in which resources move through the economic system to become waste - to a closed loop system where wastes are inputs for new processes.

Starting from the above statement, the key thesis of this paper is that "closed loop economy" approach and concept can be successfully extended from material and energy flows to non-material flows, shifting all the relationships which involve the companies (B2B-Business to Business; B2C-Business to Consumers; B2I-Business to Institution as well as Companies internal relationship) from a type I (linear / hierarchical / one-way relationship) towards a type III - symbioses (cyclic relationships with internal loops and feedbacks). When this symbiosis approach involves simultaneously all the relationships (B2B, B2C, ..) we will name it "wide symbiosis". We will see as this systemic approach can support in sustainable development implementation that is achieving economic, environmental and human/social goals (Fusco Girard, 2009).

In relation with the above aim, in the **second paragraph** we will briefly describe the most important **business trends expected for next years** focusing on the actual global economic crisis. **Then (par. 3)** we will point out **what sustainable company management is** and **how** it can support companies for next years challenges. After that (par. 4) the **sustainability vision is declined** in some **more concrete sustainability strategic objectives**. The next paragraphs are focused on describing B2B, B2C, B2I and companies internal relationships aiming at **analyzing how they can contribute to the loop economy promotion achieving the sustainability strategic objectives** as they have been previously described.

The final part of the paper is focused on analyzing **decision making processes** and **evaluation tools** to effectively implement loop economy choices. Indeed, conclusions highlight the **primary role of cultural values** to promote the *Wide Symbioses* relationships.

2. The context

Below are summarized some of the main global business trends as they are expected for next years. Of course the aim is not an in-depth drill down on possible future trends (see also Simon and Zatta, 2011), but just providing some general context evolution tendencies.

- **Global economic crisis is expected to continue**, with some relevant exception (eg. developing countries like Brazil, Far East ...): by this time it seems clear that the wished economic recovery at *ante-2008 level* will not take place soon and presumably the global GDP will evolve according to a “W trend”(see also Hope, 2011)
- **Globalization is expected to increase**: competition is getting more and more global, involving every value-chain phase: world based recruiting; worldwide level sourcing; manufacturing de-localization... This is fostering to increase Asian leadership Vs Western countries (see also Yeung et al, 2001 and Sunley, 2011)
- **Interest in environmental issues is expected to continue to grow** over the next years driven by customers and supported also by Governments. Climate change / greenhouse gas reduction and fresh water scarcity are expected to be the main issues (see also Laszlo, 2009 and Makower, 2009)
- **Raw materials and energy costs are expected to continue their increasing trends**, mainly driven by their scarcity and the widening demand to support developing countries growth. Also the recent nuclear giving up at global level (following the Fukushima nuclear disaster) will foster to increase the energy prices
- **Politics and Government influence on business is expected to remain high**: following the first part of current economic crisis (2008-early 2009) many Governments strongly entered into market dynamics for saving companies and the overall global interests (see also Simon and Zatta, 2011)
- **Customer’s behaviours definitely changed**: customer’s expectations Vs new products are by far higher than in the past, furthermore web-based communities fostered customers sharing of products experiences, their opinions about performances, ranking, values etc. (see also Boaretto et al, 2011)
- **Growing internet based-connections**: starting from the “home internet” we pass through the internet everywhere (due to PDA / *smartphones* diffusion) to reach the “internet anything”, where a number the equipments (eg. TV, cars, washing machines, home anti-theft systems ...) are web-connected (see also Simon and Zatta, 2011 and Boaretto et al, 2011).

3. The vision

In the above-described context, sustainable company management can be the key approach to really win the competition (Werbach, 2009). So, below we will describe first of all what sustainable company management is and then how it can be implemented.

Following Seralgerdin approach (Seralgerdin, 1999), which recognizes four different kinds of capital (economic capital, natural/environmental capital, social capital and human capital), sustainable development can be seen as aimed to maintain or increase all capital stocks at the same time.

According to this approach, it is also possible to express sustainability under the point of view of comprehensive efficiency or “complex efficiency” (Fusco Girard, 2008), which is the

extension of the efficiency concept to all the above forms of capital, involving (see also Goodwin, 2003):

- Economic efficiency, which is the efficiency in economic capital usage. It refers to minimizing the economic resources use while maximizing goods and services production aiming to reach the state where nothing more can be achieved given the available resources (O'Sullivan and Sheffrin, 2003)
- Natural efficiency (eco-efficiency) that is linked to the use of natural capital. It refers to minimizing the environment impacts (also in terms of waste and pollution) while maximizing goods and services production (Schmidheiny, 1992) aiming to *de-coupling* economy that is economic growth without corresponding increases in environmental pressure (Bleischwitz and Hennicke, 2004)
- Social efficiency, which involves the efficiency in social capital usage. It refers to the aiming of achieve economic results maximizing the value of social relations and the role of cooperation and confidence (Putnam, 2000)
- Human efficiency, which entails the efficiency in human capital usage aiming to improve stock of competences, knowledge and personality attributes (see also Human Development Report, UNDP, 2011)

with the overall aim of maximizing / balancing them.

Furthermore, complex efficiency enlarges time and space perspectives in managing companies:

- Enlarging spatial perspective means following a **holistic approach** and focusing not just on the single company
- Enlarging time perspective means considering not just short term, but also **medium and long term**

Given the above descriptions, it is clear that complex efficiency requires a multidimensional and systemic approach (Fusco Girard, 2009).

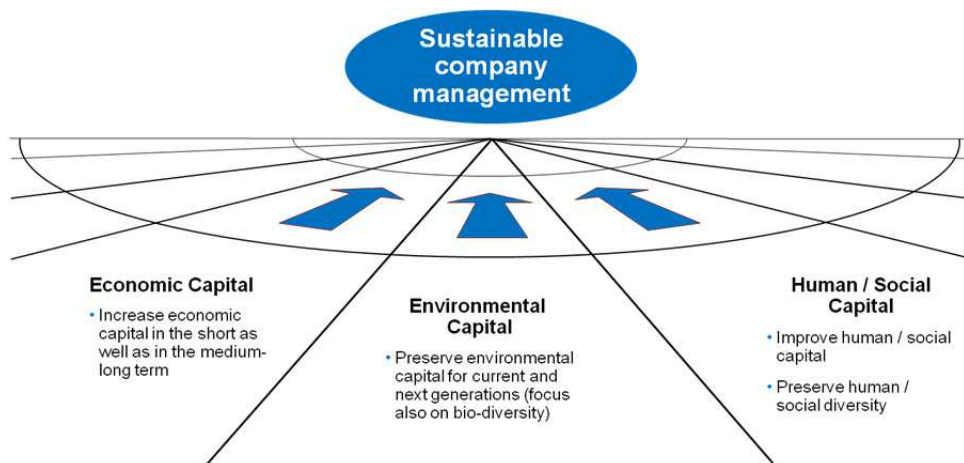


Fig. 1. Sustainable companies management vision

4. Vision and strategic objectives

The above sustainable company management vision can be realized through a **systemic approach** and by the achievement of a number of strategic objectives. Below we have grouped them according to their phase in product lifecycle and summarized, being aware of some significant overlapping.

- Overall:
 - **Achieve good financial/ economic performances also in medium-long term:** long-term approach is based on customer loyalty. Indeed, companies built on a foundation of customer loyalty can grow over the long term through all types of economic climates, while companies with weak customer loyalty face an unstable future: "Bad profits" undermine customer relationships, and include ill-gotten earnings (Reichheld, 2006). The main condition for companies sustainable management is – for sure- that the company itself must exist and long-term approach is *conditio sine qua non* in order to achieve it. Clearly, companies' risks must be managed coherently (see also Laszlo, 2008)
 - **Promote companies integration with eco-systemic dynamics:** companies as well as their products and their by-products must be always considered as part of larger eco-system, avoiding perturbing it (Ayres and Ayres, 2002)
 - **Promote companies integration with social environment (with major focus on local social environment):** encouraging strong relations with local communities can be a leverage also for increasing employees (that usually are local citizens) well-being and productivity. The integration with local social environment can be an important way to improve companies internal and external social capital
- Production phase:
 - **Follow a lifecycle approach in product design:** in the design phase all the stages of a product's life from-cradle-to-grave must be considered (i.e., from raw material extraction through materials processing, manufacture, distribution, use, repair, maintenance, and disposal or recycling) in order to achieve wished impacts on economic, environmental and social / human capital (see also Costanza, 1991)
 - **Reduce production costs:** production cost cutting (usually achieved leveraging on people/processes/IT improvements) can positively impact economics and also environment, when linked to energy / raw materials savings (see below)
 - **Reduce the quantity of required energy and materials, focusing on renewable:** consider dematerialization opportunities, that is " doing more with less", decoupling economy wellness from energy and material consumption, maximizing renewable energy and material consumption Vs non-renewable. (Bleischwitz and Hennicke, 2004)
In many field this trend is gaining room also leveraging on technologies opportunities (eg. in the work environments the use of paper is greatly reduced / eliminated thanks to digital communications) and swapping from product to services. For examples, customers need to illuminate a room (that is the service) while light bulb is just a way (product)
 - **Sell every manufactured product:** production waste is usually referred to product not-fulfilling specific "qualitative" requirements, but production waste can be considered also every unsold manufactured product: as matter of facts, unsold products can be seen as waste of money, energy and material impacting both economics and environment

- **Consider that employers have no capability limits:** the main key success factors to achieve best employers performances are an adequate management, the trust that enterprise successes are their own success, and an effective training
- Lifecycle / using phase
 - **Reduce lifecycle costs for maintenance and operation:** nowadays consumers are more aware of lifecycle costs and their increasing can be seen almost as a robbery when not justified. For example paying more than €400 for a rear mirror on a €8.000 car (about 5%) negatively impacts the customer-carmaker relationship
 - **Follow integrated approach to protect the environment:** considering that real environmental impacts are very-very difficult to be calculated, their global minimization can be very important to protect the environment *leveraging on both new technology opportunities and correct customers behaviors promotion*. For example, new cars CO2 emission are usually reduced VS previous models, but this effort can be invalidated by a more frequent car usage as well as by inappropriate drive style
 - **Satisfy customers:** considering that customers can be sorted in promoters, passives and detractors (Reichheld, 2006), every post-sales effort could be aimed on increasing the number of promoters and strongly avoiding detractors, definitively overcoming a Customers Relationship Management (CRM) approach focused just on IT systems
- Lifecycle end
 - **Extend product lifecycle:** as matter of fact, wasting a “still working product” has two key important issues: a) increasing the waste disposal needs (that can be very hard for electronic waste / hazardous materials) b) increasing energy and materials needs for replacing the wasted product. For example, replacement rate of *still working* mobile phones is very high, impacting the needs of waste disposals (that can be hard for some components such as batteries and silicon parts) as well as the need of new material and energy embedded in the new mobile phone
 - **Facilitate reuse:** as stated for the production phase, also the design efforts could be focused on both conventional reuse - where the product (or its parts) is used again for the same function - as well as new-life reuse where the product (or its parts) is used for a new function. As matter of facts, reuse help save time, money, energy, and resources, opening new opportunities to offer quality products to people and organizations with limited means
 - **Facilitate recycling** in order to prevent waste of potentially useful materials, cut the consumption of fresh raw materials, cut energy needs, reduce air and waste pollution by reducing the need for "conventional" waste disposal, and lower greenhouse gas emissions as compared to virgin production.

In the Table 1 every objective is mapped according to its impact on complex efficiency

5. How objectives can be implemented: Symbioses

Implementing sustainable development means shifting a linear economic model to promote a loop economy.

In this context, the paper aims at investigating conditions and consequences of the above well accepted and known statement:

- Extending its focus from material also to non-material flows, partially widen industrial ecology (Ayres and Ayres, 2002) / ecological economics (Costanza, 1991) approaches

- Approaching the issues from the private/enterprise point of view, filling an important gap, since most of studies are mainly focused on a public point of view.

Group	Objective	Impacts on capital		
		Economic	Environmental	Social / Human
Overall	Follow a long-term business approach	●		◐
	Promote companies integration with eco-systemic dynamics		●	◐
	Promote companies integration with social environment			●
Production phase	Follow a lifecycle approach in product design	◐	●	
	Reduce production costs	●	◐	
	Reduce the quantity of required energy and materials, focusing on renewable	◐	●	
	Sell manufactured products	◐	◐	
	Consider that employers have no capability limits	◐		●
Lifecycle / using phase	Reduce lifecycle costs for maintenance and operation	●		
	Follow integrated approach to protect the environment		●	
	Satisfy customers	●	◐	
Lifecycle end	Extend product lifecycle	◐	●	
	Facilitate reuse / recycling	●	●	◐

Table 1. Objectives impacts on complex efficiency

For the above aim, we will follow a 3 steps path:

- Recognizing of the existing elements and relationships in every node involving the companies (B2B-Business to Business; B2C-Business to Consumers; B2I-Business to Institution as well as Companies internal relationships)
- Investigate the *wide symbioses* approach opportunities, that is demonstrating how making every recognized relationships “symbioses” (that are cyclic relationships with internal loops and feedbacks) can help to promote sustainable company management matching the above strategic objectives
- Recognizing the role of specific tools and of cultural factors in order to effectively implement symbioses.

6. B2B symbioses

Hereby we investigate the development of the relationships among different companies (Business to Business), pointing out the system evolution from one-way relationship toward symbioses.

6.1 The relationship evolution and symbioses description

Type I: Before the “revolution of quality”, the **relationship** among different companies was **one-way and hierarchical**: main assembler companies provisioned from lot of little suppliers. Assemblers lead auction among suppliers to buy components previously designed by the assemblers and to be manufactured by suppliers. The competition was fully price-based: best is cheaper with very limited care of product quality. Since only assemblers are in charge of the design process, no product innovation could be implemented by suppliers, which were **frequently replaced in order to save money**.

Type II: One of the main “revolution of quality” innovation is the recognizing that **knowledge, know-how, technology and a real understanding of process and production can be allocated also in suppliers**. This recognising is the first step in establishing a new relationship with **suppliers, which became partners**: supply agreements have been lasting longer and different companies have been working in partnership sharing knowledge, technology, and – occasionally – also management strategies.

Type III: New and useful relationships (symbioses) among different companies are established when collaboration involves not only business goals, but also environmental and social goals, such as the implementation of a common Environmental Management System or the extension of LCA (Life Cycle Analysis) also to partner process.

Top symbiosis level is **industrial symbiosis**, which is based on resource exchanges: although there is not a general accepted industrial symbiosis definition, in general three primary opportunities for resource exchange are considered (Chertow, 2007):

1. By-product reuse – the exchange of firm-specific materials between two or more parties for use as substitutes for commercial products or raw materials
2. Utility/ infrastructure sharing – the pooled use and management of commonly used resources such as energy, water, and wastewater
3. Joint provision of services – meeting common needs across firms for ancillary activities such as fire suppression, transportation, and food provision.

In such a way partnership relationship do not involve only products, but also by-products, waste, emissions and whatever is no more functional for a company but could be useful for another one (Rutten and Boekema, 2004).

Below the industrial symbiosis is described by one of the main example: Kalundborg (Denmark).

6.2 Kalundborg: An industrial Symbiosis example

The most well-known example of industrial symbiosis is Kalundborg (Denmark), where co-operation has developed spontaneously over a number of decades and currently involves about 20 different projects. By products exchanges are schematized in figure 2.

Main participants in the Kalundborg Industrial Symbiosis are:

- DONG Energy Asnæs Power Station,
- Gyproc plasterboard factory,
- Novo Nordisk pharmaceutical plant
- Novozymes enzyme producer A/S,

- Statoil oil refinery
- Kara/Noveren waste company
- Kalundborg Municipality

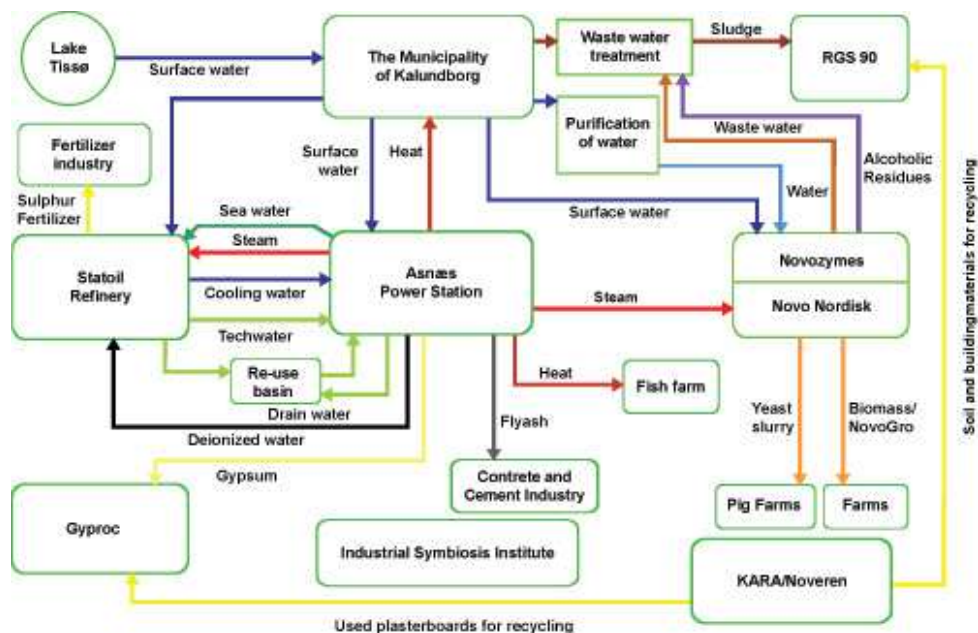


Fig. 2. Kalundborg by-products exchanges

Examples of Symbiosis Projects: Energy savings

The Asnæs Power Plant is a coal power plant (one of the main electricity plant in Denmark, producing about 10% of the electricity consumption in the Country); its excess heat is utilised as process steam and central heating. More in detail, Statoil Refinery, Novo Nordisk and Novozymes A/S receives annually about 1,5 mio. GJ (equivalent to more than 75.000 family houses yearly electricity consumption and to around 240.000 tons CO₂).

The symbiosis will optimise the process steam cooperation and return up to 150.000 m³ steam condensate to the Asnæs Power Plant.

Currently a DONG Energy technology company is setting up a bio-ethanol plant next to the power plant operating on straw - a by-product in the agricultural sector. The use of steam and delivery of biomass as fuel in the power plant improves the overall CO₂ account with more than 25.000 tons CO₂ - not including the CO₂ reduction from the replacement of bio-ethanol in gasoline and diesel. (<http://www.symbiosis.dk/industrial-symbiosis.aspx>)

6.3 Symbiosis sustainability evaluation

Below we will analyse the most important symbiosis impacts on complex efficiency in achieving vision's objectives; furthermore there are many other impacts which are more in depth analysed in industrial symbiosis and industrial ecology literature. (Ayres, 2002)

- a. Achieve good financial/ economic performances also in medium-long term: symbioses are usually shaped by market hand, driven by economical reason and usually require stable business partnerships, which is very consistent with the long-term business approach
- b. **Promote companies integration with eco-systemic dynamics:** as matter of fact, industrial symbioses follow the nature approach (see also Hawken, Lovins et al, 1999), where one company's products waste is an input for an other company
- c. **Promote companies integration with social environment (with major focus on local social environment):** despite the appearances, industrial symbiosis is strictly linked with (mainly local) social capital. In literature many scholars point out that some industrial symbioses fail to grow despite economic profitability of material exchanges. The reason is that cultural background is a key factor to implement symbiosis. It seems – from practical experiences – that realizing material exchanges require, on its turn, the existence of non material exchanges (Fusco Girard, 2009)
- d. **Reduce production costs:** as Kalundborg experience points out, many symbiosis projects have been stimulated just by economic saving opportunities. Indeed in some cases the industrial symbiosis was not “discovered” by outsiders / scholars just because the exchanges have been shaped by the invisible hand of the market rather than from conscious direct involvement
- e. **Reduce the quantity of required energy and materials, focusing on renewable opportunities:** a positive impact on the environment due to symbiosis is based on natural resources improved management, since energy, by-product exchange and common waste management increase the efficiency in resources using (Fusco Girard, 2008)
- f. **Facilitate reuse / recycling:** these are, by definition, the industrial symbioses key characteristics

7. B2C symbioses

Over the past decade, the **relationship between customer and companies** has been substantially developing. The following analysis shows this **evolution from mass production toward co-creation**, focusing on material and immaterial loop closing.

7.1 The relationship evolution

Type I: During the so-called *mass-production* period, companies produce as much as they can in order to profit from scale economy according to a push model. Of course models are always **standard** with no (or very limited) customization opportunities, quoting Henry Ford “We produce any colour cars - so long as it's black”.

This “**push**” approach is completely **linear** and implicitly implies that companies know how to fully satisfy customers.

Type II: The spread of the so-called **Toyota spirit** radically changed the relationship between customers and companies. The push approach is gradually replaced by the pull one: *just in time* and *lean production* make possible the achievement of scale economy, although products are customized, so customers began to contribute to product features. Due to this customization opportunities the **B2C relationship** is no **more only one-way: customer**

requiring a tailored products (Customer to Business input) **to be provided by companies (Business to Customer feedback)**. The new customer-focused approach implies also that, according to Kano quality model (Watson, 2001), companies put into practice a new proactive attitude, trying to anticipate, and not just to follow, customers requirements. (Ohno, 2004)

7.2 Symbiosis description

Type III: Implementing symbioses with customers means **recognising customer relationship as the most important factor in company development, promoting continuous flows and feedbacks with customers, potential customers and non-customers.**

B2C relationship as key success factor

The importance of this relationship is pointed out by many scholars, highlighting as in nowadays markets the key **success factor is not a requirement but is the relationship with customers**. Reichheld (Reichheld, 2006) stated that the relationship allows tracking promoters and detractors distinguishing good from bad profits. . The discriminator between good and bad profits is “the ultimate question”: “treat the customers as if you were a customer yourself”. As matter of facts, bad profits boost short-term earnings but alienate customers. They undermine growth by creating legions of detractors-customers who complain loudly about the company and switch to competitors at the earliest opportunity. On the contrary, company makes good profits through enthusiastic customer participation which can be achieved joining material requirements (as they are Kano’s model) to not-material requirements, such as environmental compatibility, health care, respect of human rights etc (which can be also important drivers for product and process innovations).

B2C relationship for the Co-Creation symbiosis

For a long time, the market was the place of *value exchange*, while companies’ premises were the place of *value creation*.

According to Prahalad and Ramaswamy (Prahalad and Ramaswamy, 2004) some new trends (currently costumers are informed, aware, and networked and the product value is not linked just with provided services or products) are important drivers to radically change the relationship with customers **enabling co-creation, a new form of value creation**.

Times companies simply sell their products and services are over. Successful companies allow their customers to take part in the designing process, to keep track of production tasks, to participate in customers community: **customers take part in value creation, which that is not out, but in the market**.

Under current trends, consumers "seek to exercise their influence in every part of the business system," and companies have to accommodate, by designing "experience environments" for creating new value creation spaces.

Wikinomics can be seen as the peak of the above new B2C relationship. Indeed, according to Tapscott and Williams (2006), the word *Wikinomics* identifies how some companies are using **mass collaboration** (also called *peer production*) and open-source technology to be successful.

The use of mass collaboration in a business environment, in recent history, can be seen as an extension of the trend to outsource: i.e. externalizing formerly internal business functions to

other business entities. The difference however is that instead of an organized business body brought into being specifically for only one function, mass collaboration **relies on free individual agents to come together and cooperate to improve a given operation or solve a problem** (A.T. Kearney, 2009).

The new B2C Symbioses examples can be seen along all the value chain

- **Research and development:** for example, P&G (Procter and Gamble, Fortune 500 American multinational corporation manufacturing a wide range of consumer goods) leverages on external networks (NineSigma and InnoCentive), where consumers develop and put forward suggestions for technical / scientific issues submitted by P&G. This allows an overall R&D investments reduction, while innovation success rate significantly increased. So P&G is planning to source 50% of their new product and service ideas from outside the company, where 90,000 scientists around the world can help solve tough R&D problems for a cash reward (Tapscott and Williams, 2006)
- **Purchasing:** Goldcorp (a Canadian gold producer), published geological data about an area of 200 km² on the Internet and offered awards for the best potential sources of gold. Scientists and researchers from all over the world used that data for identifying 110 locations out of which half were new for Goldcorp. At over 80% of the listed sources, Goldcorp discovered a total of 227 tons of gold (Tapscott and Williams, 2006)
- **Design:** Companies can allow customers to design their own individualized product, such as Sumerset, a US houseboats manufacturer that aims to leverage on "emotional bonding with... the company" and "a greater degree of self-esteem". (Prahalad and Ramaswamy, 2004). Other interesting practice is NikeiD where, according to the slogan "you design it. We build it", customers can customize shoes in terms of both look (materials, colours and personal id adding ...) and performance (wide and narrow sizing, independent left and right sizes, outsoles picking ...)
- **Marketing/Communications:** here many companies are focusing their efforts frequently leveraging also on new trends like Facebook. One of the main examples can be Danone (a French food-products multinational corporation): Consumers vote for the targeted flavour of a new pudding by SMS or on a website or by Facebook: more than 1 million consumers voted and were already familiar with the product before it went to market.
- **Sales/Distribution:** here frequently online companies are the most involved. For example, eBay set up an online community which is free of charge, optional offer with discussion forums, news, tips for all eBay members. Users of the eBay community bid twice as much in auctions, pay up to 24% higher prices, and spend 54% more than eBay members who are not part of the community.
- **Post-sales / CRM (Customer Relationship Management):** this broad term covers all the concepts which are used by companies to manage their relationships with customers, including collecting, storing and analyzing customer information. Since getting new customer costs about 5 times more than keeping current ones (Farinet and Ploncher, 2004), CRM is a key tool to really understand customers' requirements in order to design new products and to adjust current products in this perspective. Once again, this points out that the best company key factor is the best possible relationship with customers, rather than the best possible products. One of the main examples of post sales B2C symbiosis can be H3g (UMTS-based mobile phone company) which provides on-line free customer assistance fully leveraging on other customers' knowledge (see www.lesaitutte.it)

7.3 Symbiosis sustainability evaluation

The B2C symbioses impacts on complex efficiency can be summarized as below:

- a. **Achieve good financial/ economic performances also in medium-long term:** establishing and maintaining a strong customer relationship through B2C symbioses is a good way for generating long-term “good profits”; According to Reichheld, good profit implies high level of success: for example, every Dell not satisfied customer costs about 57 USD, whereas satisfied customer breeds about 328 USD (Reichheld, 2006)
- b. **Promote companies integration with eco-systemic dynamics:** Recognising that customers personal values are appreciated also by the companies could be an important key factor in the B2C symbiosis perspective. For example, ISPO survey points out that 77% customers state to avoid to buy products made by company which are not involved in social or environment campaign
- c. **Promote companies integration with social environment:** Active and proactive customer participation foster to improve human and social capital. Looking for and reaching information is useful to improve skills, but also to establish new networks, through internet or customers associations.
Recognising that important values are shared also with a company could be a main factor also in purchasing process: in a 2004 survey over an half of customers declare to know fair trade and 6,6% declare to buy only from fair trade
- d. **Reduce production costs:** B2C symbiosis allows many interesting savings in production costs as above pointed out in many examples along the value chain
- e. **Sell every manufactured product:** the B2C symbiosis approach implies that only sold products have been manufactured
- f. **Reduce lifecycle costs for maintenance and operation:** co-design experience by definition foster lifecycle costs reduction according to customers needs
- g. **Satisfy customers:** co-design and value co-creation can strongly help companies in making customers satisfied. Furthermore, likewise CRM surveys point out that (Farinet and Ploncher, 2004) 76% of satisfied customers buy again the same product, 33% buy again a not fully satisfying product, but 89% of customers buy again a not fully satisfying product if customer service is excellent. Once again, this points out that the best company key factor is the best possible relationship with customers, rather than the best possible products (Ronchi, 2003)
- h. **Extend product lifecycle:** through co-creation, it is possible to establish an emotional relationship with the product that can foster to prolong product life cycle, encouraging also a correct maintenance Vs thruway approach.

8. B2I symbioses

Below we investigate the evolution of the relationship among companies and Institutions, starting from command and control approach/ policies, which is a one-way and hierarchical relationship, towards voluntary agreement that needs feedbacks and reactions (symbiosis).

The relationship evolution

Type I Command and Control was the first step towards modern sustainability policies. At the beginning these laws were focused on safety in the working environment, and then have been widened also to environmental emission and waste management. These kinds of laws

reflected a one-way relationship between Public Institutions and companies so that, in many cases, companies do not appreciate them seeing mostly their additional management costs (Fusco Girard, 2009).

8.1 Symbiosis description

Type II and III: below we will analyse the type II and III relationship between Companies and Public / Private Institutions. We will analyse both types in the same time because both are based on considering sustainability as a development opportunity, through active involvement instead of passive laws acknowledge (Fusco Girard, 2009) and hereby the difference is not in the instruments, but in the level of involvement.

In this perspective, command and control instruments have been integrated by:

- **Economic instruments, in order to internalize external costs.** This goal is usually achieved through **emission trade system set up**. Here, a central authority sets a limit or cap on the amount of a pollutant that can be emitted. Companies are required to hold an equivalent number of credits or allowances which represent the right to emit a specific amount. The total amount of credits cannot exceed the cap, limiting total emissions to that level. Companies that need to increase their emissions must buy credits from those who pollute less. The transfer of allowances is referred to as a trade. Therefore, at least in theory, those who can most cheaply reduce emissions most cheaply will do so, achieving the pollution reduction at the overall lowest possible cost.
- **Green / Sustainable Procurement:** integrating also environmental and social criteria into procurement decisions in addition to the conventional criteria of price and quality.
- **Education:** education is a fundamental instrument to spread the sustainability concept, in order to increase the demand for sustainable product/services as well as a coherent use.
- **Voluntary agreement** is a contract between the public administration and a company in which the firm agrees to achieve a certain environmental or social objective and receives a subsidy to change its technology through R&D and innovation. The agreement is bilateral, between firm and administration, and requires a voluntary element on both sides.

It is very important to consider that best results can be achieved only by well combining the above instruments, in particular: (Carminio et al., 2002)

- Command and control instruments are necessary to guarantee minimal requirements
- Economic instruments are very useful to change implant behaviour
- Education is finalised to promote sustainable behaviour also through best practices.
- Voluntary agreement can be implemented only where there is a social background that promotes sustainability concepts.

8.2 Symbiosis sustainability evaluation

Symbioses promote sustainable organization of companies with positive impacts in achieving the sustainable objectives

- a. Achieve good financial/ economic performances also in medium-long term: Sustainability is the key strategy that European Union Institutions identified in order to

improve European companies competitiveness. Furthermore, it is important to notice that also “do nothing” option has its own costs: Munich Re (2009) pointed out that economic losses due to climate change related extreme events grew up from less than 5 Millions USD in 1950 till to current over 70 Millions USD

- b. **Promote companies integration with eco-systemic dynamics; Follow a lifecycle approach in product design; Reduce the quantity of required energy and materials, focusing on renewable; facilitate reuse / recycling:** The reduction of the impacts on natural capital is frequently the aim of such instruments, so we can assume that this goal is always - at least partially - achieved. Here it is also important to consider that these kinds of impacts are typically extra-national, so involving as many countries as possible is the key strategy for increasing effectiveness
- c. **Promote companies integration with social environment; Consider that employers have no capability limits:** Beyond the impacts on safety in the working environment, the impacts on human and social capital involve both offering and demand (Fusco Girard, 2009)
 - Offering-side policy could be achieved to spread new skills and knowledge in strategic fields. Similarly this kind of intervention can foster the cooperation among different firms to promote also knowledge spread through the creation of new network.
 - Demand-side policies are fundamental to educate customers to choose sustainable products. In this kind of intervention it is very important also the communication: for this reason these policies must be completed by a labelling system laws

9. Company internal symbioses

Below we will analyse the evolution of the internal organization of the firm, focusing on the employees relationships and on the relationship among company structures to analyse how the setting out of symbioses relationships could be useful in fostering towards sustainable development.

9.1 The relationship evolution and symbioses description

Type Ia: before **Scientific Management** internal relationships were **one-way and hierarchical**. Procedures and methods were not explicit, so companies management/white collars did not have to coordinate workers activities, but mainly to convince them to make available to the company their own knowledge (which usually remained tacit).

Type Ib: When the Scientific Management (also called *Taylorism*) spread, companies internal relationships have **usually been still one-way**, with no feedbacks between management and workers. Tacit knowledge was partially coded in procedure and methods, so that management duties were mainly focused on requiring and checking that workers effectively implemented them.

Type II: quality revolution led to enhanced productivity through improving workers role; the best way to assure that **a job gets done right is not to increase worker supervision, but to educate, empower, and trust the person assigned to the job**. Concurrent opinions and feedbacks finished the passive-workers era to foster a new one in which **every worker can contribute to the company** by defining his own duties and organization improvement.

Internal relationships developed similarly to customer-supplier relationship: if the quality is in the process, end process inspection is useless.

Type III: since the goals of companies are complex and do not involve only the economic sphere in the short term, **top management know-how, skills and knowledge cannot be enough. Top management leadership must be integrated with workers leadership.**

So, top management have to foster vertical collaboration - among different company hierarchical levels - and horizontal collaboration - among different company departments -. The aim should be to improve knowledge sharing through formal and informal networks and feedbacks (Galgano, 2004). This approach is becoming more and more common across both small and larger companies (Foray, 2006).

For example, Toyota – the car world leading manufacturer – implemented a program to stimulate employees to submit new ideas to management. The results is that in 2008 management approved nearly 100% of the 400 new ideas coming from the employee, achieving benefits in terms of quality of the final products, total costs and in employee satisfaction.

For implementing so high a collaboration level it is necessary to deeply understand that human capital has no limits capability if it is well run, if it trusts that enterprise success is its own success, and if it is conveniently trained.

Another instrument to implement symbioses in **internal relationship is the workers participation in company capital.** In such a way it is possible to extend the internal symbiosis to strategic aspects as company owners. In the USA, for example, institutional investors are increasing their stock participation in raising number of firms. (Caselli, 2006)

9.2 Symbiosis sustainability evaluation

Companies internal symbioses contributions to promote sustainable objectives achievements can be summarized in the following way. (Fusco Girard, 2009)

- a. **Achieve good financial/ economic performances also in medium-long term:** Revenues are the main driver in fostering company towards internal symbioses. First of all, the sharing of goals and strategies all around the firm is the only way to really implement them. Besides, it is universally recognised that the essential requirement for continuous improvement is the full involvement of every employee. Furthermore, workers participation in company capital allows to achieve:
 - workers stability within the firm (minimizing turn-over)
 - keeping tacit knowledge within the firm
 - trust and collaborative company atmosphere
- b. **Promote companies integration with social environment:** internal symbioses promote human development through the implementation of social networks, strengthening internal links. Indeed workers trust that, apart from their formal links with the company, their future is strictly linked with company future, which contributes to foster collaborative and constructive company internal climate. Trust is stimulated by cooperation and, in its turn, it promotes cooperation

10. Multi criteria evaluation approach for symbioses design

Multi criteria evaluation approaches and tools (Shi and Zeleny, 2000; Saaty and Vargas, 2006; Bogetoft and Pruzan, 1999) must have a primary supporting role for symbioses design and strategy implementation:

- *Ex ante* multi criteria evaluation should have a central role since symbioses require the involvement of a number of different stakeholders (eg. private companies, public institutions...) with different (and in some cases even conflicting) interests to be adequately evaluated and prioritized through multi criteria approach. The same approach can successfully support also coordination of actions of all partners/stakeholders to create synergies and positive interdependences in innovative management toward symbioses (see also Freedman, 2007)
- *On-going* multi criteria evaluation to monitor different steps effective achievements of goals and strategy redefinition, when need (Saaty and Vargas, 2006)
- *Ex post* multi criteria evaluation of pilots / experimental projects have a significant role to highlight costs and benefits and identify best practices as well as lesson learned providing benchmarks and strategies (Nijkamp and Rietveld, 1990), in order to support the definition of a path from “one shot” experiences towards ordinary practice

An important issue about the above evaluation is related to the indicators: as matter of fact, a consistent set of both quantitative and qualitative indicators is required to compare multidimensional aspects, defining targets and monitor project outcomes.

11. The role of culture to promote the wide symbioses

As we have seen above, in some case symbioses relationships are increasing and growing up, fostered mainly by economic drivers (Estes, 2009; Makower, 2009). According to that, can we assume that global economy is running toward sustainability? Can only market rules promote sustainability?

Unfortunately the most likely answer is negative.

What is needed is a **strong intentionality and a systemic approach** (Meadows, 2008): it is necessary to recognise that lot of aspects which seems to be like chalk and cheese, are just different aspects of the same issue.

So, what could be done in order to promote the **wide symbioses** and the **systemic approach**?

Symbioses are – by definition- constituted by two main elements: nodes, which are deputy of exchanges, and connections which are the mean to let the exchange be.

Currently we are living the “communication age”: internet, mobile phones, PDAs, as well as “old media” such as radio and TV make available billions of information to the public, so it can be assumed that what is needed are not new connections.

The need is to improve the nodes of the current network, making them really able to exchange information. Symbioses, in facts, can happen only among active *subject nodes* and never among *passive objects nodes*: **closing both material and immaterial loops through feedbacks and immaterial exchanges have sense only among subjects.**

Thus, there is not an issue related to infrastructures, but related to **culture**. So, in other words, **the first step in implementing symbioses is to “reintroduce the subject”** (Scola, 2006).

The subject reintroduction does not involve only the firms, but all the system of values they are part of. **Reintroducing the subject** means focusing on “why do?” and on “what to do?” instead of “how to do something” (Zeleny, 2005). In other words, it means to **promote critical thinking and wisdom**. The real challenge is recognizing links that others are not able to

recognise, understanding the connections among different form of capital and the following impossibility to long term maximize economic capital giving up other forms of capital.

But which are, practically, the values that promote the subject re-introduction, that means to promote the symbioses implementation?

Even though in a different context, F. Capra points out that there is a link among ethics, values and thought (see table below), so we need to **promote integrative thought instead of self assertive one**, (Capra, 2005) **that implies to promote integrative values for indirectly supporting the symbioses implementation** (see also Fusco Girard, 2009).

Thought		Values	
Self-assertive	Integrative	Self-assertive	Integrative
<i>Rational</i>	<i>Intuitive</i>	<i>Expansion</i>	<i>Conservation</i>
<i>Analytical</i>	<i>Synthetic</i>	<i>Competition</i>	<i>Co operation</i>
<i>Fragmented</i>	<i>Holistic</i>	<i>Quantity</i>	<i>Quality</i>
<i>Linear</i>	<i>Not linear</i>	<i>Domination</i>	<i>Association</i>

Table 2. Values and Thought

12. Conclusions

In the new global context - characterized by a growing complexity and uncertainty, increasing scarcity of natural resources and energy, climate destabilization, in which public institutions, consumers and NGO are demanding a better environment quality - business sector is charged by new responsibilities, **companies play a central role in the strategies for sustainable development effective implementation**. (World Business Council for Sustainable Development, 2009)

In the above context, we pointed out, in order to achieve sustainable company management, the importance of closing both material and not material flows, that is the wide symbioses generating/promoting.

All the nodes of the network which the company is part of could promote the wide symbiosis model: innovative relationships with other companies, with customers, with public institutions as well as company internal relationships. This should be the master way to real implement sustainability.

To the above aim, cultural aspects play a great role: we need to promote integrative thought instead of self assertive one that implies to promote integrative values.

13. References

- A.T. Kearney (2009) "A.T. Kearney Customer Energy: The empowered consumer is revolutionizing customer relationships". Obtained through the Internet <http://www.atkearney.com/index.php/Publications/harnessing-customer-energy.html> [accessed 13/01/2011].

- Ayres, R. U. and Ayres, L.W. (2002), *A Handbook of Industrial Ecology*, Edward Elgar Publishing Inc., Northampton, MA
- Bleischwitz R. and Hennicke P. (2004), *Eco-efficiency, regulation and sustainable business*, Edward Elgar Publishing Inc., Northampton, MA
- Begg K., F. Van der Woerd, D. Levy (2005), *The Business of Climate Change*, Greenleaf Publishing Limited, Sheffield
- Boaretto A., Noci G., Pini F. M. (2011) *Marketing reloaded*, Il Sole 24 Ore Libri
- Bogetoft P., Pruzan, P. (1991), *Planning with Multiple Criteria*, North Holland, New York
- Capra F. (2005), *La rete della vita*, BUR, Milano
- Carminio G., Frey M. and Araldo C. (2002), *Gestione del prodotto e sostenibilità*, Franco Angeli, Milano
- Caselli, L. (2006), *Democrazia economica ed azionariato dei lavoratori* in Rusconi, G., Dorigatti, M., *Impresa e Responsabilità Sociale*, Franco Angeli, Milano
- Chertow, M.R. (2007), *Uncovering Industrial Symbiosis* in *Journal of Industrial Ecology*, Volume 11, Number 1
- Costanza, R. (1991), *Ecological economics: the science and management of sustainability*. Columbia University Press, New York.
- Estes J., (2009) *Smart Green: How to Implement Sustainable Business Practices in Any Industry - and Make Money*, Wiley
- Farinet A. and Ploncher E. (2004), *Customer Relationship Management*, ETAS, Milano
- Foray D. (2006), *L'economia della conoscenza*, il Mulino, Bologna
- Fusco Girard, F. (2009) 'Symbioses strategies for sustainable company management', *International Journal of Sustainable Development*, Volume 12, Number 2-4 / 2009
- Fusco Girard, F. (2009) Extending industrial ecology principles to nonmaterial flows: the "Widen Symbiosis" *Book of Abstracts 2009 International Society for Industrial Ecology Conference*
- Fusco Girard, F. (2009), 'L'approccio della ecologia industriale per l'efficienza energetica nei processi produttivi', *Rivista AEIT num.1, 2009*
- Fusco Girard, F. (2008) 'Impresa e sviluppo sostenibile: strategie innovative per la sostenibilità dei prodotti', *Rassegna ANIAI*, 10, 2008
- Freedman R.E., Rusconi G. and Dorigatti M. (2007), *Teoria degli stakeholder*, Franco Angeli, Milano
- Galgano, A. (2004), *I Sette Strumenti della qualità totale*, Il Sole 24 ore Edizioni, Milano
- Goodwin, N.R. (2003) *Five Kinds of Capital: Useful Concepts for Sustainable Development*, Global Development and Environment Institute Tufts University
- Green, K. and Randles, K. (2006), *Industrial Ecology and Spaces of Innovations*, Edward Elgar Publishing Inc., Northampton, MA
- Hawken, P., Lovins, A., and Lovins, L.H. (1999), *Natural Capitalism*, Rocky Mountain Institute, Snowmass, CO
- UNDP, *Human Development Report 2011 Sustainability and Equity: A Better Future for All*, (2011) UNDP Press
- Hope, W. (2011) Crisis of temporalities: Global capitalism after the 2007-08 financial collapse. *Time & Society* March 2011 20: 94-118
- Kronenberg, J. (2007), *Ecological economics and Industrial Ecology*, Routledge, Abington
- Laszlo, C. (2009) *WorldShift 2012: making green business, new politics, and higher consciousness working together*, Inner Traditions, USA

- Laszlo, C. (2008) *Sustainable Value: How the World's Leading Companies Are Doing Well by Doing Good*, Stanford Business Books
- Makower, J. (2009), *Strategies for the Green Economy*, McGraw-Hill, New York
- Marchesini G.C. (2003), *L'impresa etica e le sue sfide*, Egea, Roma
- Meadows D.H. (2008), *Thinking in Systems*, Chelsea Green Publishing
- Michellini L. (2005), 'L'approccio consumer-ethic driver nell'innovazione di prodotto' *Paper presented at "Le tendenze del marketing"*, Ecole Supérieure de Commerce de Paris – EAP, January 2005
- Munchener Ruck (2009) *Topics Geo Annual review: Natural catastrophes 2008*, Munich ReGroup, Munich
- Nijkamp P., Rietveld P. (1999) *Multicriteria Evaluation in Physical Planning*, North-Holland
- Ohno T. (2004) *Lo spirito Toyota*, Einaudi, Torino
- O'Sullivan, A., Sheffrin, S.M. (2003). *Economics: Principles in action*, Upper Saddle River New Jersey
- Pine J.B. and Gilmore J.H. (1999) *The experience Economy*, Harvard Business School Press, Boston
- Prahalad, C.K. and V.Ramaswamy (2004), *The future of competition*, Harvard Business School Press, Boston
- Pruzan, P. and Pruzan Mikkelsen K. (2008), *Leading with Wisdom: Spiritual-Based Leaders in Business*, Greenleaf Publishing Limited, Sheffield
- Putnam, R. (2000) *Bowling Alone: The Collapse and Revival of American Community*, Simon and Schuster
- Reichheld F. (2006), *The ultimate question. Driving good profits and true growth*, Harvard Business School Press, Boston
- Ronchi, M. (2003) *CRM per tutti*, Franco Angeli, Milano
- Rutten R.,F.Boekema(2004), 'A knowledge Based View on Innovation in Regional Networks', in De Groot H.L.F.,P. Nijkamp and R. Stough (editors), *Entrepreneurship and Regional Economic Development*, Edward Elgar Publishing, Cheltenham
- Saaty T.L.,Vargas L.G.(2006), *Decision Making with Analytic Network Process*, Springer Science, New York
- Schmidheiny S. (1992), *Changing Course: A Global Business Perspective on Development and the Environment*, World Business Council for Sustainable Development (WBCSD), Geneve (CH)
- Schumper J.(1954), *Capitalism, Socialism and Democracy*, Allen and Unwin, London
- Scola, A. (2006) 'Antropologia, etica ed affari' in: Rusconi, G., Dorigatti, M., *Impresa e Responsabilità Sociale*, Franco Angeli, Milano
- Serageldin I. (1999) *Social Capital. A Multifaceted perspective*, The World Bank, Washington
- Shi y., M.Zeleny(2000), *New Frontiers of Decision Making for the Information Technology Era*, World Scientific Publishing, Singapore
- Simon H.,Zatta D. (2011) *I trend economici del futuro*, Il sole 24 ore
- Sunley, P. (2011) The consequences of economic globalization, In: *The SAGE handbook of economic geography*, Leyshon A., Lee R., McDowell L.
- Tapscott, D. and Williams A.D. (2006) *Wikinomics: How Mass Collaboration Changes Everything*, Portfolio Hardcover, USA
- Watson, G.H. (2001), *La visione strategica dei clienti: il modello di Kano* in Conti, T., De Risi P., *Manuale della qualità*, ed. Il Sole 24 Ore

Werbach A. (2009), *Strategy for Sustainability: A Business Manifesto*, Harvard Business Press

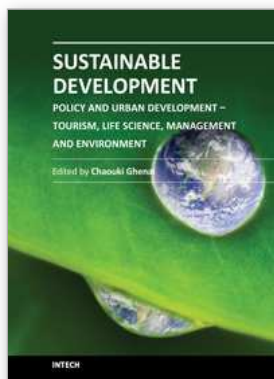
World Business Council for Sustainable Development (2009), *Transforming the Market*, Ataroto Press, Geneva

Yeung A., Xin K., Pfoertsch W., Liu S.(2011) *The Globalization of Chinese Companies: Strategies for Conquering international Markets*, John Wiley & Sons, Singapore

Zeleny M. (2005) *Human System Management*, World Scientific Publishing, Singapore

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Francesco Fusco Girard (2012). Innovative Sustainable Companies Management: The Wide Symbiosis Strategy, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/innovative-sustainable-companies-management-the-wide-symbiosis-strategy>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Innovation Ecosystem for Sustainable Development

Kayano Fukuda and Chihiro Watanabe
*National University of Singapore
Singapore*

1. Introduction

Innovation has significantly contributed to growth and development of society in the 20th century. Advances in science and technology have boosted the productivity and competitiveness of industry, and also have vastly improved living standards and the quality of life. At the same time, however, rapid growth of industrial production has increased consumption of energy and natural resources enormously. Subsequent impacts on the environment have caused various threats to endanger the survival of life such as global warming and excessive use of energy, land and water resources.

Sustainable development is of the most concern to the global society today (Millennium Ecosystem Assessment, 2005; Intergovernmental Panel on Climate Change [IPCC], 2007; World Business Council for Sustainable Development [WBCSD], 2008). While it has often focused on environmental concerns, sustainable development has three dimensions: economic, environmental and social (World Commission on Environment and Development, 1987; Senge & Carstedt, 2001; Sheth et al., 2011). The challenge of sustainable development necessitates fundamental changes in the way of growth and development in the world. Industries should develop their business model not only based on economic performance, but also taking account of the environment and social impacts as well. Governments should adopt legislation and regulation on economic activities and environmental issues to enhance sustainability consideration and social awareness.

Achieving these goals requires innovation for improving the triple bottom line: economic, environmental and social well-being. Innovation is an essential driver for sustainable development. It enables industries to increase productivity while decreasing resource uses and environmental impact. It also delivers new value to satisfy high standards of living.

With the growing awareness of the significance of innovation for sustainable development, a concept of an 'innovation ecosystem' has been postulated (President's Council of Advisors on Science and Technology [PCAST], 2004; Council on Competitiveness, 2004; Industrial Structure Council, 2005). In this concept, innovation is considered a comprehensive system interacting closely with surrounding environment rather than a linear and mechanical progression. This consideration means not only optimizing internal innovation processes but also optimizing externally. An innovation ecosystem needs to adjust all public and private sector stakeholders as well as adapt itself to changes in the external environment.

This chapter attempts to analyze dynamics of innovation systems from perspective of sustainable development. An empirical analysis focusing on stability properties rather than process complexity of ecosystem was conducted. Section 2 reviews the dynamics and features of innovation ecosystem to sustain stability. Section 3 describes the mutual inspiration cycle between Japan and the US in the last three decades. Section 4 explains the new global trends in innovation for sustainable development. Finally, Section 5 briefly summarizes and concludes this chapter.

2. Properties of innovation ecosystem

The concept of innovation ecosystem often stresses that innovation occurs through interactive networks at various levels (Council on Competitiveness, 2004; Iansiti & Levien, 2004; Industrial Structure Council, 2005; Organisation for Economic Co-operation and Development [OECD], 2008). These networks are a broad and complex array of stakeholders in both of public and private sectors. An important function of innovation ecosystem consists of governmental organizations that fund R&D activities, many areas of policy which impact the effectiveness of innovation, large and small firms who transform research and new knowledge into the market place, universities, research institutes, and different kinds of infrastructure such as transportation and telecommunications. All stakeholders are related to one another in a complex manner in innovation processes as a part of an innovation ecosystem. Their behaviors improve the performance of an ecosystem and, in doing so, improve individual performances.

Strong performance of an innovation ecosystem requires reduction of uncertainty in innovation processes (Klein & Rosenberg, 1986; Iansiti & Levien, 2004). The changes in a highly turbulent environment increase the uncertainty not only on technological performance but also on the market response and ability of stakeholders to absorb and utilize the requisite changes effectively. This correlation between change and uncertainty in an innovation ecosystem necessitates autonomic reaction of each stakeholder and coordination of the network of stakeholders. This combination of autonomy and coordination enables an innovation ecosystem to improve its performance enough to survive uncertain global circumstances, achieving sustainable development.

A natural ecosystem provides a suggestive analogy for sustaining an innovation ecosystem. Stability is an important characteristic of a natural ecosystem reflecting complex homeostatic processes, especially in the face of environmental variability (Millennium Ecosystem Assessment, 2005). As with a natural ecosystem, stability in the face of external shocks is an important goal of an innovation ecosystem sufficient to meet demands for sustainable development. Ecosystem stability requires three factors: resistance, resilience and functional redundancy (Allison & Martiny, 2008). Resistance is the capability of a system to remain in the same state in the face of disturbance. Resilience is the rate at which a system returns to its initial state after being disturbed. Functional redundancy is the ability of a system to carry out a functional process in a similar rate regardless of disturbance. Resistance can be described as inertia, and resilience has some aspects including elasticity (rapidity of restoration following disturbance) and amplitude (zone from which a system will return to a stable state) (Westman, 1978). Allison & Martiny (2008) explains the potential impacts of disturbance on an ecosystem with these three factors. When a disturbance is applied to an ecosystem, it might be resistant to the disturbance and not change. Alternatively, if an

ecosystem is sensitive to the disturbance and does change, it could be resilient and promptly recover to its initial state. Finally, an ecosystem which is not resilient might perform like the original state if the constituent members of an ecosystem are functionally redundant. This process to absorb external disturbance is deeply correlated with internal interaction process between its components. Marten (2001) pointed out three emergent properties of interaction in an ecosystem: co-existence, co-evolution and co-adaptation. Co-existence is built into an evolutionary game between species. Co-adaptation (fitting together) is a consequence of co-evolution (changing together). Species in an ecosystem has an ability to change as circumstance demands. They change the way in which they interact with other species, and as a consequence, organize themselves through co-adaption. Co-evolution is essential to coordinate an ecosystem internally in a stable manner. These processes to maintain stability of ecosystem both internally and externally are combined in such a way that the ecosystem as a whole continues to function on a sustainable basis.

The natural ecosystem analogy suggests that a competence to address rapidly changing circumstances is necessary for sustainable development. Like a natural ecosystem, an innovation ecosystem is characterized by various participants interacting with each other. They co-exist, co-evolve and co-adapt with each other, and through this interaction, improve performance of the innovation ecosystem as a whole. Meanwhile, the innovation ecosystem resist, resilient and functionally redundant to external disturbances. This function to maintain both of internal and external stabilities has been recognized by the current global society facing an increasingly uncertain future. Serious demands for sustainable development in economic, environment and social dimensions are a new challenge for an innovation ecosystem.

3. Co-evolutionary cycle between the innovation ecosystems in Japan and the U.S.

While the U.S. was the primary leader in innovation over the course of the 20th century, it confronted a challenge from Japan in the 1980s (Council on Competitiveness, 2004). After the two energy crisis of the 1970s, Japan achieved notable energy efficient improvement in the 1980s that contributed to high economic growth driven by manufacturing technologies (Watanabe, 1995). The emergence of Japan initiated mutual inspiration between both countries leading to contrasting success in innovation during the last three decades (Fukuda & Watanabe, 2008).

The challenge from Japan triggered efforts to restore the U.S. competitive position. Both public and private sectors released proposals on competitiveness, including the 1985 report of the President's Commission on Industrial Competitiveness, the Report by Council on Competitiveness analyzing competitiveness problems in 1987 and *Made in America* published in 1989, and the federal government enforced new innovation legislation such as the Bayh-Dole Act of 1980, the National Cooperative Research Act of 1984, the National Competitiveness Technology Transfer Act of 1989. Through these efforts, the U.S. established a foundation for a new economy driven by information and communication technology (ICT) in the 1990s.

While the U.S. enjoyed economic success in the 1990s, Japan experienced economic stagnation known as the Lost Decade. During the period, both of public and private sectors

in Japan rushed to construct the ICT infrastructure and accelerated R&D and dissemination of telecommunication equipments. Besides, the government enacted the Science and Technology Basic Law in 1995 to support national development through science, technology and innovation, and in response to the Basic Law, adopted the First Science and Technology Basic Plan in 1996 for a period extending to the end of Japanese Fiscal Year 2000. As a result of these efforts, Japan began to show signs of recovery in the early 2000s. However, it confronted the reality that the revitalization of its manufacturing industry is not whole industry-wide, which resulted in bi-polarization in profitability among high-technology firms.

This cyclical reversal of competitive dominance between Japan and the U.S. suggests that the natural ecosystem analogy explains the dynamism of mutual interaction between both countries. Both countries have co-evolved each other in the rise and fall of competitive advantages over the last three decades, and have survived to maintain stability of their national innovation ecosystems respectively. Their reactions to external disturbances varied over time.

3.1 Japan's success in the 1980s

Japan's conspicuous economic achievement in the 1980s can be attributed to its success in technology substitution for constrained production factors. This is similar to a function of biological ecosystems, where some species slows down and other species speeds up to compensate, in order to maintain homeostasis.

Both of public and private sectors in Japan accumulated efforts to reduce energy dependency after the energy crisis in 1973 (Watanabe, 1992, 1995a). The industry efforts to increase energy technology significantly contributed to improvement of energy efficiency. The government appropriated its R&D budget for energy R&D on a priority basis to induce vigorous energy R&D efforts by industry in the late 1970s and the early 1980s, and national R&D program projects such as the Sunshine Project initiated in 1974 and Moonlight Project initiated in 1978 encouraged networking among industries as well as between the government and industry.

	Production	Energy efficiency	Fuel switching	CO ₂ emissions
Japan	3.97	-3.44	-0.59	-0.06
U.S.	2.78	-2.62	-0.11	0.55

Source: Watanabe, 1999.

Table 1. Comparison of development path in Japan and the U.S. (1978-1988) – average change rate; % per annum

The combination of autonomic efforts by industry and coordination by the government achieved a dramatic energy efficiency improvement (Watanabe, 1995b, 1999). As tabulated in Table 1, Japan recorded the highest economic growth (3.97% per year) with a 0.06% decline in CO₂ emissions in the 10 years following the second energy crisis in 1979. This was possible due to conspicuous energy efficiency improvements (3.44% per year). During the same period, the U.S. attained 2.78% economic growth, and CO₂ emissions

increased by 0.05%, although its energy efficiency improvement remained at 2.62%. This notable success of Japan enabled the national innovation ecosystem to be resilient to energy shocks and to improve its performance by means of the fusion of efforts by public and private sectors.

3.2 Reversal of competitive advantage between Japan and the U.S. in the 1990s

Contrary to its economic success in the 1980s, Japan suffered a serious economic downturn and declined its competitiveness severely in the 1990s (IMD, 2002). This dramatic decline in competitiveness can be attributed to resistance of the national innovation ecosystem to emergence of ICT.

Japan continued to cling to a growth-oriented development trajectory in which economic growth leverages further growth, largely because its successes in the decades of high economic growth owed to the traditional development trajectory (Watanabe, 1995a; Fukuda & Watanabe, 2008). As a consequence of this strong resistance, the contribution of technological progress to economic growth decreased dramatically during the decade (European Commission, 2001). Table 2 demonstrates trends in TFP (total factor productivity) growth rate, R&D intensity (the ratio of R&D investment to GDP) and marginal productivity of technology (MPT) in Japan and the U.S. during the period from 1975 to 2001. TFP growth rate in Japan was 2.8 % per year in the late 1980s, significantly higher than that of the U.S., 0.9 % per year. However, the reverse occurred in the 1990s. The growth rate in Japan fell to negative 0.3% per year in the first half of the decade and slightly recovered to 0.2 % per year in the second half. During the decade, Japan maintained a high level of R&D intensity around 3.0 % (Ministry of Education, Culture, Sports, Science and Technology of Japan, 2002, 2003). Since TFP growth rate is measured by the product of R&D intensity and MPT, the dramatic decline in TFP growth rate notwithstanding such high R&D intensity can be attributed to the remarkable decrease in MPT.

		1975-1985	1985-1990	1990-1995	1995-2001
Japan	TFP growth rate	1.4	2.8	-0.3	0.2
	R&D intensity	2.2	2.8	2.9	3.1
	MPT	0.6	1.0	-0.1	0.1
U.S.	TFP growth rate	1.0	0.9	0.9	1.5
	R&D intensity	2.3	2.7	2.6	2.6
	MPT	0.4	0.3	0.3	0.6

Table 2. Trends in growth rate of TFP, R&D intensity and Marginal Productivity of Technology (MPT) in Japan and the U.S. (1975-2001) – average change rate; % per annum

In contrast, the U.S. increased its TFP growth rate from 0.9 % per year to 1.5% per in the 1990s due to doubling of MPT as tabulated in Table 2. While Japan suffered from a misleading option, the U.S. successfully shifted its growth trajectory to a new trajectory which maintains sustainable growth based on developing new functionality (Watanabe, 1995; Fukuda & Watanabe 2008). ICT has a feature that closely interacts with individuals, organizations, and society during the course of its diffusion (Watanabe et al., 2004). This feature enhanced the U.S. industry efforts to expand outsourcing, disseminate products and

services quickly, and improve relationships with customers. Furthermore, intensive R&D efforts in both the government and industry achieved dramatic progress in ICT. Thus, the U.S. innovation ecosystem successfully substituted ICT for manufacturing technologies and promptly increased adaptability to a new paradigm of ICT.

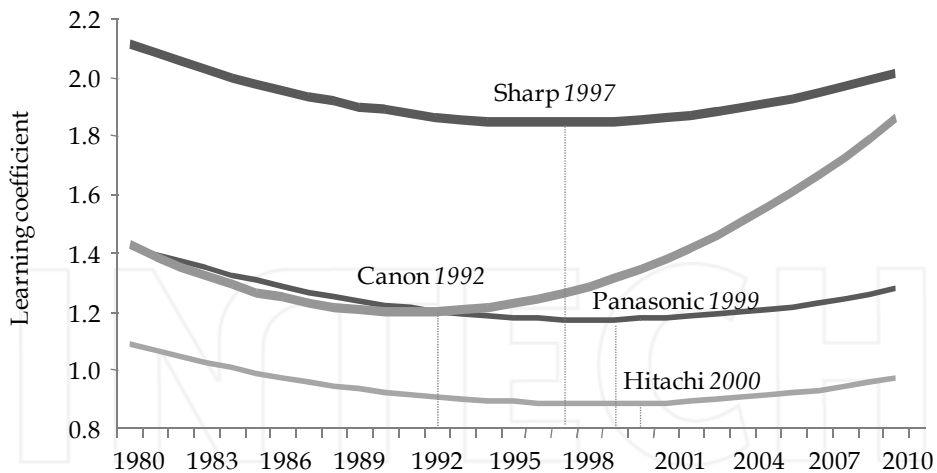
3.3 New reality for Japan and the U.S. in the 2000s

Facing the new century, Japan and the U.S. confronted a new reality of global competition in innovation.

While the U.S. enjoyed the benefits of ICT in the 1990s, threats to its competitiveness emerged internally and externally. During the decade, the U.S. capacity of innovation stagnated (Porter et al., 1999). One of the causes underlying the stagnation was emerging shortage in the R&D talent pool. The number of R&D workers as a percentage of the total workforce declined. Many international R&D talents were trained in the U.S. and returned their home country on completion of their studies. Another cause was declining investment in R&D by cutbacks at the Federal level. Total spending on basic research has declined steeply as a percentage of GDP. In addition, private research showed clear signs of becoming much shorter term. Meanwhile, catch-up competitors in emerging countries achieved rapid growth to threaten the U.S. global competitiveness. China and India accelerated their GDP growth faster than major advanced countries (OECD, 2010). These disorders suggest inertia of the U.S. innovation ecosystem which caused it to lose adaptability to rapid changes in the global economy.

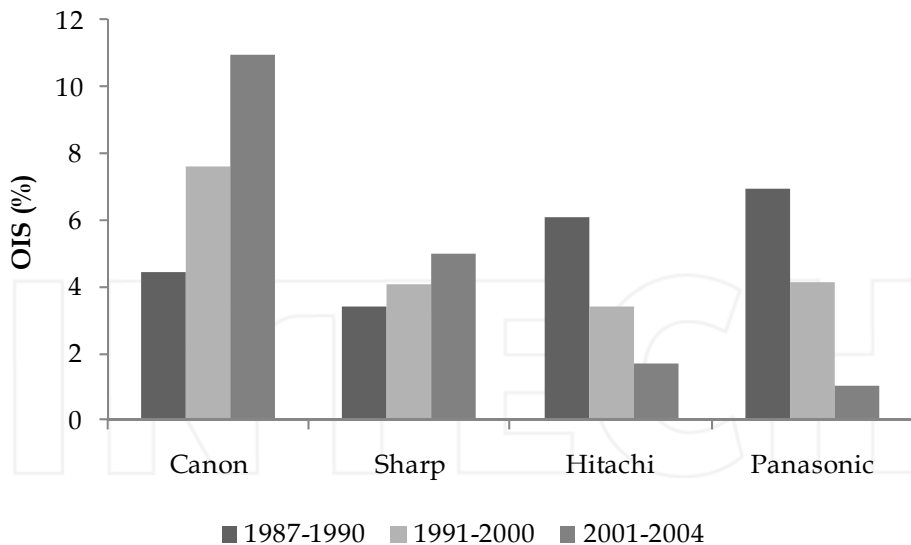
On the other hand, Japan made every effort to learn from the accomplishment of the U.S. in the 1990s. Japanese high-technology firms learned from and assimilate the experiences of the U.S. to achieve greater gain from ICT thorough competition in the global markets. Even as high-technology industry overall strengthened learning efforts, some firms improved its learning ability more effectively than others. Consequently, a discrepancy firms endeavoring to learning from the global markets and clinging to traditional business behaviors increased (Fukuda & Watanabe, 2008; Watanabe, 2009). Fig. 1 illustrates trends in learning coefficients in four leading electric machinery firms. The coefficients in Canon and Sharp reversed to steadily increase in 1992 and 1997, respectively. While Hitachi and Panasonic also started to increase their coefficients in the end of the century, those increases were not significant. The difference in their learning results led to a difference in profitability. The operating income to sales (OIS) of these four has changed in two different trajectories as demonstrated in Fig. 2. Canon and Sharp increased their average operating income to sales (OIS) steadily over all three periods examined. Comparing the average OIS in the 2000s with that of the 1980s, Canon doubled its OIS and Sharp increased it by 50%. On the other hand, Hitachi and Panasonic decreased their OIS sharply. Hitachi reduced its average OIS by 48% in the 1990s and 66% in the 2000s, and Panasonic decreased its average OIS by 41% in the 1990s and 86% in the 2000s.

These trends imply that the Japanese innovation ecosystem was resilient to the economic downturn in the 1990s. Although the national innovation ecosystem revitalized its performance through learning from competitors, its composition changed to being more heterogeneous after the downturn.



Source: Fukuda & Watanabe, 2008.

Fig. 1. Learning coefficients of Japanese four leading electric machinery firms (1980-2003: estimate; 2004-2010: prediction based on trends in 1980-2003).



Source: Nikkei Financial Data, 2005.

Fig. 2. Operating income to sales (OIS) of Japanese four leading electric machinery firms (1987-2004).

4. Co-evolutionary dynamism in innovation ecosystem for global sustainability

In the 2000s, the global economy entered an unprecedented new era of global competition due to the continuous rapid growth of emerging countries. Their growth became a new engine of new global growth. New demand from emerging countries created broader markets to offer greater business opportunities. However, at the same time, it became threats to global sustainability. Global production growth increased consumption of energy and natural resources as well as widened a gap between rich and poor.

Confronting such severe circumstances, major developed countries promoted innovation activities to secure their growth and welfare. The U.S. took various measures to activate its innovation performance including fostering R&D talents, stimulating high-risk research and catalyzing alliances between stakeholders. The European Union was launched the Lisbon Strategy in 2000 to build more creative innovation systems during the decade. Individual countries, such as the United Kingdom, Germany and France, also established national innovation strategies. Japan, Taiwan, Singapore and South Korea systematically focused on the direction of innovation to drive their growth.

While developed countries made intensive efforts to maintain their competitiveness, emerging countries expanded their markets and productivity. This was particularly the case in China and India as tabulated in Table 3. Their annual GDP growth rates exceeded or approached two-digit levels until the global financial crisis after the collapse of Lehman Brothers in 2008. In contrast, the growth rate in Japan maintains low level and in the U.S. remains lower than that in the 1990s.

	Average 1990-1999	Average 2000-2008	2007	2008	2009
China	12.5	13.1	17.6	12.0	10.2
India	8.1	9.6	13.1	8.5	7.7
Japan	3.8	4.0	5.4	1.0	-5.4
U.S.	5.5	4.9	4.9	2.2	-1.7

Source: International Monetary Fund, World Economic Outlook Database, April 2011.

Table 3. Growth of GDP (PPP) in four countries – average change rate; % per annum

These contrasting growth trajectories depend on development and utilization of ICT. Fukuda et al. (2011) conducted an empirical analysis to examine ICT contribution to the economic development in 40 countries consisting of both of emerging and developed countries including OECD members, ASEAN original members, Taiwan and BRIC. The results reveal that emerging and developed countries take contrasting approaches to functionality development by ICT as demonstrated Fig. 3. In developed countries, increase of ICT driven functionality development results in decrease of marginal productivity of ICT (*MPI*), whereas it improves *MPI* in emerging countries. This distinct difference suggests that developed countries have fallen into the paradox of ICT development which resulted from a vicious cycle between ICT driven functionality development and its marginal productivity improvement while emerging countries have maintained a virtuous cycle during the global financial crisis, resulting in significant contribution of ICT to their economic growth.

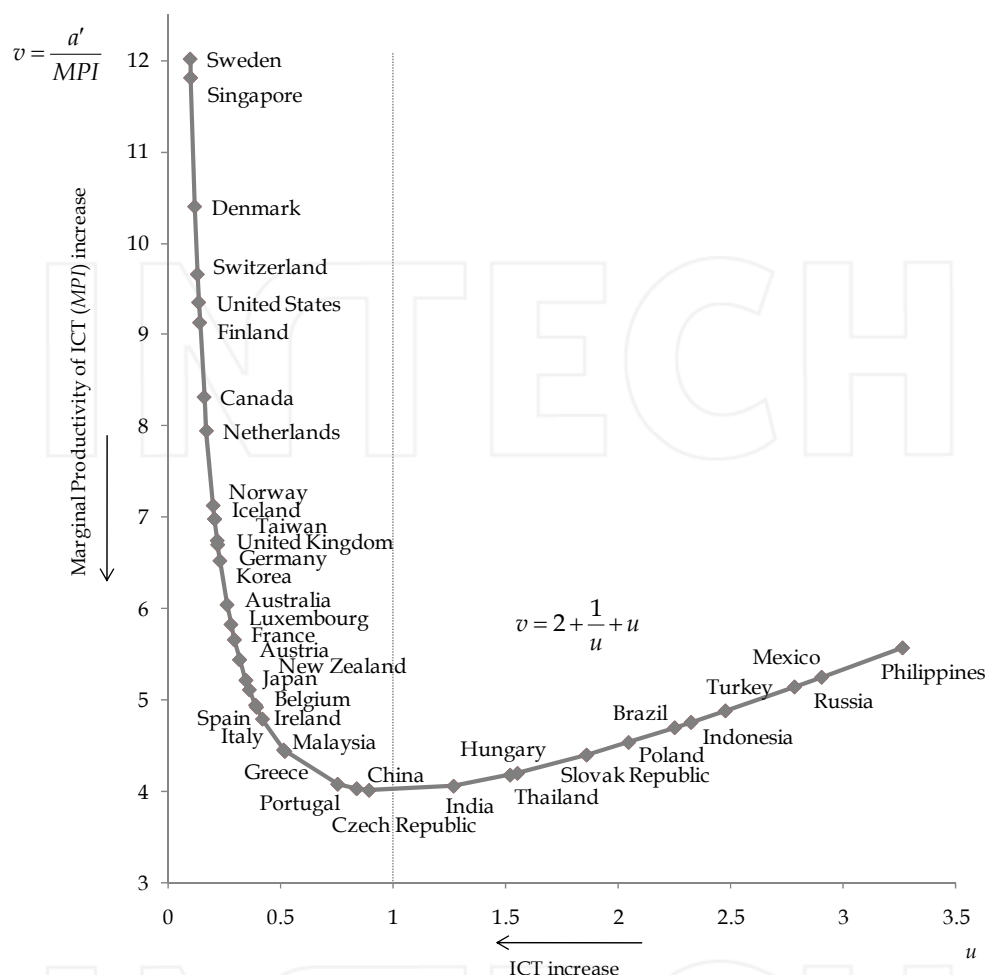


Fig. 3. ICT driven growth trajectory of 40 countries (2009).

While emerging countries are expected to continue to increase consumption steadily, their propensity to consume is not necessarily below that of developed countries as demonstrated in Table 4. Contrary to the gap in GDP per capita, household consumption as a share of GDP in emerging countries is almost at the same level as in developed countries. This contrast suggests that there should be certain structural impediments to consumption-led growth in emerging countries.

Inspired by this observation, Fukuda & Watanabe (2011) conducted an empirical analysis to identify the optimal trigger for the consumption effects on economic growth in 37 out of 40 countries examined above (except 3 countries whose data was not available). Since investment in both public and private sectors is the large component of GDP by expenditure

as well as consumption, the analysis emphasized the role of investment. The results indicate contrasting approaches to development trajectory of marginal productivity of investment per capita (MPi) induced by GDP per capita increase between emerging and developed countries as illustrated in Fig. 4. While economic growth in emerging countries largely depends on consumption growth rather than investment increase, they confront a vicious cycle where per capita GDP growth leads to MPi decrease. Developed countries, on the other hand, leverage investment for their growth.

	HFCE per GDP (PPP) (%)	GDP per capita (PPP) (current \$)
Emerging countries ^a	56.9	3945.1
Developed countries ^b	58.2	39458.7

^a 8 countries: Brazil, China, India, Indonesia, Malaysia, Philippine, Russia and Thailand

^b 29 countries: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Taiwan, Turkey, United Kingdom and United States.

Source: International Monetary Fund, World Economic Outlook Database, April 2011.

Table 4. Household final consumption expenditure (HFCE) per GDP and GDP per capita in 37 countries (2009) – median in each economic development level

The analysis also reveals that emerging and developed countries take contrasting approaches to investment driven development. Emerging countries have encountered an autarky cycle of consumption driven development. Although they have increased GDP by consumption growth strongly, they simultaneously suffered from the drop of MPi along with GDP growth. As a result, they cling to an autarky cycle where consumption contributes to life improvement and then brings GDP growth. On the contrary, developed countries enjoy a virtuous cycle between GDP, consumption and investment growth. Here, GDP growth induces consumption increase. Increased consumption, in turn, increases GDP to induce investment. Investment stimulates further GDP growth, which increases consumption demand for more attractive goods and services. The new demand contributes to a better quality of life and then leads to GDP growth.

A possible trigger for inducement of investment by growth in emerging countries can be 'frugality'. Frugality does not just mean second-rate or low cost (The Economist, 2010), but satisfies new demand on the ground in emerging countries. Their new demand come from their own unique economic, environmental and social situations which are completely different from those in developed countries, and implies the necessity of new functionality to improve their life. Emerging countries will necessitate more in-market, low-cost innovations that make new products are services satisfying frugality for their sustainable development. This necessity urges firms to change their business strategy in emerging countries. Historically, they have relied on local adaptation strategy to deliver their products and services and make a few adaptations for local markets. However, it is shifting to in-market development starting with local innovation to create new global products and services. Developed countries need to be a greater focus not on activities oriented toward their own perspectives but on demand of emerging countries from their own perspective

(Jose, 2008; Landrum, 2007). Frugality is the requirement to satisfy new demand of emerging countries from their own perspective for more attractive products and services, which would trigger a shift from a closed cycle to an investment driven cycle of growth.

$$y = \alpha' \cdot MP_i$$

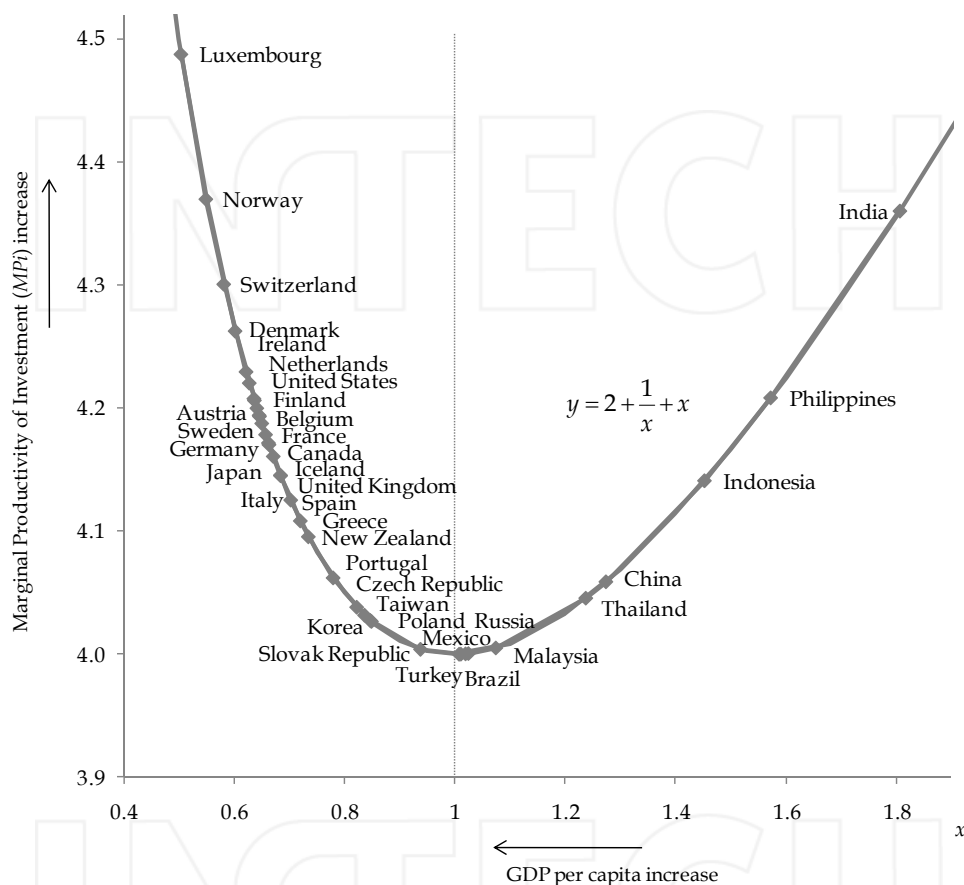


Fig. 4. Investment Driven Development Trajectory of 37 Countries (2009).

All the above results imply the necessity of co-evolution between emerging and developed countries in the new era of global competition. The co-evolution will resolve the paradox of ICT confronted by developed countries, and will enable emerging countries to shift from an autarky cycle to an investment driven cycle of growth. ICT is an essential tool for new functionality development, and effective growth driven by investment is necessary for life improvement in sustainable way. Frugality is a key for fusing the ability of emerging countries to leveraging ICT and the approach of developed countries to effective growth driven by investment. It could lead a way to exploring the new functionality which induces investment for their economic and social well beings, and further contribution to global sustainability.

The co-evolution between emerging and developed countries toward frugality will improve adaptability of innovation ecosystems of both countries to the era of global competition. Emerging countries are facing limitations in their growth cycle heavily depending on consumption growth whereas their vigorous growth is becoming a key driver of the global economy. On the other hand, developed countries are suffering economic stagnation and seeking an opportunity to boost their growth in emerging countries. Both emerging as well as developed countries need new partners to co-adapt to rapidly changing circumstances through co-evolving each other. The co-evolution with new partners will improve the performance of a national innovation ecosystem to survive the global competition as well as overcome threats for global sustainability economically, environmentally and socially.

5. Conclusion

Sustainable development is a serious global concern today and requires new innovation urgently. Innovation creates new value through new products and services, and contributes to long-term wealth creation and higher living standards. Continuous innovation is necessary for sustainability of each country as well as the global society.

Given innovation is a complex and multidimensional, its dynamics is best seen as an ecosystem where various stakeholders are interacting and networking each other. A natural ecosystem provides a suggestive analogy for sustaining an innovation ecosystem. A biological ecosystem maintains stability by resistance, resilience and functional redundancy to external disturbance, and species co-exist, co-evolve and co-adapt to address changing circumstance demands. This combination of autonomy of species and coordination of an ecosystem achieves sustainable development of ecosystems.

A techno-economic analysis can provide insight into mechanisms of an innovation ecosystem. It explains what kind of and how production factors including labor, capital, energy and materials, and technology stock contribute to productivity increase for sustainability corresponding to the environmental condition. It also demonstrates substitution possibilities between production factors for maintaining sustainable growth in the face of the constraints of certain production factors. Thus, a mechanism enabling Japan's success in overcoming energy crises can be analyzed as technology (which is constraints free production factor) substitution for energy (which is critical constraint for Japan). These mechanisms suggest dynamism between inputs, outputs and the external environment of both of them. A nation's policy environment, common infrastructure, culture and tradition influence dynamics between input and output where they both affects and are affected each other. A techno economic analysis incorporating these institutional factors helps to elucidate a complex and dynamic innovation ecosystem.

Japan and the U.S. have developed their national innovation ecosystem through the co-evolutionary cycle with the U.S. during the last three decades. The reversal of competitive dominance between both countries corresponds to a paradigm shift in each decade as follows:

- In the 1980s, Japan has achieved conspicuous economic development. This achievement can be attributed to its success of technology substitution for constrained production factors, primarily energy, after the energy crises in the 1970s.

- In the 1990s, however, the U.S. recovered its dominant competitive position over Japan. The U.S. successfully substituted ICT for manufacturing technology. This success resulted in timely switch from a traditional trajectory in which economic growth leverages further growth to a new trajectory which maintains sustainable growth based on developing new functionality.
- Facing the 2000s, the U.S. is again confronting a new reality due to the emergence of catch-up competitors such as India and China, as well as a move in Japan toward new innovation. This confrontation can be attributed to resistance of the national innovation ecosystem to rapid changes in the global economy.
- Japan began to show signs of recovery in the early 2000s due to learning from competitors in the 1990s. However, at the same time, the recovery sheds light on a profitability gap in Japanese high-technology. High-profit firms endeavor to learning from the global markets whereas low-profit firms cling to traditional business behaviors.

During the above mutual co-evolutionary competition with the U.S., Japan has maintained the system stability by means of transferring external disturbance to a springboard for innovation. This maintenance of ecosystem stability can be attributed to a sophisticated combination of autonomic efforts by industry and coordination by the government, which contributes to fusing indigenous structural strength in the ecosystem and learning from competitors. However, the national innovation ecosystem exposes limitations in the function due to resistance to the new era of global competition, coinciding with the U.S. confrontation with a new reality.

These limitations of both national innovation ecosystems necessitate co-evolution with new partners of innovation to address rapidly changing circumstances. The global financial crisis after the Lehman Brothers collapse in 2008 explicitly indicated that emerging countries is driving the global economic growth. Amid a shift of the center of innovation gravity from developed countries to emerging countries, co-evolution with emerging countries is becoming a big challenge for not only Japan and the U.S. but also other developed countries. Meanwhile, threats to global sustainability are growing seriously. Rapid growth of emerging countries is increasing industrial production as well as consumption in the world enormously, and in turn, endangers the economic, environmental and social survival of life.

Frugality is a key to new functionality satisfying local demand of people in emerging countries. Most of people in emerging countries are rising as the new middle class. They contribute to sustainable development of emerging countries, which affects global sustainability amidst the economic structural shift to emerging countries. The new middle class's contribution to global sustainability comes through its consumption growth for life improvement and its investment inducement to further economic growth leading consumption demand for more attractive goods and services. Frugality would trigger the shift from an autarky cycle between the consumption and GDP increases to investment driven development

The co-evolution between emerging and developed countries would generate frugality oriented new functionality development trajectory. Developed countries have accumulated their efforts to serve demands in emerging countries. On the other hand, emerging countries have leveraged ICT for economic growth and promoted innovation in their own unique

economic, environmental and social situations. Fusing these efforts would realize the co-evolution between them leading to sustainable development in emerging countries and global sustainability as well.

Japan has overcome the oil crisis twice and a severe energy shortage and has subsequently improved energy efficiency in the 1970s by joint efforts of government and industry. These efforts accelerated learning and assimilation of spillover technology which contributed to dramatic decrease of energy consumption in each segment of manufacturing industry. The success in declining unit energy consumption has enabled Japan to establish an energy efficient and eco-friendly society. Its primary energy consumption and carbon-dioxide emission in 2003 are 106 and 68.9 tons of oil equivalent/GPD respectively, both of which are lower than half of those of the world's average. This conspicuous energy efficiency will remain an indigenous strength of Japan's innovation ecosystem and a driving force of innovation toward sustainable development.

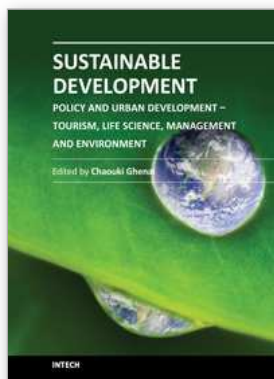
A competence to address rapidly changing circumstances in the world is crucial to sustainable development. Perspectives on innovation ecosystems provide precious suggestion for continuous improvement of the competence. Mutual inspiration between stakeholders as well as stakeholders and an innovation ecosystem achieve this improvement. Furthermore, mutual co-evolution between innovation ecosystems enhances each performance enough to survive severe competition and threats for global sustainability. Sustainable development is a big challenge for all innovation ecosystems.

6. References

- Allison, S.D. & Martiy, B.H. (2008). Resistance, Resilience, and Redundancy in Microbial Communities. *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 105, Supplement 1, (August, 2008), pp. 11512-11519, ISSN 0027-8424
- Council on Competitiveness. (2004). *Innovate America: National Innovation Initiative Summit and Report*, Council on Competitiveness, ISBN 1-889866-20-2, Washington, DC, USA
- European Commission. (2001). *European Competitiveness Report 2001*, Office for Official Publications of the European Communities, ISBN 92-894-1813-3, Luxembourg.
- Fukuda, K. & Watanabe, C. (2008). Japanese and US Perspectives on the National Innovation Ecosystem. *Technology in Society*, Vol. 30, No. 1, (January, 2008), pp. 49-63, ISSN 0160-791X
- Fukuda, K., Zhao, W. & Watanabe, C. (2011). *Dual Hybrid Management of Technology: Co-evolution with Growing Economies*, Journal of Technology Management for Growing Economies, Vol. 2, No. 1, (April, 2011), pp. 9-26, ISSN 0976-545X
- Fukuda, K. & Watanabe, C. (2011). *A Perspective on Frugality in Growing Economies: Triggering a Virtuous Cycle between Consumption Propensity and Growth*, Journal of Technology Management for Growing Economies, Vol. 2, No. 2, (October, 2011), in print, ISSN 0976-545X
- Iansiti, M. & Levien, R. (2004). *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability*, Harvard Business Publishing, ISBN 1-59139-307-8, Boston, USA
- IMD. (2002). *The World Competitiveness Yearbook 2002*, IMD, ISBN 2-970-01216-2, Zurich, Switzerland.

- Industrial Structure Council. (February 2005). Science & Technology Policy Inducing Technological Innovation, In: *Ministry of Economy, Trade and Industry*, 17.06.2011, Available from: <http://www.meti.go.jp/report/downloadfiles/g50223a01j.pdf>
- Intergovernmental Panel on Climate Change. (2007). *Climate Change 2007 : Synthesis Report*, IPCC, ISBN 92-9169-122-4, Geneva, Switzerland
- Jose, P.D. (2008). Rethinking the BOP: New Models for the New Millennium. *IIMB Management Review*, Vol. 20, No. 2, (June 2008), pp. 198-202, ISSN 0970-3896
- Klein, S.J. & Rosenberg N. (1986). An Overview of Innovation, In: *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, Landau, R & Rosenberg N. (Eds.) National Academy Press, pp. 275-306, ISBN 0-309-03630-5, Washington, DC, USA
- Landrum, N.E. (2007). Advancing the “Base of the Pyramid” Debate. *Strategic Management Review*, Vol. 1, No. 1, (May 2007), pp. 1-12, ISSN 1930-4560
- Marten, G.G. (2001). *Human Ecology: Basic Concepts for Sustainable Development*, Earthscan, ISBN 1-85383-714-8, London, UK
- Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-being: Current State and Trends*, Island Press, ISBN 1-55963-227-5, Washington, DC, USA
- Ministry of Education, Culture, Sports, Science and Technology of Japan. (2002). *Annual Report on the Promotion of Science and Technology 2002*, MEXT, ISBN 4171520770, Tokyo, Japan.
- Ministry of Education, Culture, Sports, Science and Technology of Japan. (2003). *White Paper on Science and Technology 2003*, MEXT, ISBN 4171520789, Tokyo, Japan.
- Organisation for Economic Co-operation and Development. (2008). *Open Innovation in Global Networks*, OECD Publishing, ISBN 978-92-64-04767-9, Paris, France
- Organisation for Economic Co-operation and Development. (2009). *Tackling Inequalities in Brazil, China, India and South Africa: The Role of Labour Market and Social Policies*, OECD Publishing, ISBN 978-92-64-08835-1, Paris, France
- Porter, M.E., Stern, S. & Council on Competitiveness. (1999). *The New Challenge to America's Prosperity: Findings from the Innovation Index*, Council on Competitiveness, ISBN 1-889866-21-0, Washington, DC, USA
- President's Council of Advisors on Science and Technology. (January 2004), Sustaining the Nation's Innovation Ecosystem: Information Technology Manufacturing and Competitiveness, In: *PCAST*, 17.06.2011, Available from: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-04-itreport.pdf>
- Ravallion, M. (2010). The Developing World's Bulging (but Vulnerable) Middle Class. *World Development*, Vol. 38, No. 4, (April 2010), pp. 445-454, ISSN 0305-750X
- Senge, P.M. & Carstedt G. (2001). Innovating Our Way to the Next Industrial Revolution. *MIT Sloan Management Review*, Vol.42, No.2, (January 2002), pp. 24-38, ISSN 1532-9194
- Sheth J.N., Sethia N.K. & Srinivas S. (2011). Mindful Consumption: a Customer-centric Approach to Sustainability. *Journal of the Academy of Marketing Science*, Vol. 39, No. 1, (February 2011), pp. 21-39, ISSN 0092-0703
- The Economist. (2010). First Break All the Rules. *The Economist*, Vol. 394, No. 8678, (April 2010), pp. 3-5, ISSN 0013-0613
- Watanabe, C. (1992). Trends in the Substitution of Production Factors to Technology. *Research Policy*, Vol. 21, No. 6, (December 1992), pp. 481-505, ISSN 0048-7333

- Watanabe, C. (1995a). The Feedback Loop between Technology and Economic Development: An Examination of Japanese Industry. *Technological Forecasting and Social Change*, Vol. 49, No. 2, (June 1995), pp. 127-145, ISSN 0040-1625
- Watanabe, C. (1995b). Mitigating Global Warming by Substituting Technology for Energy. *Energy Policy*, Vol. 23, No. 4/5, (June 1995), pp. 447-461, ISSN 0040-1625
- Watanabe, C. (1999). Systems Option for Sustainable Development: Effect and Limit of the MITI's Efforts to Substitute Technology for Energy. *Research Policy*, Vol. 28, No. 7, (September 1999), pp. 719-749, ISSN 0048-7333
- Watanabe, C., Kondo, R., Ouchi, N., Wei, H. & Griffy-Brown C. (2004). Institutional Elasticity as a Significant Driver of IT Functionality Development. *Technological Forecasting and Social Change*, Vol. 71, No. 7, (September 2004), pp. 723-750, ISSN 0040-1625
- Watanabe, C. (2009). *Managing Innovation in Japan: The Role Institutions Play in Helping or Hindering how Companies Develop Technology*, Springer, ISBN 978-3-540-89271-7, Berlin, Germany
- Westman, W.E. (1978). Measuring the Inertia and Resilience of Ecosystems. *BioScience*, Vol. 28, No. 11, (November, 1978), pp. 705-710, ISSN 0006-3568
- World Business Council for Sustainable Development. (2008). *Sustainable Consumption Facts and Trends From a Business Perspective*, WBCSD, ISBN 978-3-940388-30-8, Geneva, Switzerland
- World Commission on Environment and Development. (1987). *Our Common Future*, Oxford University Press, ISBN 0-19-282080-X, New York, USA



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Kayano Fukuda and Chihiro Watanabe (2012). Innovation Ecosystem for Sustainable Development, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/innovation-ecosystem-for-sustainable-development>

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

Unraveling Stakeholders' Discourses Regarding Sustainable Development and Biodiversity Conservation in Greece

Evangelia Apostolopoulou^{1,*}, Evangelia G. Drakou^{1,2}
and John D. Pantis¹

¹*Department of Ecology, School of Biology,
Aristotle University of Thessaloniki, Thessaloniki,*

²*Current Address: Global Environment Monitoring Unit, Institute for Environment and
Sustainability, Joint Research Center, European Commission, Ispra,*

¹*Greece*

²*Italy*

1. Introduction

The designation and implementation of adaptive conservation strategies able to respond to changing socio-ecological conditions, requires understanding protected areas as complex, interconnected social-ecological systems able to reconcile human needs with biodiversity conservation (Davidson-Hunt & Berkes, 2003). This consideration leads to perceiving ecosystems involved in biodiversity conservation and the social, political and economic processes and structures behind their management, as interrelated. Sustainable development has been considered, at least the last two decades, as an integrative concept aiming at combining ecological, economic and social issues. However, the concept of sustainable development has received much criticism, whereas the outcomes of successfully combining economic development, social welfare and ecological sustainability can be characterized as quite mixed.

Focusing on the relationships between conservation and development we should refer to Blaikie & Jeanrenaud (1997) who describe three distinct intellectual paradigms, which also entail fundamentally different approaches to human welfare and assume different set of relations between civil society, the market and the state: the classic/authoritarian, the neo-populist (people-oriented conservation programs such as integrated conservation and development projects - ICDPs, joint or co-management schemes) and the neo-liberal. Similarly, Salafsky & Wollenberg (2000) analyze three types of linkages between livelihoods and conservation: no linkage, indirect linkage and direct linkage, whereas Nygren (1998) analyzes four ideological perspectives dominant in the current discourse of sustainable environmentalism in the "Third World": (i) environmentalism for nature, (ii)

* Corresponding/Invited Author

environmentalism for profit, (iii) alternative environmentalism, and (iv) environmentalism for the people. Finally, Adams et al. (2004) offer a conceptual typology of the relationships between poverty reduction and conservation, which is quite relevant to the discussion regarding sustainable development and biodiversity conservation: (i) poverty and conservation as separate policy realms, (ii) poverty as a critical constraint on conservation, (iii) conservation as a process which should not compromise poverty reduction, and (iv) poverty reduction as depending on living resource conservation.

This chapter presents the different discourses between sustainable development and biodiversity conservation strategies, using as an example that of protected areas while presenting at the same time the actions these discourses are promoting. Given also that the research design was based on a multilevel governance approach, a significant aim of this research is to investigate the perceptions of stakeholders acting at different governance levels regarding development and conservation. Towards this goal and in order to disentangle the multiple myths surrounding conservation and development discourses we try to contextualize the latter in their specific institutional fields as well as to reconceptualize (Nygren, 1998). We furthermore investigate how the perverse understanding of the sustainable development concept could cause scale mismatches between ecological and social systems and thus between natural and social processes (see also Cumming et al., 2006).

The analysis followed in this chapter uses primary data obtained from the authors through qualitative research methods. Following the grounded theory approach (Strauss & Corbin, 1998), 87 semi-structured interviews were conducted in Greece in order to analyze current policy and governance discourses as well as management strategies on sustainable development and biodiversity conservation.

2. Literature review: About sustainable development and conservation

A brief description of the historical development of conservation policy is essential to unravel the links between sustainable development and nature conservation and understand the broader context in which these concepts have emerged. The establishment of protected areas has been the leading conservation strategy since the late 19th century (Adams et al., 2004). The different purposes of the wilderness movement and the wise use movement raised the focus of conservation and utilization - oriented dialogues (Kalamandeen & Gillson, 2007). These two opposing perceptions of nature have always reflected a wavering between idealistic and mechanistic representations of nature (see also Foster, 2002). The latter has been evident in the history of the establishment of protected areas which has been based on aesthetic, moral (Thiele, 1999), political and economic criteria as well as on the displacement of indigenous people (Abakerli, 2001).

The gradual increase in the number and extent of protected areas during the 20th century led to the establishment of networks of protected areas during the '90s. The Habitats Directive and the establishment of the Natura 2000 Network were influenced by the political and economic context of the period, especially the "meteoric rise of sustainable development" (Peterson et al., 2005). This has been associated with a shift towards consensus-driven policies based on the belief that longstanding conflicts between

development and conservation could be resolved through collaborative governance (Apostolopoulou & Pantis, 2010). Similarly, the ecological modernization theory emerged during the '80s and remains until today dominant in environmental sociology, fact that can become evident by the prevalence of the opinion that environmental protection, including biodiversity conservation, can be a potential source of economic or developmental growth (Clark & York, 2005), something in line with the core principles of sustainable development. On the other hand, the role of the market as a tool against biodiversity loss has been linked to private property rights over natural resources (Mukhopadhyay, 2005), an expanded role for non state economic and development actors, and results-based regulatory approaches, typical characteristics of neoliberal governance (McCarthy, 2006).

In current discourses the terms of sustainable development, ecological modernization and collaborative governance constitute the core ideas around which the dominant conservation policy is being framed. The new approach to sustainable development and management of protected areas which became institutionalized in the European policy of protecting the natural environment with the Habitats Directive (92/43/EEC) reflects this broader understanding of the relationship between society and nature. To understand what is involved in this perception it is crucial to consider the context in which it was formed (see also Apostolopoulou, 2010).

The sustainable development concept first appeared in the early '70s. At that time, the capital accumulation crisis combined with a major ecological crisis, lead to the emergence of the ecological issue as an independent and important face of social and political struggle. Amid the increasing intensification of environmental problems and the increasing inability of the environmental policy to solve them (Weale, 1992) and sufficiently respond to radical ecological movements (Hajer, 1995), the issue of environmental protection has officially -i.e. institutionally- emerged. The emergence of measures for the protection of the natural environment by state policies as a separate issue came after a relatively long period during which EU's environmental policy had not set specific rules for protecting the natural environment. On the other hand, EU's policies included from the beginning a variety of social, economic and technological objectives the achievement of which would further enhance growth. Specifically, the treaty on European unification in 1957 did not contain elements of environmental policy and the First Action Programme for the Environment was launched in 1972 (Naxakis, 1997). Furthermore, the sustainable development concept also served as a reaction to the growing literature which addressed the need to set limits on development and has been initially set with the publication of the Club of Rome in 1972.

The overall ideology of that era, and particularly the fact that the end of the three postwar decades of dynamic economic growth has been followed by the entry into a period of crisis and recession, played a major role in the autonomous emergence of ecological issues. The official entry into the global scenery of the concept of sustainable development has been followed by the emergence of the concept of participation of "civil society" in environmental governance initiated by the United Nations and especially through the Brundtland report (World Commission on Environment and Development [WCED], 1987). The Brundtland report was practically the formal adoption of a system of ideas, which was substantially based on the concept of "ecological modernization" (see also Hajer, 1995; Weale, 1992).

Without ignoring the fact that sustainable development and ecological modernization do not have the exact same meaning and interpretation, nevertheless it is considered that they largely overlap and coincide (see Blowers, 1998; Dryzek, 1997; Jänicke, 1997). The theory of ecological modernization has its roots in the work of the German sociologists Joseph Huber and Martin Jänicke (Spaargaren, 1997) and began to emerge more clearly in Western countries and international organizations in the early '80s. In particular, by the mid-80s it has been widely recognized as a promising alternative policy while following the general acceptance of Agenda 21 in 1992 it began to be the dominant approach to environmental policy (Hajer, 1996).

Sustainable development is often defined as the development that meets present needs without jeopardizing the ability of future generations to meet their own needs (according to the Brundtland report, see WCED, 1987). However, most neoclassical economists understand sustainable development as the development in which consumption remains undiminished by time (Vlachou, 2005). Specifically, they suggest that the concept of sustainability should focus on maintaining the productive opportunities of future generations, without specifying if it is determined by physical capital or natural boundaries (Vlachou, 2005). Similarly, the theory of ecological modernization seeks to broadly analyze the way in which today's societies organize their economic, political and cultural institutions to cope with environmental crises. Based on this logic, ecologically modernized societies are those that incorporate environmental principles into the design of institutions to regulate human interactions with nature. The concept of democracy and constitutionally guaranteed rights and freedoms are the necessary institutions for ecological modernization in the sense that they operate as self-regulating mechanisms that have the potential to alleviate the human impacts on the planet. Alongside the market, further industrialization and technology are considered to be the main forces of modernization that will lead to ecological sustainability (Hajer, 1995; Mol, 1995, 2002; Mol & Sonnenfeld, 2000; Mol & Spaargaren, 2000; Spaargaren, 1997, 2000).

If the concept of sustainable development has lost some of its original "glory" the same does not apply to the ecological modernization theory, which is a prominent neo-liberal theory and one of the leading theories in environmental sociology (York & Rosa, 2003). Its widespread prevalence in shaping the current environmental policy is evident in the dominant approach that environmental protection should not be treated as an obstacle to economic development, but rather as a potential source for future growth (Weale, 1992, p. 75), a view highly related to the concept of sustainable development. This perception is accompanied by the assumption that the "ecological rationality" will emerge from already existing institutions rather than from radical environmental movements. As Clark & York (2005) argue the theory of ecological modernization is basically a functionalist theory, in the sense that it does not see the emergence of ecological rationality as derived primarily from social conflicts but rather from ecological enlightenment within the key institutions of modern society (Mol, 1995). As a response to the increasing criticism regarding the intensification of environmental problems in the existing socio-economic system and delays in the emergence of this "rationality", supporters of the theory consider it to become a prevalent trend in the near future.

In particular, they argue that in the early years of modernization states degraded the environment, while in its last stages environmental concerns will diffuse through society,

leading to the restructuring of major political, economic and social institutions towards ecological sustainability and social welfare (Mol, 1995). It is important to note that discussions of these concepts are mainly oriented to performance issues (efficiency), a focus that is not at all accidental. The criterion of efficiency is fully accredited by various public and private economic actors and establishes a common ground within the theory of ecological modernization that manages to combine the concerns of environmentalists, businesses and states. It is typical that many environmental organizations have embraced this consensual framework for discussion because it promises to make environmental protection "attractive" to governments and businesses whose cooperation is needed for environmental organizations to achieve specific reformist objectives (Hajer, 1995). The collaborative governance concept is also based in the same core ideas by supporting the participation of a variety of stakeholders in a context of apparent equity and fairness.

In general, strategies promoting sustainable development and ecological modernization goals in the context of collaborative governance do not address environmental degradation as an inherent characteristic of the current socio-economic system. Moreover, these perceptions often get to support that the forces of modernization will lead to the dematerialization of society and will succeed to decouple the economy from energy and material consumption, thus allowing the human society to overcome the environmental crisis within the present socio-economic system (Mol, 1995; Spaargaren, 1997). Nevertheless, so far, and despite the numerous signed conventions and directives, the various policy objectives and legislative measures towards the conservation and protection of the natural environment and biodiversity, the protection of human health, the rational use of natural resources etc., economic development remains the primary objective at both international and EU levels, thus weakening the effectiveness of existent environmental measures (Naxakis, 1997). After all, as Brand and Görg (2003) argue, politics on the conservation of biodiversity focus more on the creation of a stable political institutional framework for its commercialization, rather than on its actual conservation.

The above insights are essential in order to disentangle the variety of approaches regarding sustainable development and biodiversity conservation. Even though debates around the issues described above may not be transferred as such in the case of biodiversity conservation and protected areas they are relevant in order to contextualize the latter. Moreover, it is now obvious that debates regarding the relationship between biodiversity conservation and sustainable development are closely related to different approaches regarding the relationship between society and nature. These debates are of fundamental importance for the designation and implementation of management strategies and more generally for the direction and content of future conservation policy and governance.

3. Methodological approach

In our research we adopted a grounded theory approach. Grounded theory has been widely used in environmental research (e.g. Berghoefer et al., 2010; Kittinger et al., 2011) and produces theories that are likely to offer insight, enhance understanding and provide a meaningful guide towards action (Strauss & Corbin, 1998).

During the process of grounded theory building, four analytic and not strictly sequential phases were identified: research design, data collection, data analysis and literature

comparison. In the initial phase (sampling) of the research, when the major purpose was to generate as many categories as possible, we gathered data using the method of snowball sampling, asking our initial list of individuals who they thought would be good informants based on their experience and then tried to gather data in a wide range of pertinent areas. We also followed the method of purposive sampling that allowed us the use of personal judgment for the selection of the respondents who had the knowledge and the experience to cover the topics of the research. Once the initial categories were formed, then the sampling became more specific. The sample was then selected according to the “theoretical sampling” method, based on analytic questions and comparisons, pinpointing places, people or events to maximize the chances of discovering variations among concepts (Corbin & Strauss, 1990). This meant that the sample definition and requirements evolved during the research process itself. The criterion for stopping the research of a certain category was based on the category’s “theoretical saturation”, a major component of our research methodology since without this the theory would be unevenly developed and lacking density and precision (Strauss & Corbin, 1998).

Overall, we conducted 87 face-to-face semi-structured interviews with actors acting at several governance levels between January of 2007 and September of 2008 (see Table 1). Research questions were open, exploring issues regarding the relationships between sustainable development and biodiversity conservation with specific reference to the role of local community, the state and the market. The interviews were then transcribed and the transcribed passages were labeled with codes. In grounded theory data analysis is a well-defined process that begins with basic description and moves to conceptual ordering and then on to theorizing (Patton, 2002). Thus, the main analytical techniques include three types of coding: open, axial and selective coding (for further details see also Apostolopoulou & Pantis 2009, 2010). The main purpose of coding is the same as in other types of qualitative research (Padgett, 1998; Patton, 2002) but its level of specificity is what distinguishes grounded theory from other qualitative methods.

Interviewees were also asked to give specific examples in line with our approach to disentangle confusing and contradicting discourses and investigate what actions they actually support in practice. We selected as case studies Zakynthos Marine National Park and Schinias National Park as in both cases previous research has already been conducted by the authors, thus a relatively good knowledge on the actual situation served as a basis for the interpretation of research outcomes. Moreover, both cases are exceptional examples, since the history of their establishment as national parks has been characterized by significant conflicts between development and conservation.

We should clarify that the formulation of the research questions was based on an extensive literature review and on the described theoretical section (see section 2), in order to ensure that they will serve to investigate the relationship between sustainable development and biodiversity conservation. Similarly, given that the objective of this research is to use empirical research as a start for a broader discussion, the findings of the analysis are linked to relevant existing scientific literature and in particular to research on human-environment relationships. This is in line with the focus of coding in grounded theory which is not based only on the opinion of the individual interviewees but also on the core emerging concepts which can guide researchers from “description to conceptualization and from the more specific to the general or abstract” (Strauss & Corbin, 1998).

Stakeholders participating in Greek biodiversity governance	Number of interviews
<i>Central administration</i>	
Ministry of the Environment	14
Ministry of Rural Development and Food	5
Ministry of Development	3
Ministry of Economics	1
Ministry of Tourism	1
National Center for the Environment and Sustainable Development	1
Council of the State	1
Total	26
<i>NGOs</i>	
World Wide Fund for Nature Greece	5
The Sea Turtle Protection Society of Greece	3
Hellenic Ornithological Society	2
Hellenic Society for the Study and Protection of the Mediterranean monk seal	2
Mediterranean association to save the sea turtles	1
Hellenic Society for the Protection of Nature	1
Pan - Hellenic Network of Ecological Organizations	1
Hellenic Society for the Protection of the Environment and the Cultural Heritage	1
Total	16
<i>Management agencies and local administration</i>	
Management agency of National Park of Schinias - Marathon	9
Management agency of National Marine Park of Zakynthos	5
Municipalities and Regions	5
Central Union of Municipalities and Communities of Greece	1
Total	20
<i>Other key stakeholders</i>	
Companies providing consulting and assessment services in the field of nature conservation	3
Greek Biotope/Wetland Center	2
Greek General Confederation of Labor	2
The centre of Athens labor unions - Department of environment and international relations	1
Hellenic Federation of Enterprises	1
Pan - Hellenic Federation of Tourism Enterprises	1
Technical Chamber of Greece	1
The Mediterranean Initiative of the Ramsar Convention on Wetlands	1
Total	12
<i>Scientific community</i>	
Aristotle University of Thessaloniki	4
National & Kapodistrian University of Athens	4
Scientific institutions	2
National Centre for Social Research	3
Total	13
TOTAL	87

Table 1. The sample of interviewees.

During data analysis we chose to categorize *discourses* (see Phillips & Jorgensen, 2006) and not categories of stakeholders as such, a choice based both on theoretical arguments as well as on empirical findings. Regarding the theoretical arguments, following Blaikie & Jeanrenaud (1997, p. 47) we argue that different actors tend to use different parts of specific paradigms and approaches in eclectic and contradictory ways in order to support their projects, policies and often their special interests. Therefore, a focus on ideas and paradigms is valuable in order to disentangle dominant policies and practices. As far as empirical findings are concerned, the analysis of our qualitative empirical data confirmed that the majority of stakeholders tend to combine different arguments and conceptualizations of the linkages between conservation and development in order to support different claims. Even if specific stakeholder groups, such as state officials, adopted a more specific standpoint reflecting a specific ideology or even if in some cases one approach was more dominant, e.g. in the case of private economic actors, in many occasions stakeholders were using different arguments in order to support these approaches.

Therefore, the process of data analysis resulted in the construction of a conceptual model according to which the variety of stakeholders' discourses relating sustainable development to biodiversity conservation is categorized in the three main approaches that are described in the results and discussion section, as well as in several subcategories regarding the role of local community (including the role of NGOs), the role of protected areas, the role of the market and the state as well as the explanation of (natural resource) conflicts between development and conservation with reference to the two case studies.

4. Results & discussion

4.1 Biodiversity conservation and sustainable development as incompatible discourses

This approach could be divided in two different but interlinked discourses, in the sense that they result to the same conceptualization of the relationship between nature and society: in the first one the priority lies explicitly on biodiversity protection and in the second one on development. Each discourse, even if it often has completely different foundations and arguments, by putting either development or protection as a priority, leads to the reproduction of a dichotomy between nature and society.

4.1.1 Development as a barrier to conservation

One of the two dimensions of this approach, the conceptualization of development as a barrier to conservation, was dominant mainly between stakeholders from NGOs and Universities. Underneath this approach lies a strong moral imperative regarding nature's intrinsic value as well as a strong belief that development should be understood as the main cause of current biodiversity loss. The latter was grounded in the chronic failure of Greek state conservation policy to ensure the conservation of biodiversity which was mainly attributed to the explicit prioritization of development and public works. Sustainable development was interpreted as mainly based on rhetorical arguments in order to support actions and initiatives that are not actually "sustainable", more or less as a term used in official reports or policy documents without being based on concrete actions that take seriously into account biodiversity conservation concerns.

Interviewees adopting the above arguments often failed to distinguish between corporate developmental interests and local community livelihoods and thus to explain the roots behind the current direction of Greek economic development. Conflating sustainable and non-sustainable human activities has in its core the idea that humans are an *a priori* threat to biodiversity conservation leading to calls for strict nature protection excluding any type of human activities including those of the local community.

The above approach is quite similar to what has been characterized as the classic or authoritarian paradigm to biodiversity conservation (Blaikie & Jeanrenaud, 1997) and one significant element of this discourse was the explicit support for the establishment of more protected areas as the dominant proposed strategy for biodiversity conservation. The effect of the presence of local communities and in particular of indigenous people around protected areas (Chatty & Colchester, 2002), along with the economic and social impacts of these areas have been widely acknowledged and investigated (Adams & Hulme, 2001; Igoe, 2006; McNeely, 1993), mainly highlighting the tendency of conservation policy to act against the economically weaker groups of local communities. The establishment of protected areas has often been accompanied by the financial exploitation of these areas and the degradation of local communities. One of the most significant consequences is related to the displacement of local populations with direct impacts on their survival, as well as on livelihood provision (Brown, 1998; Cernea, 1997; Cernea and Schmidt-Soltau, 2006; Chatty & Colchester, 2002; Geoghegan & Renard, 2002; Gjertsen, 2005; Harper, 2002; Knudsen, 1999; Nygren, 2005). Even if the majority of the research on the unequal costs and benefits of conservation policies and on their increasing economic and social consequences have focused on “developing” countries (e.g. Sodhi et al., 2010; Swetnam et al., 2011) the last decades research on “developed” countries is also increasing (Apostolopoulou & Pantis, 2010; Foster, 2002; Haggerty, 2007).

However, interviewees who considered development as a barrier to conservation tended to underestimate the social dimensions of conservation policies. The latter was linked to the general tendency towards blaming humanity or mankind as a whole for environmental degradation. Moreover, usually interviewees mainly blamed the economic “weaker” social groups following the dominant ideology that poverty and environmental degradation are interlinked, considering poverty as a cause of environmental degradation and not both as a result of the existing socio-economic structures. Interviewees often considered that local communities by prioritizing their individual welfare could easily adopt short-term developmental goals and initiatives without taking into account environmental concerns. The conceptualization of local community as a group of people caring only for short-term profit from rapid development has been often associated with a more general understanding of society as a unified entity without significant differentiations (e.g. economic, social, political, gender), but as divided between two poles: the people that are environmental conscious and those that are not. It is worthy to note that many interviewees considered the latter category as a typical example of Greek local communities, attributing major responsibilities for biodiversity loss to local people, thus arguing that non-conservation is not only a state choice but also a social demand. Interestingly, this claim was in accordance with arguments of private economic actors and state officials who considered conservation as a barrier to development (see §4.1.2. and also Apostolopoulou & Pantis, 2010).

The way that the above argumentation has been used in order to explain the conflicts between development and conservation that have emerged in the two case studies, the National Park of Schinias and the National Marine Park of Zakynthos, is remarkable. The following quote from

a non-governmental organization (NGO) representative regarding the conflicts between development and conservation in National Marine Park of Zakynthos is indicative:

"The best way to end these unresolved conflicts between biodiversity and development is to buy the beaches that are the matter of debate. This has already happened –from an NGO- for one beach with very positive results. Sustainability is not an issue any more in these areas; they have abandoned it forever when they uncritically adopted mass tourism. Local people create problems each summer and they will continue to do the same because they understand the protected area as a barrier to their welfare so the only realistic way to proceed and ensure biodiversity conservation is unfortunately without them..."

The conceptualization of local community through the adoption of the term "civil society" proved in many cases as a crucial factor leading to the homogeneity of local people's interests. The determinative role of "civil society" in environmental policy has firstly emerged during the international meeting in Rio (1992) and today the term is more or less established. Civil society includes all the organizations and institutions which, at least theoretically, are located outside direct state control like associations, community groups, corporations, NGOs as well as business interests (Scholte, 2004). Prominent role in environmental and conservation policy is given to NGOs at international, national and local levels. It is characteristic that many interviewees consider that NGOs' participation is equal to public participation stemming from the belief that NGOs are the main representatives of common opinion. It is crucial to notice that the establishment of NGOs has been increased approximately 400% the last twenty years. These organizations are quite heterogeneous not only regarding the scale of their activity (local, national, international) but also in the forms of their organization, their goals, as well as their general standpoint towards political processes (De Angelis, 2003). However, in many cases they share common economic goals with business cycles while in other cases they purposefully promote the values and policies of neoliberal state and market (De Angelis, 2003).

A crucial point of this research is that representatives of NGOs tended to consider themselves during interviews as representatives of society without clarifying if they represent the interests of a specific part of society, whilst in many cases the only role that they were acknowledging for local people was the need to include them in environmental education activities. This seems to be a general trend especially if we take into account the fact that none of the international organizations which are promoting the establishment of protected areas has adopted and published explicit policies and official principles which would forbid the displacement of local people from these areas (Cernea & Schmidt-Soltau, 2006). However, big international organizations which are active in biodiversity conservation and which are lobbying for more protected areas, mainly at international and national levels, are receiving significant economic support from states, public and business whereas small-scale and mainly local NGOs working along with local communities in order to actively support the combination of sustainable development and biodiversity conservation are mainly based on the voluntary work of activists (Chapin, 2004).

Another issue raised here is that as in the past the movement of strict nature protection found common ground with the utilitarian movement in the creation of national parks, nowadays this seems to happen again. In particular, the fact that the idea that environmental and conservation initiatives and goals come first has often been used as an excuse for excluding local people and promoting private economic interests revealing that

often in this classic approach the problem is not people in general, but local people and especially indigenous people. It is indicative that many interviewees were highly critical towards local practices but at the same time they were supportive of private market-based initiatives for conservation. Not only powerful economic interests are not distinguished as potentially harmful for biodiversity, but to add to that, local people are blamed for unsustainable behavior with the common arguments that they are either not educated or due to their small-scale and short-term economic interests they do not take seriously into consideration environmental impacts. Thus we could argue that this approach is partly an inverted image of the "human-in-nature" approach that reproduces the division between human society and environment leading to serious mismatches between social and ecological systems.

4.1.2 Conservation as a barrier to development

This discourse was dominant in a small group of state officials and private economic actors and has been largely based on the criticism regarding unsatisfactory current developmental trends in Greece. Interviewees adopting this view argued that current environmental laws are very strict hindering opportunities for real development in Greek rural, marine and coastal areas. Particular emphasis was put on Natura 2000 network and the large percentage of Greek land (27,13% of national terrestrial area) that it covers. Many interviewees were adopting a mix of different arguments in order to support this approach whereas local community has mainly been portrayed as poor people-victims of strict biodiversity policies. However, the real focus of this approach was related to concerns regarding the fact that corporate interests do not select Greece for their investments because of the dominance of strict conservation measures. The following quotes from a private economic actor are quite indicative:

"Natura 2000 network has been designed without taking into account the developmental opportunities that existed in these areas which are now "trapped" inside the boundaries of the network. The result is that more than the 50% of areas ideal for tourist, residential and energy development are now Natura 2000 sites. Inside these areas, but also outside them because of the strict legislation, an investor should wait four years or more in order to receive a "yes" or a "no" from the Greek state regarding the authorization of his project. Thus, in this era of competition you should wait at least four years for investment in Greece! You can understand that this is detrimental for any kind of development and completely contrary to sustainable development: sustainability is supposed to be taking into account economy-society-environment; If it considered only the last two things then it wouldn't be called development".

And:

"Sustainable means "viable" and this clarifies current extremities in the interpretation of the term in Greek discourses considering that sustainable is equal to "inheriting" resources to the next generations. But who can guaranty to us that the future societies of our children or grandchildren will have the same needs with us? Technology continuously invents and develops new materials and substitutes for the rare ones".

It is rather remarkable that interviewees adopting this discourse had a completely different opinion regarding biodiversity policy in Greece. In contrast with all other interviewees (see also Apostolopoulou & Pantis, 2009), they argued that there is a national biodiversity strategy and a clear priority from Greek state to promote and support the establishment of protected areas and especially Natura 2000 network.

It is important to keep in mind at this point the huge struggle regarding the issue of arbitrary building, which has emerged during the voting of the new national (Greek) biodiversity law in 2011. Even though this happened after the period that this research was carried out, it has been quite indicative of the predominance of this minority discourse during interviews in real biodiversity politics in Greece.

Simultaneously, the local community has been portrayed in quite contradicting ways. The statement of K. Brown (2002) that “development perspectives have often argued that conservation is a threat to human welfare and highlight the exclusion of local people from protected areas as a denial of rights to resources and as undermining livelihoods” was dominant in this discourse, which on the other hand was combined with the conceptualization of local people as environmentally uneducated. The “value” of local people seemed to be considered as increased because of their role as voters at least for the ministries’ and local administration’s political leadership. As a ministry representative stated:

“Sustainable development is good in theory. But can it be really implemented in practice? Big interests will always prioritize development. [...] EU is trying to reach consensus between environment and society and is willing to take into account citizens’ opinions. They were imagining sensitive citizens though, but in reality citizens use environmental protection as a “flag” while claiming other things. Therefore, state leadership will conflict only for something of huge importance. And since people are those voting for the existing governments we should prioritize people’s preferences –which are clearly development and profit-, especially in a small underdeveloped country like Greece”.

This has been more clearly illustrated in stakeholders’ opinions about the conflicts in the two case studies. The following quote is indicative:

“The participation of local community in combining sustainable development and biodiversity conservation is risky. People who have interests will try to promote their interests and just name this “sustainable development” and in this way personal interest for profit will dominate, exactly as it happened in the cases of Schinias and Zakynthos. But on the other hand these people are those who really know these areas, own land there, thus you cannot exclude them from decision-making or decide the transformation of these areas to protected parks, which stands for actually taking over their land based on some international agreements or NGOs strategies”.

However, the fact that the above argument if expressed in a different way can be used for exactly the different purpose from populist discourses or from the “human-in-nature” approach on biodiversity conservation should sensitize researchers to focus both on the social construction of nature and on the politics of conservation and development including the actual practices that each discourse supports.

4.2 Biodiversity conservation and sustainable development as compatible discourses: Green economy, ecosystem services and “win-win” scenarios

A different stakeholders’ discourse, the dominant one in comparison with all others analyzed in this chapter, consisted of the main idea that biodiversity conservation and sustainable development could and should be combined with the main goal to support development through biodiversity conservation. Interviewees adopting this approach, tended to emphasize that environment is a common good, from the conservation of which every individual member of society could significantly benefit. In this context, ideas of

collaborative and multilevel governance were dominant in the discussions. Even though the term civil society was the main term used for the local community also in this discourse, in contrast with the previous cases, this time local community was portrayed as consisting of more or less equal groups of actors between which "win-win" solutions could be reached. Behind this approach lies the ideology that social groups with different interests could co-decide and reach consensus through negotiations. A central argument supporting this potential has been based in the importance to render biodiversity protection politically viable through the development of new partnerships between various actors in the context of the common expectation for economic development, something in line with ecological modernization theory (Fisher & Freudenburg, 2001).

The idea of green economy is placed at the core of this discourse as well as the attempt to explicitly link economy to biodiversity conservation. The core issue here proved to be not the conservation of biodiversity as such but as a potential strategy that would benefit economic development. This was a dominant discourse among interviewees from different organizations and sectors, even though there was a continuum of approaches, from the more explicitly economic to the more socially conscious. In particular, interviewees located in the first end of this continuum, explicitly referred to the necessity to include nature into market through its valuation. This general proposal was further supported by more specific ones in the context of the popular motto, "the polluter pays" or even "the user pays". In the first case, it was argued that environmental degradation, including biodiversity loss, has been primarily caused by polluting activities, infrastructure or overexploitation of natural resources and thus should be arranged through negotiations among relevant actors and compensations should be made mainly from the responsible enterprises. In the second case, it was argued that each person visiting a national park or swimming in a protected beach should pay for using this natural "service". This is in line with what Naxakis (1997) explains as the dominant response to environmental problems: "to give prices to nature, to consider that natural resources have value, they are commodities, since the prices are those regulating the changes of available quantities of goods. The economic valuation of natural resources -from the air that we breath, the oceans, the forests, the fauna and flora- and their exchange in the market will determine according to neoliberals their demand and consumption rates, will thus regulate their exhaustion (destruction) rate".

In particular, interviewees from central and local administration, NGOs as well as private economic actors argued that the transition to a green economy, including a green tourist industry, green investments and banking, as well as green products, by regulating supply and demand will lead to the increase of the price of products and services which are rare, including ecosystem services, endangered species, habitats and landscapes and will accelerate their protection or in some cases even their replacement through technological innovation. This approach by adopting the core arguments of the ecological modernization theory is in line with the main arguments of the classical theories of ecological economics. In particular, the latter theories support that increased demand for environmental quality, expressed mainly through the preference for green commodities and services, would force governments and business to invest in ecologically friendly technologies and practices. Financial support for these technologies would in turn be possible because of the increased profit that these would bring. However, interviewees tended to underevaluate the fact that if value and scarcity are inversely related then species recovery and relative abundance could paradoxically result in reduced support for conservation (Vira & Adams, 2009).

Simultaneously, interviewees tended to support that the causes of biodiversity extinction are strongly related to the communal property of natural resources. As an interviewee noted:

"If a rare species belongs to everybody then it belongs to no one and therefore nobody has the responsibility for its conservation and management. To put it simply: nobody cares if it disappears because it won't cost anything to him".

This has been strongly attributed to the incapacity of Greek state to effectively conserve valuable ecosystems and combine in practice sustainable development with biodiversity conservation. The absence of explicitly defined property rights has been considered as a main factor, which helps and legitimates state intervention while at the same time does not allow the market to take an active role in managing conservation problems. These arguments have been further supported through the open support for free businesses and in general for a free market unobstructed from both governments and employees (see also Jamal et al., 2003). The market was portrayed here as rational, fair and representative of social interests whereas according to more extreme opinions it was considered as able to ensure the democratic distribution of ecosystem services and natural resources.

Following the above line of argumentation, interviewees explained that they consider as necessary the further privatization and commercialization of natural resources, while arguing that private property rights in individual parts of natural environment could partly deal with many current threats to biodiversity. As Fraser (1996) explains, a neoliberal approach aligns government and capital more directly, thus leading to a variety of services and goods which are neither public nor commodities, but more or less hybrids combining characteristics of both forms. This was expressed during interviews while discussing the role of protected areas on conservation and development where it was argued that initiatives towards the commercialization of landscapes and environmental "experience" could be good solutions in order to make protected areas economically viable and a core element of tourist and residential development. This is actually a very popular trend, which has led to many partnerships between parks administration, especially national parks, and mainly tourist industry in the face of constantly decreasing state funding for nature conservation (Searle, 2000). The following quotes from a representative of the tourist industry and a member of local administration regarding the two national parks are indicative:

"Eco-development and thus ecotourism set as the main economic touristic value, the preservation of innocence, wilderness and of the broad variety of nature that is essential for the modern societies that are trapped in the large cities, the fast working conditions, even in the large luxurious apartments of the big cities. Volunteering, extreme sport activities and generally the "mother nature" package that is considered as a shelter from the wild city life, is rapidly evolving as the new way of commercializing sustainability, thus enhancing the huge benefits one can gain from the non-monetary economic development. This model if adopted in Schinias and especially in Zakynthos would transform these areas into green and expensive paradises".

And:

"Many experts agree that nature which is pristine can remain like this only if it brings money. Local people in Zakynthos, and generally in Greek rural areas, are still trying to gain money from the exploitation of natural resources but they could achieve the same, if not more, by guiding tourists into their beautiful and valuable areas. Without tourists and their money neither local economies nor endangered species have the prospect to survive".

The dominance of these approaches has also been evident in the fact that the last 30 years the valuation of ecosystem services has been proved to be one of the faster developing research areas in environmental economics (Jenkins et al., 2010; Jim & Chen, 2009; Lange & Jiddawi, 2009). This has been a core argument of many interviewees, especially those more familiarized with environmental research, and it was widely used in order to support that these ideas have somehow “naturally” evolved in the era of modernity and have now become a highly respected scientific endeavor. Reference to ecosystem services, mostly seen as economic benefits provided by natural ecosystems, was not only a dominant theme during interviews but it can also be considered as the dominant trend in conservation science (MA, 2003; McCauley, 2006). However, research focusing on these issues tends to support approaches which are based in consumers’ preferences and which are compatible with the usual monetary system of valuating competitive products and services (e.g. Jenkins et al., 2010).

Supporters of these approaches defending themselves towards criticism for attempts to costing and selling natural environment, argue that the main goal it is not to select a specific price («\$ price tag») for natural environment or its components, but to express in economic terms the result of a change in the benefits of ecosystem services in relation to other services that people are willing to pay for (e.g. Jenkins et al., 2010), thus to calculate the potential, as well as the amount, that “consumers” are willing to pay for conserving natural environment in comparison to other “products” (Hanley & Shogren, 2002; Randall, 2002). As Vira & Adams (2009) argue “the ecosystem services approach may provide a useful additional argument for conservation, but practitioners should be cautious about the potential pitfalls of utilizing economic metaphors that are not always perfectly related to the biological systems that are the subject of conservation interest”. They furthermore explain that “while natural capital is a useful economic concept, it does not capture the full complexity of relations between genes, species, and ecosystems that is associated with the term biodiversity (cited Wilson, 1992)”. This is of particular importance for conservationists, who seem to adopt ecosystem services as the new “win-win” strategy, which in contrast to sustainable development puts the emphasis of this dual relationship on conservation and not on development. On the other hand, the concept of ecosystem services is essentially based on human valuation systems, which are based on changing consumer preferences, willingness to pay, and technological advances (Vira & Adams, 2009). As Tallis et al. (2008) explain “if policy and financial incentives for conservation of ecosystem services are to be successful and equitable, we will also need a solid scientific understanding of how services flow from one region to another, what human groups benefit from ecosystem services, and what groups or populations would need to be compensated for protecting those services”. Moreover, there is “a strategic risk in justifying biodiversity conservation primarily in terms of ecosystem services”, as McCauley (2006) points out. One should thus be aware of the potential risk that economic benefits from services that are valued by human society will overwrite and outweigh noneconomic justifications for conservation (Redford & Adams, 2009).

In the above context, proposals for economic benefits from the establishment of protected areas dominated interviews. The most dominant one concerned proposals for investigating visitors’ willingness to pay for visiting a protected area or for establishing a small market based on souvenirs sold in the protected areas. Simultaneously, proposals for partnerships with the tourist industry proved to be quite popular. The conceptualization of public access

to recreation as a commodity has been a constantly emerging topic in scientific literature and since the early '90s the optimal way to "charge" people for recreational purposes has been considered to be a market under constant development (see Bishop & Phillips, 1993). As Kiss (2004) notices "ecotourism represents one facet of the sustainable use approach, in which biodiversity is regarded as a product to be sold to consumers (using the terms broadly)". As a representative of an NGO put it:

"There have been many thoughts about promoting ecotourism and partnerships with the private sector, but in Zakynthos –as well as in Schinias and in Greece in general- we are too far from these approaches – the problem is not the protected area but the investment projects. We do not have the necessary development law, which would help each local landowner or business owner to think in an environmentally friendly way and start acting towards this direction [...] It is a matter of time that these people realize that environment and biodiversity conservation can give major job opportunities and bring money to their areas. Similarly, it is a matter of time for administration to realize that valuation of ecosystem services is crucial for the survival of Greek protected areas".

The latter proposals were often related, in economic actors' discourses, to proposals for promoting the importance of protected areas for residential development. This is in line with peer-reviewed publications (Pejchar et al., 2007), where authors argue that the most direct benefit from such initiatives would be the decrease in the total amount (and therefore cost) of necessary infrastructure in order to support development, assuming that almost the same number of houses is built in a smaller area. Pejchar et al. (2007) notice that the National Association of Home Builders calculated that a medium developmental complex in a protected area costs 34% less in order to be developed compared to a conventional area (citing Thomas, 1991). They also add that there are plenty of proofs indicating that vicinity to open space, like protected areas, increase the value of a property whereas the bigger increases in values concern houses located in a area of approximately 455 m from permanent protected natural areas. Therefore, development based on the conservation of natural environment could potentially give competitive advantage to those who would choose it given that it would offer them the opportunity to differentiate their houses in relation to those which are part of the "classic developmental paradigm" which tends to offer limited variations in a rather common subject (Pejchar et al., 2007). However, as Pejchar et al. (2007) argue, it is estimated that development based on conservation entails a degree of risk and under specific circumstances could be considered as less advantageous because for instance, "the identification and protection of important ecological assets could eliminate the best potential home sites on a property [sic]".

A major characteristic of this discourse is the way that different and conflicting arguments co-existed in the same sentence reflecting a tendency to resolve real conflicts around development and conservation in theory. Although each discourse was not expressed in a concise way, as explained earlier in this chapter, it was especially in this approach that policies and goals not sufficiently combined in current practices were presented as totally compatible.

4.3 Biodiversity conservation and sustainable development as complementary discourses: "Human-in-nature" approaches

This discourse proved to be dominant among scientists, NGOs representatives and state employees. Nevertheless we must emphasize that this idea has been more directly

expressed through individual arguments and has not, at least for most interviewees, been presented as a clear and concrete standpoint reflected in all individual questions. An important feature of this view is that it was expressed through calls for redefining or reconceptualizing both sustainable development and biodiversity conservation. Again, we could place these discourses in a continuum from approaches that argued for redefining both concepts through criticizing current practices, to more holistic approaches that were based on specific proposals towards adopting a new more integrative approach.

At the core of this discourse lies the understanding of society and environment as co-evolving social-ecological systems. Interviewees argued that sustainable development should be interpreted as the type of development that encompasses both biodiversity conservation and human welfare, primarily defined as explicit support for environmental friendly activities, resilient local livelihoods and increased quality of life for the majority of local people. Therefore, current developmental trends were considered as non-compatible with conservation. Interviewees emphasized that those who support the need for conservation of biodiversity and sustainable development should become more critical against the wider-scale policies that threaten it and the specific actors who promote and actually profit from these (see also McAfee, 1999). They should also consider more carefully the connections between individual acts and the wider structures and processes that drive social and environmental practices and changes (see also Adams & Hutton, 2007). It was argued that for the latter it is crucial to acknowledge the differentiation within local community groups as well as the variety of activities through which they interact with natural environment. Clearly taking into account the role of power and productive relations and the way that these influence human metabolism with nature was considered as crucial towards the above acknowledgement as well as towards resolving scale mismatches between natural and social systems. As a state employee explained:

"In natural resource conflicts all social groups are not sharing equally either the costs or the benefits of conservation policy. This has been obvious in both cases, I mean in both Schinias and Zakynthos, and it was further aggravated by the fact that many people in these areas were obliged to make sacrifices whereas at the same time others remained unaffected from regulations despite the environmental disastrous character of their activities. [...] And moreover there is no official policy or strategy trying to explain and deal with the reasons behind non-sustainable activities of local people. Maybe because in this case state would have to blame itself and then who could ever be convinced for biodiversity conservation from a state which is mainly responsible for its loss?"

In this view sustainable development is closely related to social equity and local community livelihoods and therefore local perceptions regarding issues of social justice and improvement of life conditions are considered as crucial factors for the success of projects aiming at combining development and conservation. However, it was pinpointed that this approach in the Greek case is not an established trend and therefore besides reference to some specific cases where initiatives towards this direction have been adopted, this was mainly conceptualized as a proposal for future Greek policies and practices. As a scientist explained:

"The main goal of current practices of biodiversity conservation in Greece, along with the absence of references to a "societal economy" which could potentially distribute the benefits of the management agencies established in protected areas to local communities, are indicative of the dominant direction

of present initiatives towards the commercialization of the natural environment and the exclusion of local people from their areas. They are reproducing a dichotomy between society and nature arguing at the same time that this is the only realistic approach in the era of modernity. Future integrative policies will be successful only if they escape from such dipoles. After all, our experiences with areas such as Zakynthos or Schinias confirm this argument”.

Interviewees adopting this view emphasized the role of multiple types of knowledge in the process of designing, implementing and evaluating conservation projects. The role of scientific knowledge and monitoring proved to be of fundamental importance for assessing whether sustainable development is actually combined with conservation, by analyzing the impacts of development projects for ecosystems. Similarly, traditional and lay knowledge were considered as necessary tools for assessing the incorporation of socio-economic and cultural objectives in conservation-development projects as well as for resolving mismatches occurring from inaccurate analysis of the interactions between ecosystem processes and human activities.

It is remarkable that some interviewees while analyzing their proposals for improving the situation in Schinias, they focused on the need to realize that in order to minimize the degradation of ecosystems in the region due to a set of interrelated factors (fragmentation and habitat loss, hydrologic regime, residential and tourist development, etc.) an interdisciplinary designation of conservation policy that would be based on the interaction and interrelationship of social, political, ecological, economic and cultural conditions should be considered as a prerequisite. While assessing the situation in Schinias National Park interviewees explained that it would be critical to promote sustainable development by integrating the social dimension in biodiversity conservation to improve the living standards of local community with investments in areas such as infrastructure for local people (sewers, flood control, biological control of mosquitoes, etc.), works to strengthen the family income, agrienvironmental schemes, economic incentives for environmental protection and compensation for loss of income. These actions could significantly restore the chronic unequal distribution of costs and benefits that state policies have promoted. In this view, sustainable development was perceived as a strategy which could potentially lead to resilient social-ecological systems. Similar insights were documented for the National Marine Park of Zakynthos.

Similarly, the principle of “participation” has been dominant in discussions whereas the role of local communities has been described as crucial during the designation and implementation of environmental policy with the main goal to promote sustainable development. Elements of the neo-populist paradigm can be traced here in stakeholders’ discourses, mainly in the quotes of NGOs representatives, especially regarding the role of protected areas (see also Brown, 2002). However, it is important to notice that the reference to ICDPs projects (for further details about ICDPs see Garnett et al., 2007), which has been a dominant strategy for combining development and conservation worldwide, was not considered as relevant for the Greek case, something also evident from the fact that this kind of projects are actually non-existent. The latter is also related to the fact that discourses about local communities leaving in harmony with nature tend to be popular in “developing” countries and not in “developed” ones.

Concurrently, some interviewees, mainly researchers, claimed that in order to make stakeholders networks to effectively work, research should be focused on the investigation

of the socio-economic and political power relations within and among social groups (see also Paulson et al., 2003) across scales. The designation of a socially inclusive conservation strategy, including specific incentives, compensation measures and support for traditional human activities, at national level was considered as necessary in order to achieve real changes at both regional and local levels. Such initiatives can be based on the benefits from the establishment of linkages between humans and protected areas (Hoole & Berkes, 2010) and on schemes that would deal with the unequal distribution of cost and benefits that conservation policies produce (Apostolopoulou & Pantis, 2010).

Finally, interviewees argued that issues such as the definition of "local community" and the description of how societal participation in implementing conservation programs will occur in practice should no longer be located on the margins of the dominant approaches. It was argued that conflicts over natural resources cannot be treated as "technical" issues that need to be resolved by the appropriate "communication strategies".

The adoption of adaptive co-management strategies (see Armitage et al., 2009) was a dominant proposal in this discourse. The latter was perceived as a strategy which could lead to the improvement of the current situation through the transition to a comprehensive and long-term adaptive management plan where a variety of management measures will be implemented and tested in practice to achieve the integration of sustainable development and biodiversity conservation in a context of environmental justice. Similarly, a participatory and transparent decision-making process was considered by interviewees as necessary in order to implement integrative conservation and development strategies according to the social needs of the majority of local people.

5. Conclusion

It is evident that different discourses regarding sustainable development and biodiversity conservation have core differences on the way they interpret and frame the relationship between nature and human society. The conceptualizations of the role of local community, NGOs, the state and the market have fundamental consequences for the way that biodiversity conservation and sustainable development as well as potentials for their integration are being understood and defined. Undoubtedly, there is a huge confusion around all these terms evident in the apparent difficulty of the interviewees to explicitly explain their ideas and offer integrative approaches whereas in many cases same observations on several points were used to support very different arguments (see also Brechin et al., 2002). The fact that different agencies interpret the linkages between development and conservation in different ways, along with the different policy instruments implemented in protected areas, results in a range of prescriptions and management strategies (Brown, 2002). This confusion is directly related to the variety of cultural and ideological perspectives as well as to the influence of powerful economic interests and especially to the fact that "by no means all of these different interests and normative notions about biodiversity concern human welfare although they may be invoked in its name (Blaikie & Jeanrenaud, 1997)". The existence of many contradictory tendencies and rivalries in development strategies requires a thorough analysis of the social construction of nature especially given that the discourses regarding conservation and sustainability are directly linked to the broader systems of development and power (Nygren, 1998).

Towards this direction the role of the state, the market and local communities should be carefully analyzed. Apart from the overall role of NGOs, the “civil society” term is still unclear and problematic, since it encompasses the definition of society as a homogeneous entity. In the current reconstruction of the term, the “civil society” concept diminishes the structural conflicts that occur among different social groups (Meiksins Wood, 1998). The failure to recognize differences within local communities has been highly criticized by a broad variety of researchers (Agrawal & Gibson, 1999; Brosius et al., 2005; Brosius et al., 1998). Similarly, focusing on “actors” rather than state and market structures and processes tends to remove agents from structures forgetting that the central questions related to environmental degradation and rural deprivation are to be found in land tenure relations, market dependencies, organization of economies, and violence against local knowledge (Bebbington, 1993; Nygren, 1998). The latter are primarily responsible for serious mismatches between social and ecological sustainability whereas they are strongly related to the fact that individuals in fundamental societal roles have the power to influence ecological patterns and processes at scales beyond expected. This is highly apparent in the case of biodiversity conservation and sustainable development with the example of Protected Areas, to be of the most typical ones. This, in turn, causes several misconceptions, mismatches and conflicts of interest among the various administrative levels as well as between and within institutional and governance structures and processes.

Today, it is considered that due to scientific advances and new political coalitions new approaches are emerging that align development with conservation linking human and environmental well being (Daily & Matson, 2008). However, we could argue that combining nature protection with social justice has not yet been implemented as a general strategy whereas the role of sustainability remains complicated and quite ambiguous in current policies and practices (Apostolopoulou & Pantis, 2010; Apostolopoulou, 2010; Brechin et al., 2002). Therefore, it is of fundamental importance to unravel current stakeholders’ discourses in order to analyze current deficits in both theory and practice. The latter is, in turn, critical for the designation and implementation of future integrating policies which would consider biodiversity conservation and sustainable development as complementary goals in the context of a new positive relationship between nature and human society.

6. Acknowledgements

An important part of this study was funded by the EU European Social Fund (75%) and the Greek Ministry of Development - GSRT (25%). Funding for a part of this study was also provided by the Large-Scale Integrating Project within FP7 SCALES (grant 226 852). We thank the many people and organizations for providing us with information necessary for our research.

7. References

Abakerli, S. (2001). A critique of development and conservation policies in environmentally sensitive regions in Brazil. *Geoforum*, Vol.32, pp. 551-565

- Adams, W.M. & Hulme, D. (2001). Conservation and communities: Changing narratives, policies and practices in African conservation, in: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation*, D. Hulme & M. Murphree, (Eds), 9-23, James Currey, London
- Adams, W.M. & Hutton, J. (2007). People, Parks and Poverty: Political Ecology and Biodiversity Conservation. *Conservation and Society*, Vol.5, pp. 147-183
- Adams, W.M., Aveling, R., Brockington, D., Dickson, B., Elliott, J., Hutton, J., Roe, D., Vira, B. & Wolmer, W. (2004). Biodiversity conservation and the eradication of poverty. *Science*, Vol.306, pp. 1146-1149
- Agrawal, A. & Gibson, C.C. (1999). Enchantment and disenchantment: The role of community in natural resource conservation. *World Development*, Vol.27, pp. 629-649
- Apostolopoulou, E. & Pantis, J.D. (2010). Development plans versus conservation: explanation of emergent conflicts and state political handling. *Environment and Planning A*, Vol. 42, pp. 982-1000
- Apostolopoulou, E. & Pantis, J.D. (2009). Conceptual gaps in the national strategy for the implementation of the European Natura 2000 conservation policy in Greece. *Biological Conservation*, Vol.142, pp. 221-237
- Apostolopoulou, E. (2010). Critique of the dominant developmental ideology regarding the nature-society relationship: The case of conservation policies. *Utopia*, Vol.91, pp. 87-106 (in Greek)
- Armitage, D.R., Plummer, R., Berkes, F., Arthur, R.I., Charles, A.T., Davidson-Hunt, I.J., Diduck, A.P., Doubleday, N.C., Johnson, D.S., Marschke, M., McConney, P., Pinkerton, E.W. & Wollenberg, E.K. (2009). Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment*, Vol.7, pp. 95-102
- Bebbington, A. (1993). Modernization from below: an alternative indigenous development? *Economic Geography*, Vol.69, pp. 274-292.
- Berghoefer, U., Rozzi, R. & Jax, K. (2010). Many eyes on nature: diverse perspectives in the Cape Horn Biosphere Reserve and their relevance for conservation. *Ecology and Society*, 15(1): 18, Available from <http://www.ecologyandsociety.org/vol15/iss1/art18/>
- Bishop, K.D. & Phillips, A.A.C. (1993). Seven Steps to Market - the Development of the Market-led Approach to Countryside Conservation and Recreation. *Journal of Rural Studies*, Vol.9, pp. 315-338
- Blaikie, P. & Jeanrenaud, S. (1997). Biodiversity and human welfare, In: *Social change and conservation: environmental politics and impacts of national parks and protected areas*, K. Ghimire & M.P. Pimbert, (Eds), 46-70, Earthscan, London
- Blowers, A. (1998). Power, participation and partnership, In: *Cooperative Environmental Governance: Public-Private Agreements as a Policy Strategy*, P. Glasbergen, (Ed.), 229-249, Kluwer Academic Publishers, Dordrecht
- Brand, U. & Görg, C. (2003). The state and the regulation of biodiversity. International biopolitics and the case of Mexico. *Geoforum*, Vol.34, pp. 221-233

- Brechin, S.R., Wilshusen, P.R., Fortwangler, C.L. & West, P.C. (2002). Beyond the square wheel: toward a more comprehensive understanding of biodiversity conservation as social and political process. *Society and Natural Resources*, Vol.15, pp. 41-64
- Brosius, J.P., Tsing, A.L. & Zerner, C. (2005). *Communities and Conservation: Histories and Politics of Community-Based Natural Resource Management*, Altamira Press, Walnut Creek, USA
- Brosius, J.P., Tsing, A.L. & Zerner, C. (1998). Representing communities: histories and politics of community-based natural resource management. *Society and Natural Resources*, Vol.11, pp. 157-168.
- Brown, K. (2002). Innovations for conservation and development. *The Geographical Journal*, Vol.168, pp. 6-17
- Brown, K. (1998). The political ecology of biodiversity, conservation and development in Nepal's Terai: confused meanings, means and ends. *Ecological Economics*, Vol.24, pp. 73-88
- Cernea, M.M. & Schmidt-Soltan, K. (2006). Poverty risks and national parks: Policy issues in conservation and resettlement. *World Development*, Vol.34, pp. 1808-1830
- Cernea, M.M. (1997). The risks and reconstruction model for resettling displaced populations. *World Development*, Vol.25, pp. 1569-1589
- Chapin, M. (2004). A challenge to conservationists. *World Watch Magazine*, Vol.11-12, pp. 17-31
- Chatty, D. & Colchester, M. (2002). *Conservation and Mobile Indigenous Peoples: Displacement, Forced Resettlement and Sustainable Development*, Berghahn Press, New York
- Clark, B. & York, R. (2005). Dialectical Materialism and Nature: An Alternative to Economism and Deep Ecology. *Organization and Environment*, Vol.18, pp. 318-337
- Corbin, J. & Strauss, A. (1990). Grounded theory research: procedures, canons, and evaluative criteria. *Qualitative Sociology*, Vol.13, pp. 3-21
- Cumming, G.S., Cumming, D.H.M. & Redman, C.L. (2006). Scale Mismatches in Social-Ecological Systems: Causes, Consequences, and Solutions. *Ecology and Society* 11(1): 14, Available from <http://www.ecologyandsociety.org/vol11/iss1/art14/>
- Daily, G.C. & Matson, P.A. (2008). Ecosystem services: from theory to implementation. *PNAS*, Vol.105, pp. 9455-9456
- Davidson-Hunt, I.J. & Berkes, F. (2003). Nature and society through the lens of resilience: toward a human-in-ecosystem perspective, In: *Navigating Social-Ecological Systems*, F. Berkes, J. Colding & C. Folke, (Eds.), 53-82, Cambridge University Press
- De Angelis, M. (2003). Neoliberal Governance, Reproduction and Accumulation. *The Commoner*, Spring/Summer 2003, Available from <http://www.thecommoner.org>
- Dryzek, J.S. (1997). *The Politics of the Earth: Environmental Discourses*, Oxford University Press, Oxford
- Fisher, D.R. & Freudenburg, W.R. (2001). Ecological modernization and its critics: assessing the past and looking toward the future. *Society and Natural Resources*, Vol.14, pp. 701-709
- Foster, J.B. (2002). *Ecology against capitalism*, Monthly Review Press, New York

- Fraser, N. (1996). Clintonism, Welfare, and the Antisocial Wage: The Emergence of a Neo-liberal Political Imaginary, In: *Marxism in the Postmodern Age: Confronting the New World Order*, A. Callari, S. Cullenberg, C., Biewener, (Eds), 493-505, The Guildford Press, New York and London
- Garnett, S.T., J. Sayer & Du Toit, J. (2007). Improving the effectiveness of interventions to balance conservation and development: a conceptual framework. *Ecology and Society* 12(1): 2, Available from <http://www.ecologyandsociety.org/vol12/iss1/art2/>
- Geoghegan, T. & Renard, Y. (2002). Beyond community involvement: lessons from the insular Caribbean. *Parks*, Vol.12, pp. 16-25
- Gjertsen, H. (2005). Can habitat protection lead to improvements in human well-being? Evidence from marine protected areas in the Philippines. *World Development*, Vol.33, pp. 199-217
- Haggerty, J.H. (2007). I'm not a greenie but ...: environmentality, eco-populism and governance in New Zealand: experiences from the Southland whitebait fishery. *Journal of Rural Studies*, Vol.23, pp. 222-237
- Hajer, M.A. (1996). Ecological modernization as cultural politics, In: *Risk, Environment and modernity: towards a new ecology*, S. Lash, B. Szerszynski, B. Wynne, B., (Eds), 246-268, Sage publications, London
- Hajer, M.A. (1995). *The politics of environmental discourse: Ecological modernization and the policy process*, Oxford University Press, Oxford
- Hanley, N. & Shogren, J.F. (2002). Awkward choices: economics and nature conservation, In: *Economics, Ethics and Environmental Policy: Contested Choices*, D.W. Bromley & J. Paavola, (Eds), Blackwell Publishing, Oxford
- Harper, J. (2002). *Endangered species*, Carolina Academic Press, Durham, North Carolina
- Hoole, A. & Berkes, F. (2010). Breaking down fences: Recoupling social-ecological systems for biodiversity conservation in Namibia. *Geoforum*, Vol.41, pp. 304-317
- Igoe, J. (2006). Measuring the costs and benefits of conservation to local communities. *Journal of Ecological Anthropology*, Vol.10, pp. 72-77
- Jamal, T., Everett, J. & Dann, G.M.S. (2003). Ecological rationalization and performative resistance in natural area destinations. *Tourist studies*, Vol.3, pp. 143-169
- Jänicke, M. (1997). The political system's capacity for environmental policy, In: *National Environmental Policies: A Comparative Study of Capacity-Building*, M. Jänicke & H. Weidner, (Eds), 1-24, Springer Verlag, Berlin
- Jenkins, W.A., Murray, B.C., Kramer, R.A. & Faulkner, S.P. (2010). Valuing ecosystem services from wetlands restoration in the Mississippi Alluvial Valley. *Ecological Economics*, Vol.69, pp. 1051-1061
- Jim, C.Y. & Chen, W.Y. (2009). Ecosystem services and valuation of urban forests in China. *Cities*, Vol.26, pp. 187-194
- Kalamandeen, M. & Gillson, L. (2007). Demything "wilderness": implications for protected area designation and management. *Biodiversity and Conservation*, Vol.16, pp. 165-182
- Kiss, A. (2004). Is community-based ecotourism a good use of biodiversity conservation funds? *Trends in Ecology and Evolution*, Vol.19, pp. 232-237

- Kittinger, J.N., Dowling, A., Purves, A.R., Milne, N.A. & Olsoon, P. (2011). Marine Protected Areas, Multiple-Agency Management, and Monumental Surprise in the Northwestern Hawaiian Islands. *Journal of Marine Biology* doi:10.1155/2011/241374
- Knudsen, A. (1999). Conservation and controversy in Karakoram: Khunjerab National Park, Pakistan. *Journal of Political Ecology*, Vol.6, pp. 1-30
- Lange, G.-M. & Jiddawi, M. (2009). Economic value of marine ecosystem services in Zanzibar: Implications for marine conservation and sustainable development. *Ocean & Coastal Management*, Vol.52, pp. 521-532
- MA (Millennium Ecosystem Assessment) (2003). *Ecosystems and human well-being*, Island Press, Washington
- McAfee, K. (1999). Selling nature to save it? Biodiversity and green developmentalism. *Environment and Planning D: Society and Space*, Vol.17, pp. 133-154
- McCarthy, J. (2006). Neoliberalism and the Politics of Alternatives: Community Forestry in British Columbia and the United States. *Annals of the Association of American Geographers*, Vol.96, pp. 84-104
- McCauley, D.J. (2006) Selling out on nature. *Nature*, Vol.443, pp. 27-28
- McNeeley, J.A. (1993). Economic incentives for conserving biodiversity: Lessons for Africa. *Ambio*, Vol.22, pp. 144-150.
- Meiksins Wood, A., 1998. The communist manifesto 150 years later. Monthly Review Press, New York.
- Mol, A.P.J. & Sonnenfeld, D.A. (2000). *Ecological modernization around the world: Perspectives and critical debates*, Frank Cass, London
- Mol, A.P.J. & Spaargaren, G. (2000). Ecological Modernization Theory in Debate: A Review. *Environmental Politics*, Vol.9, pp. 17-49
- Mol, A.P.J. (2002). Ecological modernization and the global economy. *Global Environmental Politics*, Vol.2, pp. 92-115
- Mol, A.P.J. (1995). *The Refinement of Production: Ecological Modernization Theory and the Chemical Industry*, Van Arkel, Utrecht, The Netherlands
- Mukhopadhyay, A. (2005). *Merchandising nature. Political ecology of biodiversity*, Working paper series, Indian Institute of Management, Calcutta
- Naxakis, C. (1997). The environmental impacts of the Maastricht Treaty. *Outopia*, Vol. 26, pp. 107-118 (in Greek)
- Nygren, A. (2005). Community-based forest management within the context of institutional decentralization in Honduras. *World Development*, Vol.33, pp. 639-655
- Nygren, A. (1998). Environment as Discourse: Searching for Sustainable Development in Costa Rica. *Environmental Values*, Vol.7, pp. 201-222
- Padgett, D.K. (1998). *Qualitative methods in social work research: Challenges and rewards*, Sage, Thousand Oaks, CA
- Patton, M.Q. (2002). *Qualitative research and evaluation methods*, Sage, Thousand Oaks, CA. 3rd edition
- Paulson, S., Gezon, L.L. & Watts, M. (2003). Locating the political in political ecology: an introduction. *Human Organization*, Vol. 62, pp. 205-217

- Pejchar, L., Morgan, P.M., Caldwell, M.R., Palmer, C. & Daily, G.C. (2007). Evaluating the Potential for Conservation Development: Biophysical, Economic, and Institutional Perspectives. *Conservation Biology*, Vol.21, pp. 69-78
- Peterson, M.N., Peterson, M.J. & Peterson T.R. (2005). Conservation and the myth of consensus. *Conservation Biology*, Vol.19, pp. 762-767
- Phillips, L. & Jørgensen, W. (2006). *Discourse Analysis as Theory and Method*, Sage Publications, London
- Randall, A. (2002). Benefit cost considerations should be decisive when there is nothing more important at stake, In: *Economics, Ethics and Environmental Policy: Contested Choices*, D.W. Bromley & J. Paavola, (Eds.), Blackwell Publishing, Oxford
- Redford, K.H. & Adams, W.M. (2009). Payment for ecosystem services and the challenge of saving nature. *Conservation Biology*, Vol.23, pp. 785-787
- Salafsky, N. & Wollenberg, E. (2000). Linking livelihoods and conservation: a conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development*, Vol.28, pp. 1421-1438
- Scholte, J.A. (2004). Civil society and democratically accountable global governance. *Government and Opposition*, Vol.39, pp. 211-233
- Searle, M. (2000). *Phantom Parks: The Struggle to Save Canada's National Parks*, Key Porter Books, Toronto
- Sodhi, N.S., Lee, T.M., Sekercioglu, C.H., Webb, E.L., Prawiradilaga, D.M., Lohman, D.J., Pierce, N.E., Diesmos, A.C., Rao, M. & Ehrlich, P.R. (2010). Local people value environmental services provided by forested parks. *Biodiversity and Conservation*, Vol.19, pp. 1175-1188
- Spaargaren, G. (2000). Ecological modernization theory and domestic consumption. *Journal of Environmental Policy & Planning*, Vol.1, pp. 323-335
- Spaargaren, G. (1997). *The ecological modernization of production and consumption: essays in environmental sociology*, Wageningen Agricultural University, PhD thesis.
- Strauss, A. & Corbin, J. (1998). *Basics of Qualitative Research, Techniques and Procedures for Developing Grounded Theory*, Sage Publications, London
- Swetnam, R.D., Fisher, B., Mbilinyi, B.P., Munishi, P.K.T., Willcock, S., Ricketts, T., Mwakalila, S., Balmford, A., Burgess, N.D., Marshall, A.R. & Lewis, S.L. (2011). Mapping socio-economic scenarios of land cover change: A GIS method to enable ecosystem service modeling. *Journal of Environmental Management*, Vol.92, pp. 563-574
- Tallis, H., Kareiva, P., Marvier, M. & Chang, A. (2008). An ecosystem services framework to support both practical conservation and economic development. *PNAS*, Vol.105, pp. 9457-9464
- Thiele, L.P. (1999). *Environmentalism for a new millennium: the challenge of coevolution*, Oxford University Press, Oxford
- Vira, B. & Adams, W.M. (2009). Ecosystem services and conservation strategy: beware the silver bullet. *Conservation Letters*, Vol.2, pp. 158-162
- Vlachou, A. (2005). Debating sustainable development. *Rethinking Marxism*, Vol.17, pp. 627-638

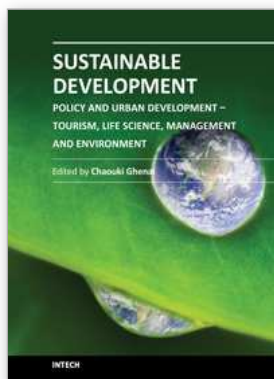
WCED (World Commission on Environment and Development) (1987). *Our Common Future*, Oxford University Press, Oxford

Weale, A. (1992). *The new politics of pollution*, Manchester University Press, Manchester

York, R. & Rosa, E.A. (2003). Key Challenges to Ecological Modernization Theory: Institutional Efficacy, Case Study Evidence, Units of Analysis, and the Pace of Eco-Efficiency. *Organization & Environment*, Vol.16, pp. 273-288

INTECH

INTECH



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Evangelia Apostolopoulou, Evangelia G. Drakou, and John D. Pantis (2012). Unraveling Stakeholders' Discourses Regarding Sustainable Development and Biodiversity Conservation in Greece, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from:
<http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/unraveling-stakeholders-discourses-regarding-sustainable-development-and-biodiversity-conservation-i>

INTECH

open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

The Environment as a Factor of Spatial Injustice: A New Challenge for the Sustainable Development of European Regions?

Guillaume Faburel

*Urban Planning Department (Institut d'Urbanisme de Paris)
University of Paris Est – Coordinator of Research Unit Aménités
France*

1. Introduction

The poor are much more subject and vulnerable to environmental degradation, or risks of its occurring; they are also more strongly affected by the negative impact of certain international, national or local policies. This has long been the case, in France and abroad, in the North as well as, of course, in the South (see for instance Schroeder and al., 2008). Similarly, so-called pro-environmental attitudes and practices (relative to food, energy or mobility, for example), which have recently made their appearance, particularly in western European countries, prove to be no less non-egalitarian or inequitable. This issue nowadays represents a major stake for social and spatial justice, at various levels: from the continental and intercontinental (e.g.: ecological debt, environmental refugees...), to the local level (e.g.: socially precarious energy resources), and encompassing the urban scale (e.g.: gentrification and environmental segregation). Yet, the equitable rights of individuals to a healthy and quality environment have been set down in a number of texts, some of them constitutional, both international (Aalborg and Leipzig Charters, in 1998 and 2007, Declaration of Istanbul in 1996) and national (e.g. Environmental Charter in the French Constitution in 2005).

The values (moral, social and/or esthetic references embraced by a given group at a given time) and the principles that found its action (social norms and rules of implementation), embodied in public planning, environmental and even social policies, are direct queries, both as concerns their contribution to these contradictions, and with a view to bring about change for sustainable development. Starting out from sustainable development, we note that for a long time the official discourse relative to these values and principles limited itself to the “prophetic horizons” by formulating the famous ecological, economic and social pillars: livable, viable... and equitable. These are what sustainable development was supposed to guarantee. In fact, it is only as part of eco-neighbourhood (or so called sustainable neighbourhood) projects, and more generally within the framework of so-called sustainable urbanism and planning projects, that these considerations on values and principles are today more clearly highlighted. It is also true that they pose increasingly concrete questions concerning the various forms of socio-environmental segregation, i.e. social and environmental inequalities in certain places, to which these new neighbourhoods may have given rise abroad (BedZed in London, BO01 in Malmoe, Vauban in Freiburg, Germany).

Thus, the theme of environmental inequalities, and the forms of injustice they generate, appear to be anything but neutral for the practical implementation or practice of sustainability. In France for instance, this is illustrated by the updating in 2006 of the National Scheme of Sustainable Development, which places environmental inequalities squarely in the center of the approach. For Europe, we find similar initiatives in Scotland, with the Strategy for Sustainable Development (Section 8, 2005), as well as the earlier official report of the UK Environmental Agency on *Poverty and the Environment* (2003), which subsequently introduced a poverty indicator into environmental accounting (UK Environmental Agency, 2007). In fact, it is in the United States that official recognition of this issue goes back the furthest. Born of the civic rights movement and the fight against discrimination, *Environmental Justice* is based on early proof (General Accounting Office in 1979 and 1983 ; the United Church of Christ, in 1987 ; Bullard in 1983, 1990 and 1994 ; Wenz in 1988) of a non-egalitarian distribution, first ethnic (especially Blacks, Amerindians and Hispanics), then economic, of populations relative to the major forms of infrastructure and equipment that have a major impact on the environment (health risks, mortality rates). On 11 February 1994, the Federal Administration institutionalized *Environmental Justice* pursuant to Executive Order 12898 : *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This Executive Order decreed that all federal agencies including the EPA or Environmental Protection Agency should: “*identify and remedy the effects of measures that disproportionately affect the health and living conditions of the poor or those who belong to ethnic minority groups*”.

More recently, as we will discuss below, developments focus particularly on regions or cities, which increasingly concentrate these environmental inequalities, and challenge social and spatial justice. For instance, as mentioned by the Interministerial Delegation for Cities in France 2006, it is becoming difficult to call for social mixity in neighbourhoods with a strongly degraded environment. It is true that, as confirmed by experiences with eco-neighbourhoods, such inequalities are particularly damaging when considering the city, i.e. lifestyles that are strongly affected by socio-spatial divisions and forms of socio-spatial segregation that are historically constituted but also subject to powerful market mechanisms (e.g.: scarcity of property and building costs / acquiring housing). If one adds a few recent challenges and the ecological considerations they feed into (e.g. ‘shrinking cities’, even ‘urban decline’), it is easy to admit that environmental inequalities theoretically represent major social and spatial stakes for territorial governance and urban regulation.

Hence, if the subject of environmental inequalities or injustices is today an increasingly vital question addressing the sustainable development that underlies a growing number of actions, it continues to be globally ignored or overlooked in the public policies. Admittedly, the subject closely interlinks environmental, social and economic aspects, a combination that is theoretically at the basis of all sustainable thought and action, but often finds it difficult to fully realize them. In fact it requires that we overcome sectorial approaches that have developed historically and that are often implemented rationally from the top down. The first reason being that they address major questions relative to the technical approaches and normative answers developed to date throughout the world to solve these problems, and to reposition them within the universe of socio-environmental responses, particularly in cities.

The aim here is to understand why reflections undertaken on environmental inequalities and injustices could, under certain conditions of action, generate a new perspective of the

sustainable city in European regions, by repositioning the terms of the debate, linking social, spatial and environmental justice. Going out from findings and examples of scientific studies from several European countries (France, Germany, Netherlands, United Kingdom...), this chapter aims to highlight the scientific benefits of adopting a different approach to the environment, linking it to social situations and the construction of territories, in order to:

- Not only provide different scientific findings on the state of environmental disparities, inequalities or even injustices, particularly relative to spatial injustices, singularly in cities;
- But also invent other types of actions and means of intervention for sustainable development at urban or regional scales in Europe.

With this aim in mind, the chapter will be divided into two main parts.

The first will propose a few findings and an oriented synthesis of scientific research, based on 50 studies, both French and international (USA, the United Kingdom, Belgium, the Netherlands...). In 2008, the objective was establish, for the French Center for Scientific Research, an international and trans-disciplinary report on the state of the art on environmental justice (main topics, issues and purposes), in order to better identify scientifically relevant issues in France comparatively to other European countries, as assets or limitations, even as hot spots in public and private decision making supports and processes (Faburel, 2010a).

Two integrated hot spots and topics have been particularly explored. Traditionally, in France, environmental issues are viewed through an institutional lens which emphasizes technology and bureaucratic tools of assessment and action. Thus, the historical and legal spatial approach to justice (e.g.: land use and city planning, housing policies...) uses a technocratic and normative conception of the environment to face up to environmental challenges in innovative ways (such as environmental segregation in large cities). However, recent research projects carried out in several countries as well as in France stress the fact that environmental justice should take a more dynamic approach, for instance accounting for local and historic dimensions. So, considering the logic of decision makers and the cultures in the urban field, it has been proposed to explore new ways of thinking that would improve the inclusion of environmental inequalities from the perspective of sustainable development. One way would be to focus on lifestyles and people's experiences linked to the environment, and their attachment to a particular place. Another way would be to adopt a participatory rather than a structural approach to the investigation of exclusion and capacity forms of involvement (i.e. *capabilities*, in Sen, 1993 and 2009) instead of more conventional behavioural markers of urban inequality (such as moving house, for example).

The second part of the study proposes an empirical approach which applies these orientations towards environmental perceptions, representations and local experiences, such as:

- Pertinent issues that provide an interesting scale for the observation or the highlighting of certain other factors that determine urban inequalities in cities;
- Thus orienting both the evaluation (generally based on static and descriptive nomenclatures) and territorial decision making directed by sustainability.

It was conducted for the French Ministry of Ecology, Sustainable Development, Transport and Housing in close cooperation with the Ile-de-France (Paris) region (Faburel et Gueymard, 2008). On the one hand the study confronted so-called objective environmental data (geophysical indicators usually employed to characterize resources and harms: degrees of pollution, noise levels, density of green areas...) with classical socio-economic information (indicators on income, employment, housing...) in 1300 municipalities in the Paris region in order to pinpoint the major types of disparities in the environmental quality of the living environment. Thus, after identifying, on this basis, 6 municipalities close to Paris considered representative of different disparity situations, we conducted a survey in order to confront their responses with the data generated in the first part.

These various linkages notably made apparent a list of environmental objects and factors that make a place attractive or undesirable. Our study also highlighted certain difficulties relative to environmental evaluation and monitoring in urban, suburban and even rural territories. Information on the living and felt environment, through local experiences, satisfaction, place attachment relative to the environment, generated additional elements for a finer assessment of local disparities, inequalities or even injustices (neighbourhood, municipality, inter-municipality), in a sustainable development perspective. The conclusion addresses the issue of the role of the living environment and social involvement in decision making processes, balancing between institutional and bottom up approaches to sustainability for European regions.

2. On several major findings and conceptual stakes for sustainable development: Towards new links between justice and the environment in public policies?

2.1 On observing environmental inequalities at different scales

Abroad, this approach linking living conditions and environmental quality is not new, if one considers the *Environmental Justice* movement in North America which goes back to the 1970s (*supra*); even in France, where it was more modest and used different reference terms, it goes back to the 1980s. At the end of the 1980s, for example, in France a suburban social housing development was four times more likely to have an expressway running through it; in 1986, low income populations were proportionally four times more exposed to annoying noise levels (French National Institute for Research on Transport and Security, 1988). However, ecological crises and environmental ordeals have generated new stakes in this field, at different scales:

- from the international scale, with for example between 50 to 163 million climate refugees, fleeing desertification, deforestation, soil erosion, and disasters (partly also caused by large scale development projects: mines, dams, periurbanisation, biofuels, etc.); in wider terms, owing to the poverty gap between regions (e.g. access to drinking water, food shortages),
- to the more local scale of energy precarity and insalubrious housing of low income populations in certain urban neighbourhoods (plus, in our regions, emerging problems relative to environmental health),
- but also including environmental segregation in cities, with such issues as pollution, nuisances and urban risks which increasingly discriminate between social groups,

regardless of sometimes laudable policies: green taxation and energy measures, steps to protect the landscapes of historical city center neighbourhoods, projects of so-called sustainable/eco neighbourhoods (*supra*)...



184. Cité Pierre-Sernand à Saint-Denis, 1956-60. Vue aérienne (depuis le nord).

Photo 1. Public responsibility: large scale housing developments in France (Ile-de-France region in 1950s)

A great number of data were generated only recently. The attention of the international community focuses on climate change and natural hazards. The 2007 report of the Intergovernmental Panel on Climate Change (IPCC) shows for example that in 2004 the poorest countries represented 37% of the world's population, but only 7% of CO₂ emissions, whereas the richest countries showed an inverse proportion of 15% to 45%. Similarly, as shown in the the table below, natural disasters imply different levels of damage.

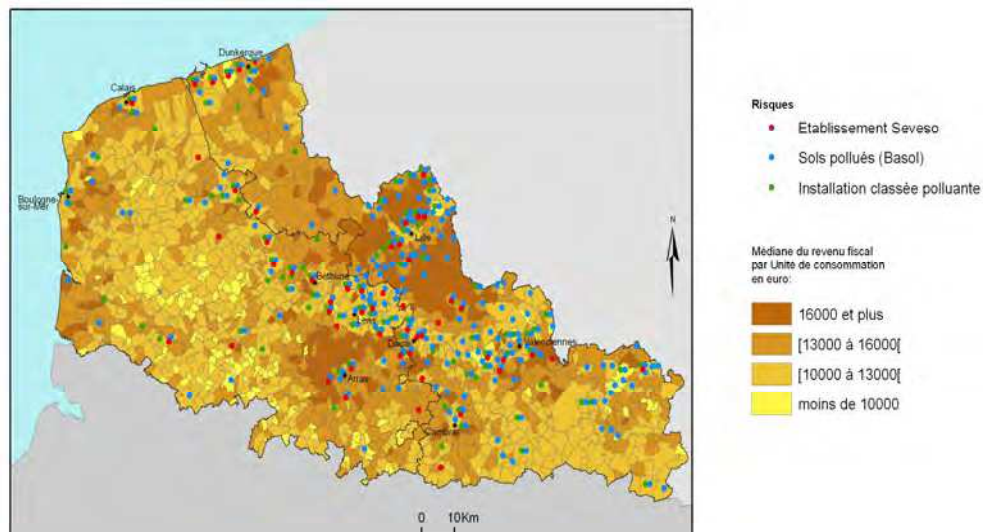
Catégorie de revenu	Nombres de désastres	Population (millions)	PIB par habitant	Nombres de morts	Coût total, en % du PIB
Haut revenu	1 476	828	23 021	75 425	0,007
Bas revenu	1 533	869	1 345	907 810	0,55

Source : Strömberg, David, 2007, « Natural Disasters, Economic Development, and Humanitarian Aid, » *Journal of Economic Perspectives*, Vol. 21 (Summer), pp. 199–22.

Column titles: Income category, Number of disasters, Population (millions), GDP per inhabitant, Number of dead, Total cost in % GDP. Line titles: High income, Low income)

Table 1 Rich countries and poor countries in the face of natural disasters

At the national scale, industrial risks (chemical and other), polluted sites and soils have been the object of several recent studies. It has for example been shown that metropolitan France has a very unequal distribution of high risk sites (safe industrial waste dumps, waste incineration facilities, Seveso sites). 8 % of municipalities harbour two sites, 2.5 % three or more. The southeastern and northern Paris regions (along the old industrial valley of the Seine), the poorer regions around Marseille as well as the large "industrial" agglomerations of the North - Pas de Calais harbour (Laurian, 2009).



Source : IGN BD-CARTO, 2000
 - INSEE, revenus_fiscaux_ménages_par_commune_2002_nord_pas_de_calais, 2002
 - DIPP, seveso, 2003
 - DIPP, installations classées polluantes
 - MEDD, basol, nov 2004
 N.B. : Document de travail

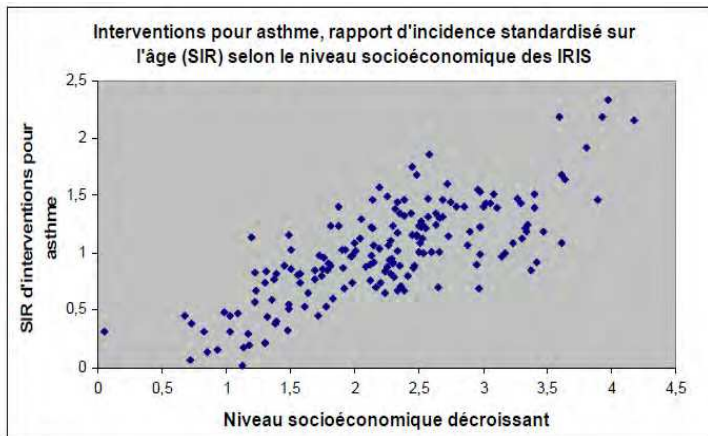
Legend: Seveso site (red), Polluted soil (blue), Site classified as polluted (green). Income category (brown)

Map 1. Inequalities relative to risks and polluted soils (Nord Pas-de-Calais region in 2000s)

Similarly, energy practices have begun to be analyzed from a social profile angle. In this register, the French Environment and Energy Management Agency (ADEME), for example, calculated that in France the part of energy expenditure of the 20% poorest households is 2.5 times higher than that of the 20% richest households.

Finally, on the urban scale, which up till now has certainly been the least studied, a differentiated offer of natural sites, unequal exposure to nuisances and the disparate quality of the living environment are attracting increased attention. Notably in the Ile-de-France region (Faburel, Gueymard, 2008), it has been shown that 2 750 000 persons were in a situation of environmental inequality, industrial decline and economic change, mainly concentrated in the northeastern departments of the “first ring” (e.g. Seine-Saint-Denis), with a historically low income population, or in more remote areas characterized by recent urbanization owing to poorer populations no longer being able to afford housing in the center of the agglomeration, accompanied by strong environmental impact (e.g. east of the Seine et Marne). We shall come back to this issue in the 3rd part.

And, at this more urban scale, environmental health is increasingly studied, throughout western European regions.



Source: Laurent, Filleul, Havard, Deguen, Bard (2008)

Titles: Interventions for asthma, standardized incidence report on age (SIR) according to socio-economic level; SIR interventions for asthma; Decreasing socio-economic level

Graph. 1 Correlation between interventions for asthma and socio-economic status in Strasbourg (France)

2.2 What justice do we mean when we speak of environmental inequalities?

2.2.1 Conceptions of the environment

These data, which we could easily extend to many geographic areas and countries, provide us with several spatial findings on environmental disparity situations. However, they are often still purely descriptive and static, and frequently address only pollution, nuisances and risks. They express a conventional characterization of environmental inequalities: proportionally higher physico-chemical exposure of low income populations to environmental loads and sometimes to negative effects (on health, for example). They also share one characteristic – they often only minimally address the socio-spatial dynamics and segregation mechanisms that underpin the relative inequality in the environmental field, particularly in cities where such mechanisms can be highly complex (Faburel, 2008). Thus, they ignore possible connections between different types of social and environmental inequalities. All this static information in fact ignores the dynamic nature of all inequality: *"differences that are the result of unequal access to the diverse resources offered by society"*.

How then, on the basis of only the exposure of populations, can we pinpoint the role of the environment in mechanisms of segregation? How can one explain that although affluent city centers are often subject to high noise and air pollution exposure levels, caused by heavy automobile traffic, they are the object of urban requalification measures? Does this mean that to ensure justice, everyone should get their equal "share" of exposure, regardless of the socio-economic means available to avoid it? Could it be that environmental and/or ecological inequalities are only social inequalities which, relatively to the physical, chemical etc. attributes of the living environment, highlight other aspects of the historical production of social divisions of and in places? On the other hand, are such inequalities not one of the

most difficult challenges we must face in view of their economic, cultural, social, psychological, environmental components? What then is their specific content? How should one view such inequalities in a more equitable urban perspective, in the name of sustainable development?

In fact, if these data generate other geographies and territorial characteristics at different scales, notably by means of mappings (*supra*), they above all question the concept of the environment that is involved. The statistics used are in fact generated by the historical assessment apparatus: nomenclatures, protocols and data. In France, this apparatus is inherited directly, as in many other countries, whether centralist or federalist (see '*materialist ethos of sustainability*' by Shirazi, 2011, from Germany), from a techno-centered approach to the environment (Theys, 2010), i.e. to a cognitive institutional rationale, "*conditioned by the possibility of aligning it (the environment) on a normative measure*" (Charvolin, 2003, p. 9). Expert and globalizing assessment criteria are often applied:

- thresholds of physico-chemical exposure (for air quality, for example),
- probabilities of the occurrence of official risks (for example to regulate housing construction in response to potential flood risks and hazards),
- acoustic levels as predictors of annoyance (problems of noise nuisance),
- distance for the accessibility of urban amenities (e.g. green spaces),
- ...

In our opinion, this very normative and thus objectifying approach to the environment is not appropriate for environmental policies, be they national or local, yet it influences all public policies. For example, the national observatory of so called Sensitive Urban Areas (Zones Urbaines Sensibles - ZUS)¹ recently showed that they suffer particularly from nuisances, pollution and environmental risks; it used approaches that were technical as well as surveys (Choffel, 2004): 38% of households living in ZUS areas declared that they were often bothered by noise, as against 20% of the inhabitants of low-rise residential areas; only 36% were satisfied with the abundance and quality of green areas in their neighbourhood, against 59% in non-ZUS areas. Other applications of these studies also indicate that children from families with a poor standard of living are overexposed to environmental nuisances (Rizk, 2003). However, although this qualitative opening is noteworthy, the psycho-sociological relations with the environment are viewed only within the strict perimeter of the neighbourhood. Also, the housing issue does not address all territorial aspects of the environment (access to nature, mobility, consumption attitudes).

The examples in the box below also illustrate the effects of such initiatives on the scientific understanding of environmental inequalities.

Why is this straitjacket imposed on official nomenclatures and institutional perimeters, including urban policies, although the latter are traditionally prone to opt for more qualitative and social approaches to the facts and mechanisms of inequality?

¹ Sensitive Urban Areas (ZUS) are infra-urban areas (e.g. neighbourhoods) which French public policy makers have defined as a priority target for urban policies, in view of the difficulties which their inhabitants encounter constantly (increasingly important fiscal and social provisions). There were 640 of them in metropolitan France in 2005.

Box 1. Some surprises and difficulties when approaching situations of environmental inequality: the case of large-scale transport equipment and infrastructure

Kruize analyzed environmental equity on the scale of the Netherlands and of two strongly urbanized regions, including the Amsterdam-Schiphol airport zone (2007). Environmental inequalities were analyzed according to the distribution of environmental “minuses” (“*bads*”), i.e. situations that did not comply with statutory norms, and of environmental pluses (“*goods*”), i.e. those that complied with the norms or fixed objectives, by income categories. As environmental indicators she used: noise levels (as defined by the statutory indicator), azote oxides rate (compared to thresholds of concentration in the air), official risks (planned zones) and distance to green areas.

The study shows that modest income populations usually live in slightly less environmentally friendly neighbourhoods, with stronger disparities relative to green spaces. The differences observed primarily concern areas in which noise and azote oxide emissions are low. But, surprisingly, the highest income populations are more exposed to noise (i.e. level of acoustical intensity) than populations with the lowest incomes. The author decided to couple this observation with a survey on perceptions and opinions.

Another study that goes back to 2004 (Faburel, Maleyre, 2007) involving eight municipalities in the vicinity of Orly airport (2nd airport in France) made use of the Hedonic Pricing Method to analyze the determinants of the property values of 688 accommodations, selected in the data base of the Paris chamber of notaries public (Chambre des Notaires de Paris). Property value depreciation is observed in the municipalities suffering the highest levels of noise generated by air traffic, with a *Noise Depreciation Index* of 0.96 % of the value, by decibel. This rate concords with what is stated in the literature on the subject, and the municipalities concerned are the poorest in the analyzed sample.

However, thanks to the segmentation of the value bases into several significant periods, one may observe that depreciation increased during the period from 1995 to 2003, going from 0.86% of the price of the property per decibel between the reference municipality and the three municipalities identified at 1.48 %... while noise level remained stable according to official indicators, due to a limitation (cap) on air traffic introduced in 1994.

Indicators based on physico-chemical exposure do not suffice – on the contrary – to explain the dynamic character of non-egalitarian phenomena. *“To draw conclusions with regard to the status of a person’s health and well-being, the perception of exposure may be as important as or even more important than objectively measured exposure”* (Mielck, 2004, cité par Kohlhuber et al, 2006).

2.2.2 From concepts of the environment... to concepts of justice

Certainly the environment is still to a large extent viewed in total and universal terms, with prophecies based on technical mastery and the normed reduction of environmental “impacts” feeding into many areas. But above all – and we think this may be the most fundamental reason – any concept of the environment carries with it a concept of justice, since – as demonstrated notably by Peter Wenz (1988) – the environment is specifically linked to such reflection (Faburel, 2010b).

As an example, the *Environmental Justice* trends in the English speaking countries have developed consubstantially:

- a more individualized approach to the environment (at often primarily the local scale), and an essentially distributive justice (based on the measure of environmental values - *preferences-based approaches*), and its theoretical evolution (Rawls, 1971),
- with a few participatory (*Voice* in Hirschman model, 1970) though institutional, aspects (e.g. environmental self-determination, as *class action*), and in a vaster sense, on the capacities to defend, adapt and protect households, as in the Tiebout model ("*feet voting*", 1956).

We also find this aspect in the definition of environmental inequalities that was officially formulated in 1995 by the US Environmental Protection Agency in a first handbook, *Environmental Justice Strategy*; this included a *toolkit* (indicators and quantitative tools), that was updated in 2004: "*Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies*". To this day, because it is grounded on regulation environmental studies, this framework remains highly relevant for waste storage depots and recycling sites, chemical plants, transport infrastructure (roads and airports), almost exclusively from the point of view of the potential or actual pollution they emit, as well as other risks and nuisances.

Most prevalent in European countries, especially the UK and Ireland, this working definition has moved away from racial discrimination to concentrate on social exclusion and environmental issues (Fairburn, 2008) with a specific focus on industrial polluters and clean air campaigns. But these slight differences between countries, for example in how social and ethnic divisions are measured, cannot hide a common factor: the way a concern for equity at the local level tends to strongly influence how we think about environmental issues. Again, in the UK, for instance, there is a tendency to privilege health and epidemiology. And the examples we have cited above at national scale are representative of the production of approaches of this type.

Similarly, with the approach via ecological inequalities of development, which positions itself at the global scale of development models (production conditions, technical systems, forms of social organization) to observe the ecological consequences of inequalities (internal) and disparities in poverty (external), another concept of the environment unfolds, more oriented towards ecological rights and obligations of societies (*rights-based approaches*, in Martinez-Alier, 2002). So by focusing on economic phenomena such as environmental dumping as a by-product of free trade policies (see Baumol and Oates, 1988) and more recent political defeats (such as in some cases a lack of regulation policies), the links between social inequalities, poverty and environmental disasters become clearer. The examples cited above at international scale (e.g. the 2007 Report of the Intergovernmental Panel on Climate Change - IPCC) perfectly illustrate this approach.

Moreover, it is more open to the diversity of lifestyles of populations. We can cite Pye et al's work (2008) which shows empirically how poor Europeans (single parent, low income or unemployed households) have a far lower carbon footprint than others. In this vein the work of Diamantopoulos, Schlegelmilch, Sinkoviks and Bolhen (2003) illustrates at the same scale the decreasing relevance of socio-demographic factors in green consumption habits.

This focus on how much waste our consumerist lifestyles generate also appears in the work of Dozzi, Lennert and Wallenborn (2008) carried out in Belgium at a microlevel: they looked at energy consumption and household spending on water and food including production and delivery costs. Other qualifications are thus given to environmental inequalities, such as those that Pye et al offer in their European Commission report (*op. cit.*): these include discrimination in terms of how different residents are able to access a green lifestyle (where social exclusion exists) and the uneven effects of environmental policies on these same residents.

Above all, this approach brings with it a conception of justice which is somewhat different (Dobson, 1998): much more social and openly procedural (focused on citizen involvement) than strictly (re)distributive at the economic level (via economic compensation for the weakest, for example). And, on this dual basis, the second approach pleads for the need of public action that is more re-founding than simply corrective or compensatory (as in the *Environmental Justice* approach), in order to more effectively face environmental inequalities.

Thus, over and above the common terms they use (inequalities, injustices, vulnerability), these two approaches differ greatly; the 1st focuses on epidemiological studies of risks, the 2nd more on social or ecological aspects. The second generates much more will for political change, although with undeniably different positions concerning the distribution of rights and duties. These differences both express and feed relatively different conceptions of the environment (and of justice): in the time scale they imply, notably for the no less diverse modalities of the regulations they propose; in the spatial frame of reference, much more micro-spatial for the 1st, revolving around individuals and their local collectivities, more macro-spatial for the 2nd, implying other forms of social organization and related conceptions of justice (more social and procedural).

Despite those approaches, in France, as in many other European countries, except for those cited above, the issue of environmental inequalities apparently suffers from a lack of political focus (Theys, 2007), and continues to be dealt with mainly in scientific publications. It is true that these, present also in Germany, seem to point towards a socio-urban opening: a meso-spatial reading (see for instance De Palma, Motamedi, Picard and Waddell, 2007). However, in the socio-urban and regional approach, frequent overlappings confirm that the content is far from stable, for example for such terms as risk, vulnerability, territorial disparities, environmental justice, spatial equity, ecological inequalities. To the point that we do not really seem to know the real specificity (does it exist?) of environmental as against social inequalities. Thus, things could be qualified in much broader terms, for example environmental inequalities could be described as follows: "*A difference in the situation between individuals or social groups that may be noted not only with reference to "ecological" considerations strictly speaking (pollution, public hygiene, natural environment), but also in terms of living space, accessible renewable resources, quality of human places, living conditions, landscapes, etc., this difference being seen as contrary to the rights and respect for the individual, and moreover likely the generate an imbalance that is harmful to the satisfactory functioning of the community*" (French committee for the Sustainable Development World Summit in Johannesburg, 2002, p. 164).

Yet it still fails to contribute to the nascent debate on sustainable development, although environmental inequalities are among the few issues that truly combine environmental, economic and social stakes (and "pillars"). It should certainly be viewed as a political aporia relative to sustainable development - which could, in theory at least, make public some of its

aspects. Promoted by some as the nascent rationale for public action, notably in Europe (Beatley, 2000), in the area of urban planning and design (Riddell, 2004; Wheeler and Beatley, 2004; Ascher, 2004), even environment (Mazmanian and Kraft, 1999), it is frequently criticized in France for its empty eloquence which makes it possible to institutionally avoid essential reflections on the measures that must be taken in the face of economic, ecological and food crises (Lascoumes, 2001 ; Puech, 2011). While some authors view it in terms of a pragmatic construction of a meta-narrative (Rumpala, 2010), others report highly unequal territorial experiences, in which once again physico-chemical approaches to the environment (*supra*) or values defended, play an essential differentiating role (cf. notably, for the United States, Portney, 2003). And above all, many criticize its incapacity born of its generalization (every sector now boasts of its sustainability), its failure to prove its specificity and convincingly argue its fundamental and concrete contributions required to meet recognized challenges (e.g. climate change).

However, since this lack of ambition relative to environmental inequalities applies above all to France (cf. approaches abroad, *supra*), and since there can be no doubt that the links between conceptions of the environment and of justice, the republican tradition relative to the social pact and equality of treatment, the forms of injustice to which it also may have contributed (environmental?), have also marked it heavily. Thus, what conceptions of justice and of the environment should be debated in France? On what knowledge basis concerning environmental inequalities? For what view of urban sustainability?

2.3 The primary forms of environmental injustice: social inequity in the commitment to socio-ecological change

2.3.1 Towards a cosmopolitical approach

Certain economists consider that due to the vital questions relative to social justice in terms of environmental inequalities, we dispose of a first lever to socialize the environment via its (un)egalitarian aspects, as well as via a nascent perspective of a social ecology, given more egalitarian democracies (Laurent, 2010). This is certainly the case. But thanks to a reading that draws upon a cosmopolitical approach to the environment (see for instance debate between U. Beck and B. Latour in 2004), notably in its links with land use planning (Lolive and Soubeyran, 2007), the interest of this subject (but also certainly its failure to generate political reflection) is – we think – a different one. The issue is not to uniquely revise the founding myths (e.g. egalitarian), thus advocating compromises between economical progress and environmental conservation (*op. cit.*), but to fully establish them anew by means of:

- cornerstone questions which this subject would address consubstantially with concepts of justice and the environment,
- but also to be addressed to our 'governmentality' (e.g. the exercise of democracy in our liberal/free-market societies),
- in order to become fully aware of the means provided by the environment (human and non-human) to change our societies, their development models and modes of government, i.e. of a number of values and principles that have been advocated until now.

Everyone knows that over the last thirty years the environment has everywhere imposed itself as one of the most powerful filters for the understanding and interpretation of the

living environment, and thus as one of the primary operators of our reflections on modernity:

- the finite nature of resources and ecological irreversibility,
- the desynchronization of environmental time with time in terms of development,
- the growing distance between the spaces where problems occur and where decisions are made,
- with for example a growing lack of predictability relative to the effects of the "rationale" of modernist planning on places and its societies.

In France particularly, this change is observable in a certain number of recent programmatic aspirations or, essentially, watchwords which are often adequate in urban planning or urbanism fields: territorial energy transition, dense/slow city/short distance cities... and the post-Kyoto "paradigm" (cf. Greater Paris²). However, these aspirations do not compete with other aims relative to change, notably community or affinity-group-based solutions in the United Kingdom (e.g. *Cities in Transition*). In France, such bottom-up initiatives are still few and far between and rarely popularized (e.g. *Relocalisons !* movement).

Embodying values (esthetic, heritage-based, symbolic...), "*environmental situations*" and their "*qualitative variations*", terms which though dynamic are present everywhere in the literature on environmental inequalities³, and more and more often mediate our relationship to (the) world(s). The growing importance of environmental considerations in the residential choices of households, in individuals' choices of transportation mode, in nutritional practices and individual energy choices... and even in our lifestyles and involvements in associations and local communities, shows this every day. Thus the environment contributes to a gradual re-founding of the joint government of humans and nature, reviewing certain values and action principles (Boltanski and Thévenot, 1991), particularly for policies with a strong territorial basis (land use planning, urban design, nature protection). According to Beck (1995), Latour (2004b)... this conception even announces, in different ways, a new age of politics, an age in which relations to identity, notably spatial identity, are being composed anew, to the extent that they shake up the historic chain of the construction of public action, above all in countries with a centralist tradition: a certain production of the rationalities (techno-scientific) for a certain exercise of democracy (delegative) (Stengers, 1997).

This larger purpose may even be found in certain recent French studies of environmental inequalities (below).

Box 2. When a more dynamic view of the environment raises the issue of time and space scales in the apprehension of environmental inequalities (French cases)

Having noted a lack of prospective and dynamic approaches to territories, Laigle (2005) proposes a territorial analysis of the urban dynamics that generate environmental inequalities, based on four cases: regions/territories characterized by a heavy industrial

² A choice which is apparently justified by environmental inequalities as evoked in the presidential discourse when the different architectural projects were presented in 2009.

³ "*Environmental inequalities are inequalities of situation (...) resulting from qualitative variations of the urban environment*" (Inspection Générale de l'Environnement, French Ministry of Ecology and Sustainable Development 2005, p. 11).

past (Lille agglomeration – North of France), regions that are attractive economically and residentially (the Mediterranean agglomerations of Aix-en-Provence and Toulouse), territories or regions characterized by multipolar expansion (Strasbourg agglomeration, in the Rhein region).

Globally, the analysis generated two types of configurations, which according to the author encourage cumulative links: *“ configurations in which past urbanization overlapping with industrialization resulted in: social deterioration, a degraded living environment making economic and urban reconversion difficult ”*; *“ configurations characterized by attractive economic and residential conditions, based on the quality of the living environment, which may strengthen selective factors of access to urbanity and – paradoxically – damage the quality of the environment.”* (p. 11).

Thus, local pathways, trajectories, heritage, as well as priority orientations and the dynamics of contemporary territorial action should be placed squarely in the center of the analysis of environmental inequalities. Further proof of this is supplied by the studies on the industrial heritage in the Seine-Saint-Denis department, to the northeast of Paris (from 1850 to 2000, cf. Guillerme, Jigaudon and Lefort, 2004), which gave rise to a historic phenomenon of discrimination and environmental and social segregation, notably due to choices made by public authorities, in spite of several recent large-scale requalification programs.

Picking up on the idea of cumulative disparities, Deboudt, Deldrève, Houillon and Paris (2008) examined a narrower, coastal territory: the Chemin Vert neighbourhood in Boulogne-sur-Mer (coastal industrial municipality in northern France). It was marked by its connection with the development of sea transport, tourism, port and residential economies, and thus by spaces with a high ecological value.

Their findings demonstrate firstly that social inequalities are cumulative (overrepresentation of unemployment, single parenthood, low income), and marginalization that is also geographic (remoteness to city center, topographic disparities, cuts in the urban tissue, few public spaces). Above all, there are few nuisance factors and the area is not vulnerable to natural hazards, with even a potential for amenities and enhancement. Consequently, urban policies wish to make use of this potential, notably by valorizing the “maritime” aspect.

However, according to a survey of the inhabitants, if the coastal environment is certainly seen as an element identifying and enhancing the living environment and a source of amenities, the inhabitants do not think that it should be preserved, since memories of the maritime past are not very strong, and the maritime professions are not in high regard. Thus, over and above the single issue of amenities and environmental practices, the study proposes to approach the subject from the point of view of the social value(s) ascribed to the environment. *“In a situation in which the inhabitants do not directly identify with the “maritime” concept, massive and qualitative public intervention leads to a paradoxical syndrome in certain individuals who ask themselves if they are “worthy of these new homes”* (p. 189).

This leads to a proposed analysis: should the analysis of inequalities, cumulative effects, and vulnerability aspects not be oriented more towards the spatial scale of ecosystems and human settings, as the historic crucible of the environmental offer and the social

values attached to it?

Thus, more than just crossing static data, should not any investigation of environmental inequalities position itself with respect to privileged time scales (local itineraries and heritage, public and private arbitration in the past, current territorial strategies), and to the observed spatial scales (ecological or territorial ones, areas of practices, historic districts and divisions...).

2.3.2 The individual involvement capacities at the heart of environmental issues

Thus we think that the very first “disturbance” introduced by the subject of environmental inequalities, particularly in an urban analysis, is that in theory it makes possible a much more dynamic and active screening of a model of social equality, and its spatial correlations in land use planning, urban design, environmental protection policies. Here, beside the social aspect with the revitalization/reconfiguration of links (e.g. the importance of nature for local forms of solidarity in cities, in the North as in the South), or that of the economy of the new trends/sectors of locally-oriented production (ecological housing, local consumption of agricultural and cooperative products...), it first examines this model from the point of view of the “*myth of the passive citizen*” which makes this model operational (Rosanvallon, 2008). Individuals as subjects aspire more and more often to different ways of life and commitments, often invoking nature and the environment (see for instance Haanpää, 2007, for the role of lifestyles or Jagers, 2009, for the role of perceived ideologies in commitments; see also Dobré and Juan, 2009, for French cases). Also, the constitution of new, more informal collective entities, increasingly underpins no less social forms of mobilization (Lolive, 2010), also via different relations to the environment and to nature (e.g. sustainable/ecological/green communities in Roseland, 1997; and the return to Urban Design in Beatley, 2010).

From the point of view of the relationship between society and the environment we are encouraged to consider the contribution of environmental inequalities to the debate on sustainable development, in terms of both individual and collective capacities of involvement, and to examine their non-egalitarian social distribution and the very scope of such inequalities in the capacity for change. Let us also note the presence across-the-board, though with very different modalities (sometimes strictly regulated) of so-called citizen participation in the approaches targeting environmental inequalities that were discussed above (*Environmental Justice*, Ecological inequalities of development). This contradicts the official report of the Inspection Générale de l'Environnement (Diebolt and al., 2005, for French Ministry of Ecology and Sustainable Development, Transport and Housing) which denies this participatory dimension as an integral part of the issue of environmental inequalities.

In fact, it is here that we would today place the primary forms of environmental injustice. No longer simply disparities of exposure (although this interpretation remains useful for the detection of long term sanitary impacts, cf. Roussel, 2010), but gross social injustice relative to more individualized forms of access to formal or informal involvement (lifestyle commitments, unaffiliated collectives...) in socio-ecological transition. For, even though studies, mainly conducted in English-speaking countries, tend to show that the poor are increasingly involved in local causes (cf. case studied by Corburn, 2005), such capacities to influence environmental situations and the mechanisms behind environmental inequalities

are no less unequally distributed than other capacities (Beck, 2001), as stipulated in Article 3.9 of the Aarhus Convention (1998), of which the countries of the European Union are signatories.

This would imply placing the means for change (still inequitable) at the heart of the reflection on sustainable development, perhaps in greater measure than social equality as a finality, which we know to be globally non-environmental (e.g. redistributive approaches of social and urban policies). This could also generate other axiological pluses, bearing witness to the scope of socio-political implications of a collective examination of environmental justice. This more dynamic and active option lies in fact at the crossroads of the various dividing lines:

- from the individual freedom to act, which is certainly a fundamental right inscribed upon the pediment of our liberal democracies, but which also – due to their backing of free market societies – suffers from all the spatial divisions which they are subject to as a result of social inequalities... to the responsibility, not via environmental education but via accompanying the poor in the definition of the stakes and the improvement of their own disparate environmental situations⁴,
- from social mixity – and intergenerational mixity, which is at the forefront of sustainable development – via quotas and regulatory provisions often still implemented topdown on the strength of norms that are taken for granted (concerning the proportion of subsidized housing, for example) to more fundamental forms of solidarity which are spreading notably for and through nature (since we know that living together does not necessarily mean exchanging, and even less sharing or helping each other).

Without including – always in terms of values and principles – this conception of the environment in the moderation and sobriety displayed by certain lifestyles, or in the self-sufficiency which is increasingly invoked by local economy projects.

2.3.3 Inhabitants, lifestyles, and their places as subjects of environmental inequality?

As a result we have at least one proposal on the subject of environmental inequalities in the perspective of sustainability. It advocates the use of other conceptions of both the environment and of justice in public policies, which a possible horizon of sustainability should address (Faburel, 2010b). Thus it would seem that the concept of the environment presented here focuses on the environment as it has become, i.e. *“on the qualitative differences between situations”* (supra), recognizing the links and perception relations of local societies to the environment. *“To perceive an atmosphere as sustainable, the physical dimension must meet the expectations of our existential living body; otherwise, an individual never perceives the environment as “sustainable” and never achieves a “sustainable status”* (Shirazi, 2011, p. 8). This would call for an egalitarian project that would finally be open to socio-environmental singularities, to the ways in which they are lived and experienced through the inhabitants’ sensibility, and how they are recognized by local knowledge (Fisher, 2000)... in short how they are embedded in ecological ways of living, lifestyles and involvements, in an cosmopolitical perspective of sustainability.

⁴ Rather than for example to simply let households change their environment by residential mobility and its market stimulations, thus negatively positioning certain settings (environments).

The concept of justice would thus move away from an interpretation based on only (re)distributive justice (with an egalitarian motivation but liberal rationale), characterized notably in France by its real estate (rehabilitation/renovation, housing offers) and urban aspects (the *Promethean* approach of land use planning, uniformization of public spaces, social insertion via state-imposed policies). It would be more procedural (e.g. participatory) than structural and merely (re)distributive, based on the capacity of poor populations and their place to face up to dynamic and inherited contexts via their own local experience. It would thus admit that citizenship can be differentiated (Young, 1990)⁵, and therefore open to other factors of inequality than only individual income, and above all mindful of the rights of affinity-based groups (and not just community-based ones). In brief, following Schlosberg (2004) and Jamieson (2007), environmental justice needs to address not only the distribution of environmental harms and benefits, but also people's participation in decision-making processes, including recognition of people's particular identities and visions of a desirable life.

On this reflexive and conceptual basis which develops a cosmopolitical approach to environmental stakes, a more phenomenological conception of the subject-individual, and a critical reading of the consubstantially dominant accepted meanings of the environment and of justice, in 2008 we conducted an empirical study of environmental inequalities in the Ile-de-France, i.e. the capital region of France (11.6 million inhabitants). The realization and results of this project are discussed below.

3. Lived environmental experience, satisfaction and quality of life in the Ile-de-France region. A different regional geography of environmental inequalities

3.1 A pluridisciplinary approach and a multi-scale procedure

As already stated in the previous section, several statistical observations tend to demonstrate the existence of environmental inequalities in France and abroad, both now and in the past. However, we have also seen that when conducted at scale-level, these studies generated numerous conceptions in which the environment and justice overlapped; they were also less and less adequate to the development of other approaches, better adapted to the changes that our societies are subject to as a result of the environmental situation and the challenges it brings: a gradual reformulation of the joint government of the human element and nature, revising certain values and action principles of our so-called reflexive modernity (Giddens, 1991). The system of environmental evaluation that still dominates worldwide, i.e. principally technical, physico-chemical approaches, to normative ends for environmental protection, and their regulatory and operational relays (*Environmental Impact Assessment, Strategic Environmental Assessment...*) is increasingly ill adapted to disclose the scope of a territorialized phenomenon, which has at least as much to do with the socio-environmental as the bio-physical domain: environmental inequalities and injustices. From its strictly evaluative aspect, this system still strongly depends on the segmentation of knowledge and scientific disciplines, on their disparate recognition by the powers-that-be, and – not to say above all – on a vision of the inhabitants as “statistical individuals”. This gives rise to a lack of instruments of territorialized assessment, particularly in the cities, where socio-spatial and segregatory mechanisms are particularly

⁵ For an application to urban policies, cf. Harvey (1992).

powerful, and old (Faburel, 2008). Such methodological obstacles or even limitations both contribute to and embody the deficits in the scientific recognition (techno-scientific production of rationalities) and the political action targeting such inequalities (delegative exercise of democracy).

The current scientific literature increasingly calls for pluridisciplinary, or even interdisciplinary approaches, in the attempt to integrate at least some elements of the inhabitants' living experience, complementing or contradicting existing observation and information systems. Since, where socio-environmental issues as well as others are concerned, the gap between what is given by so-called objective environmental data and what the population feels and experiences constantly widens. And, as already noted (cf. Box 2.), concerning the question of environmental inequalities, "*studies to clarify the relationships between objective and perceived exposure and the influence of social status on the perception of environmental exposures are still necessary*" (Kohlhuber et al, 2006, p. 254).

Conducted between 2006 and 2008 (Faburel and Gueymard, 2008) for the French Ministry of Ecology, Sustainable Development, Transport and Housing, for its *Territorial policies and sustainable development* research program (2005-2009), in close cooperation with the Ile-de-France (Paris) region, the research, a synthesis of which is presented here, had the primary objective of establishing a different geography of environmental inequalities.

On the one hand this geography confronts environmental disparities made apparent by the crossing of physico-chemical data⁶ with no less institutional data relative to official socio-economic spatial characterization (income levels, proportion of subsidized housing, unemployment rates). More importantly, these observations of disparity were then compared with information on the living and felt environment, by means of local experiences, satisfaction, place attachment and political expectations relating to the environmental qualities which generated these observations. The aim was therefore to implement a perceptual and well-founded observation of "objectively" described socio-environmental situations, while opening oneself to the symbolic and identity factors that are at the basis of the attraction, attachment to or refusal of certain places by the populations. Within this framework, a further aim was to improve the understanding of operative mechanisms, notably residential ones, in the phenomena of spatial polarization for environmental reasons at a regional scale.

Several specific questions guided this work:

- How do people perceive and judge environmental quality, and what experiences and expectations ground their points of view, notably during residential arbitration procedures?
- How far do conventional indicators make it possible to register real satisfaction or dissatisfaction, when taken out of a given environment?
- How then can one imagine a system of observation and measure that could best account for the influence of the quality/non-quality of the environment on individual decisions, and explain certain phenomena of inequality and segregation, and the resulting territorial dynamics?

⁶ Thresholds of chemical exposure for air quality; probabilities of risks occurrence, flood risks and hazards for instance; acoustic levels for noise nuisance; distance for the accessibility of urban amenities, of green spaces...

In fact, we think that, due to its territoriality and resulting transversality, the register of the personal lived experiences and of environmental satisfaction constitutes a non-negligible source of information, which could prove essential to:

- (re)define the analytic frameworks of these situations which until now have been mainly perceived as “objectively” unequal, often presented as a “combination” of environmental degradation and socio-historical spatial disqualification (i.e. disparities),
- shed a light on potential levers for sustainable action, thus contributing to the entry into politics of a fully socio-environmental set of problems which are still rarely viewed from the perspective of public intervention and change (i.e. injustices),
- for example, by observing the aptitude of the current environmental evaluation system to describe a fully territorialized phenomenon, defined at least as much by felt, symbolic and axiological relations of local societies with their living space, as by largely accounted for physical or social characteristics (i.e. inequalities).

This was our first working hypothesis. The second resulted from it: the subject-individual, via his lived environmental experience and the cognitive and social transactions he operates, constitutes together with his immediate living environment, a pertinent scale of observation. Unlike the “statistical individual”, this scale enables to both “territorialize” environmental quality, and to highlight certain determining dynamic factors of inequalities in this area, in order to perhaps differently ground no less territorial decision making.

Exploring the two dimensions of environmental inequalities, which are usually called “objective” and “subjective”, first raised the question of the reference scale for observation. Working on the Ile-de-France⁷ region, we opted for different, though complementary scales. This confrontation and overlapping of scales of analysis is also part of an approach underpinned by the territorialization of public action, particularly with reference to sustainable development: the progressive structuring of areas of competence (subsidiarity principle) and decision making levels (territorial governance) around the reality of phenomena and pertinent new scales of observation.

Two successive stages at two scales defined our empirical work. First, we made a conventional reading of environmental disparities, at regional scale, by spatializing so-called objective environmental data and crossing them with classical socio-economic and demographic data. The second step was to select six municipalities in the different environmental situations identified, with the aim to analyze inequalities of lived environmental experience. A survey was conducted with 600 inhabitants, face to face. However, in view of the size of the sample (600 questionnaires) and the various criteria which defined the choice of our sites as well as of our groups of individuals, we did not aim for representativity at a scale of a region with a population of 11.6 million. We thus adopted an essentially exploratory perspective, with a view to preparing the ground for a different system of observation, fully focused on environmental inequalities as linked to individuals’ lived experience, in order to understand certain phenomena and mechanisms of dynamic socio-environmental spatial polarization. With this exploratory view, we developed and adopted a dual approach, referring to both spatial analysis (quantitative)

⁷ Capital region of France, the Ile-de-France is the most densely populated with 11.6 million inhabitants, 90 % of whom live in the (Paris) agglomeration which covers 20 % of the regional territory.

and socio-cognitive investigation (qualitative), highlighting inhabitants and the socio-cognitive transactions with their living environment and the environment as such. Thus, our work closely combined geographical, economic, sociological and psychological knowledge.

3.2 A static reading of environmental inequalities in the Ile-de-France (Paris) region

The first stage of our work was to draw up a geography of environmental disparities at the regional scale, by setting up two typologies (environmental and socio-economic).

3.2.1 Construction of two multi-criteria typologies: choice of indicators and statistical method

To set up the environmental typology, we selected both classical criteria and indicators, but also such as are liable to interact with lived environmental experience and the environmental satisfaction of populations. We thought it important to address several thematic environmental registers by taking an interest in diverse environmental objects, referring certain of them to the sensitivity register (e.g.: noise) and above all such as could have contrasting effects (some perceived as agreeable, others as disagreeable). Twelve indicators, grouped into two families, which for clarity's sake we designated as resources and harms, were noted at the scale of the 1 300 municipalities in the Ile-de-France region.

In a next step, the environmental typology was established on the basis of discretization between 3 average classes (+/- standard deviation) for each of the variables. The different environmental parameters were then aggregated by calculating two weighted multi-criteria averages – average resources and average harms; based on certain findings concerning residential choices and on a conventional hierarchy of nuisances and risks in the Paris region (cf. 2.2.1). This calculation generated nine possible combinations, depending on different resource and harm levels, and 9 environmental groups, with at the two extremes: environments designated as very favourable or very degraded. For greater clarity, these different groups were then combined within three great environmental categories: good, average, bad.

This general map of environmental categories establishes a geography of disparities by clearly emphasizing areas of so-called “objective” good or bad environmental quality. These major disparities are generated by structural factors which have been known for a certain time, notably:

- the center, which corresponds to the heart of the Paris region, with mediocre environmental quality (density of infrastructures and of centers of economic activity, lack of vegetation...),
- municipalities that are environmentally and traditionally the most disadvantaged are mainly located in northeastern Paris, owing to an industrial past, but also to political choices to concentrate infrastructure and equipment, above all relative to traffic: in the Seine-St-Denis (93), in the northern Hauts-de-Seine (92), in southeastern Val-d'Oise (95) – along the “francilienne” (by-pass motorway for the agglomeration) and close to Roissy Charles de Gaulle airport (2nd airport in Europe),

	Environmental variables
Resources	Green*surface areas with possible landscape value (in % of municipal area)
	Population living close to green spaces open to the public (within a perimeter of 250 meters to 1.2 kilometers, depending on size of the space, in % of the municipal population)
	Surface of listed areas** (in % of the municipal surface area)
	Population living close to waterways and bodies of water (within a perimeter of 100 to 500 meters, in % of the municipal population)
Harms	Annual average nitrogen dioxide (NO ₂) level (2005)
	Population potentially concerned by local pollution *** (in % of municipal population)
	Population living in the flooding zone (in % of the municipal population)
	Population living close to a Seveso II**** class industrial site (within a radius of 500 meters, in % of the municipal population)
	Population exposed to aircraft noise caused by traffic at major airports***** (in % of municipal population)
	Population exposed to aircraft noise caused by traffic at small airports***** (in % of municipal population)
	Population living within railway traffic noise “hot spots” (in % of municipal population)
	Number of road segments with noise emissions higher than the hot spots daytime noise threshold (in % of the studied road area)

* Notably includes natural and agricultural lands, open urban gardens (allotment gardens, private family gardens), hippodromes, golfs and cemeteries.

** Designates listed sites and historic monuments, protected urban areas, protected urban architecture and landscape heritage areas (Zones de Protection du Patrimoine Architectural Urbain et Paysager, ZPPAUP).

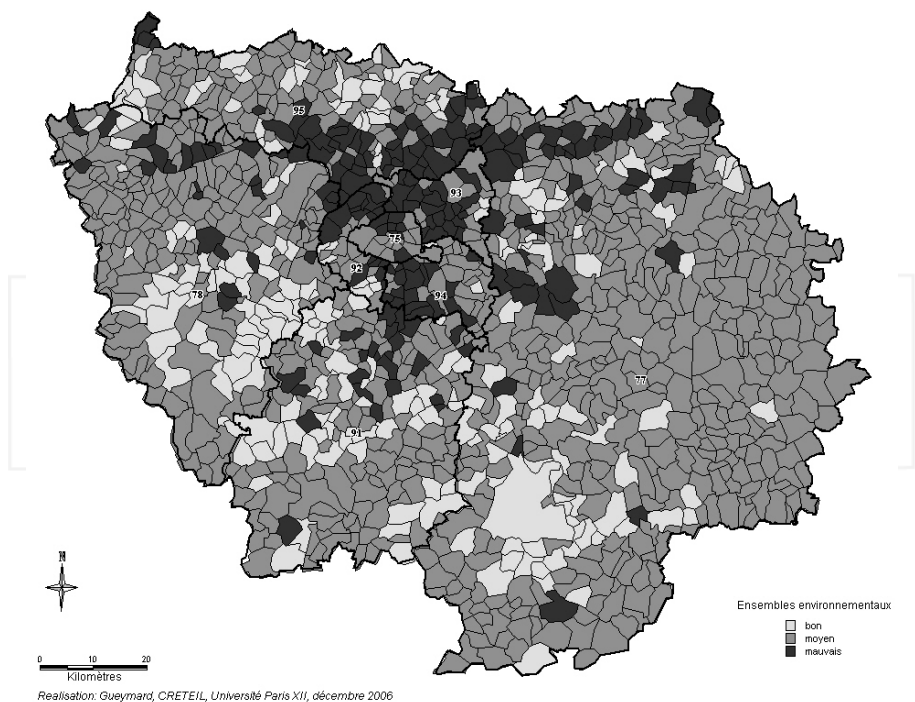
*** Population living close to (100 meters) road segments with annual average NO₂ levels higher than the annual quality objective, established by the air quality protection plan (Plan de Protection de l'Atmosphère, PPA) (2005-2010) and taken up by the air quality monitoring program for the Ile-de-France (Programme de Surveillance de la Qualité de l'Air en Ile-de-France, PSQA) for 2004.

**** The so-called Seveso directive or directive 96/82/EC is a European directive that imposes the obligation upon all EU member states to identify all industrial sites presenting major risks of accident. The directive, which was made official on 24 June 1982, was modified on 9 December 1996 (Seveso II) and amended in 2003 (2003/105/EC). Companies are listed according to the quantities and types of hazardous products they handle.

***** Populations included in the nuisance mitigation schemes (Plans de Gêne Sonore, PGS) for soundproofing grants, of Charles de Gaulle and Orly airports (1st and 2nd in France, 16th in Europe), or flown over at an altitude of less than 1000 meters.

***** Populations living in impact areas of other small airports, included in a land use compatibility noise program (Plan d'Exposition au Bruit, PEB) or, if no such program exists, within a radius of 1000 meters around the operator's infrastructural impact.

Table 2. Environmental variables selected to establish a descriptive geography of environmental disparities in the Ile-de-France region Source: Faburel et Gueymard (2008)



Map 2. Distribution of Ile-de-France municipalities among 3 environmental categories

- other smaller but also degraded sub-areas are located in the Val-de-Marne (94), close to Orly airport (2nd airport in France) and in the vicinity of the major motorways (A6 and A10), but sometimes also in the “second ring”, at the peri-urban border of the northeastern agglomeration, notably in the Seine et Marne (77), owing to an influx of populations that can no longer cope with the cost of living in the center,
- and, at the opposite, the most environmentally favoured municipalities, located more in the west and the south of the agglomeration, mainly in the departments of the “outer ring”, with a major focus here on municipalities close to woodlands and the Regional National Parks (Parcs Naturels Régionaux PNR).

In other words, this first general illustration casts a light on certain structuring oppositions at regional scale (east/west, center/periphery) which are well known to geographers and urban planners. However, a conventional reading of environmental inequalities makes it necessary to cross given environmental characteristics and socio-urban data that are specific to the areas.

So, in parallel, and in the same spirit, we established a socio-economic typology of Ile-de-France municipalities, crossing information with a view to undertaking a first descriptive reading of environmental disparities at regional scale, before rigorously delimiting study areas (*supra*). Always going out from past findings, and in close cooperation with the Ile-de-France (Paris) region, we decided to opt for five variables, accounting for both the socio-economic characteristics of households, and housing stock.

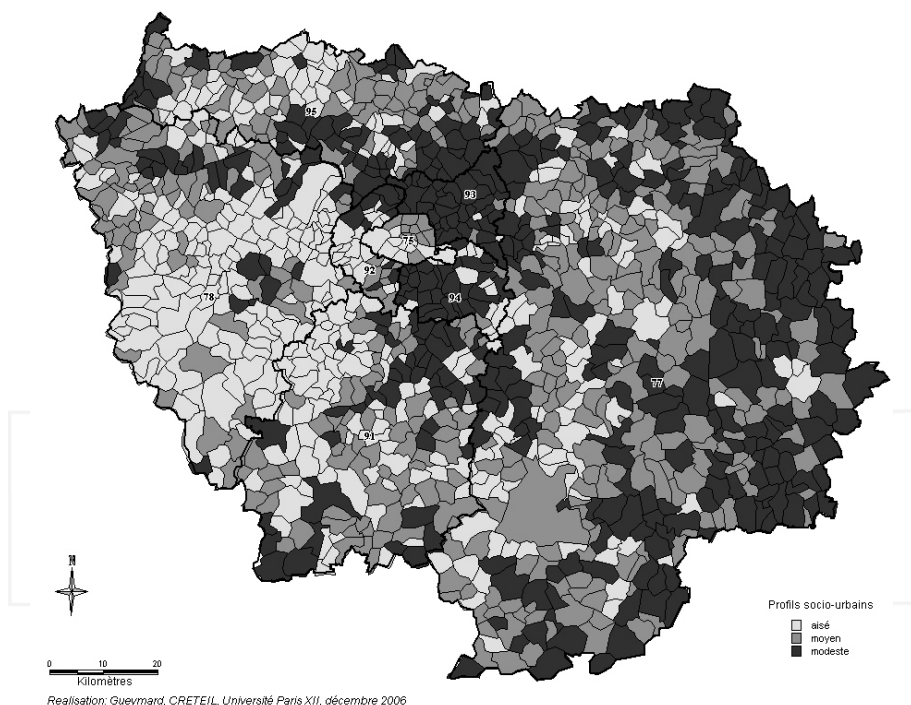
Variables	Sources
Proportion of management level and higher level intermediary professionals	RGP*, 1999
Gross municipal income per inhabitant	DGI**, 2003
Unemployment rate	RGP, 1999
Proportion of tenants in social housing HLM	RGP, 1999
Proportion of social housing (2006)	DGI/DGCL, 2006

*General Census of the Population (National Institute National for Statistics and Economic Studies)

**General Tax Office (Ministry for the Economy and Finance)

Table 3. Variables to establish a socio-economic typology of municipalities in the Ile-de-France region, Source : Faburel et Gueymard (2008)

The discretization method adopted for these variables was the same as above. For each of the included variables, 3 classes (weak, average, strong) were defined on the basis of the average and the standard deviation. A municipal average was computed for all concerned ranks. Here too, we decided to distinguish between certain variables, by allotting a differentiated weight coefficient when calculating the average. This calculation generated 3 groups (low income, average, well-off).



Map 3. Distribution of Ile-de-France municipalities among 3 socio-urban groups

This other general map comes as no surprise. The regional distribution of socio-urban groups again expresses the industrial past of certain central and peri-central areas of the

agglomeration (e.g.: along the Seine Valley, in southeastern and northeastern Paris), with a social composition that is very different from the municipalities marked by the development of the tertiary sector in the western and southwestern sectors. Here we find again the usual separation between the Seine-Saint-Denis (93), poorest department in the region, and its opposite, the Yvelines (78). It largely coincides with the geography of income (Saint-Julien, François, Mathian, Ribardi re, 2002), as well as with other socio-economic large studies (Berger, 2004; Pr teceille, 2003). Above all, this map illustrates the growing recent impoverishment of more remote areas, first of all of the Seine et Marne (77), which since the mid 90s has absorbed households that can no longer afford to live in the agglomeration, and a decline of certain agricultural activities.

3.2.2 A first reading of crossed regional environmental disparities, confirming our intuitions

Crossing environmental and social typologies generated a first reading of this phenomenon at regional level. The table below presents the crossed selection generated for the environmental types grouped into 3 categories (good, average, low) and the 3 socio-economic groups.

Environmental category	Socio-economic profile			
	Affluent	Average	Low income	Total
Good	45.53	31.49	22.98	100
Average	33.57	36.15	30.28	100
Low	17.84	32.39	49.77	100

Table 4. Socio-economic profile of the three major environmental categories, Source: Faburel et Gueymard (2008)

Unsurprisingly at this stage, we observe an increasing relation between environmental and social characteristics of municipalities in the region:

- 45.5 % of the municipalities in the good quality environmental category are municipalities with the highest socio-economic profile in the Ile-de-France,
- Symmetrically, almost 50 % of municipalities in the low quality environmental category are municipalities that are home to deprived populations.

Seemingly, these first, general results, confirm the existence of environmental disparities at regional scale, in conventional terms: proportionally more of the poorest households live in environments of low or mediocre quality, according to the standard indicators used to characterize these situations.

Another approach to this phenomenon was to cross it with the presence of Sensitive Urban Areas (Zones Urbaines Sensibles – ZUS). As a reminder - these areas (ZUS) are infra-urban areas (e.g. neighbourhoods) which French public policy makers have defined as a priority target for urban policies, in view of the difficulties which their inhabitants encounter constantly (increasingly important fiscal and social provisions). There were 640 of them in metropolitan France in 2005; of these 138 in the Ile-de-France, with a population of 1.1 million. Here, too, we see a strong link, confirming the several findings that already exist in this field (cf. 2.2.1). The proportion of municipalities in which there are no ZUS is almost of 100 % in the “good” environmental category. On the other hand, ZUS are over-represented

in municipalities with a high level of environmental harms; 20 to 30 %, depending on the type of environment, while the proportion of municipalities with ZUS in the Ile-de-France lies under 10 %.

Environmental category	Presence of ZUS on municipal territory		
	No	Yes	Total
Good	95.74	4.26	100
Average	92.96	7.04	100
Low	73.71	26.29	100

Table 5. Proportion of municipalities with ZUS in the three environmental categories, Source: Faburel et Gueymard (2008)

Nevertheless, if the existence of a global correspondence between socio-economic and environmental characteristics is here clearly apparent at the aggregate scale, what about each environmental factor? Do the environmental factors investigated in our typology confirm this link when taken one by one? Could there be environmental factors which, on the basis of this static “objective” reading, are more likely to feed the disparities we have already noted at this stage?

3.2.3 Socio-spatial distribution of environmental objects and the environmental profile of social groups: The structuring role of factors of degradation

The table below gives an example of a crossing between environmental factors and different socio-economic groups. This was in particular established for class 3 of environmental objects, where they are present in greater proportion than in the regional average, and – since they illustrate a “caricature-like” situation - better highlight the specificities of each group’s spatial distribution.

Environmental objects (class 3)	Socio-economic profile (in %)			
	Well-off	Average	Low income	Total
Green spaces	42.42	25.76	31.82	100
Green components	29.88	42.07	28.05	100
Listed spaces (e.g.: ZPPAUP)	45.3	38.46	16.24	100
Waterways and bodies of water	34.2	29.97	35.83	100
Overall pollution (average N02)	3007	21.57	48.37	100
Local pollution	3571	21.43	42.86	100
Flooding zone	2597	19.48	54.55	100
Seveso industrial risk site	1176	47.06	41.18	100
Aircraft noise (major airports)	14.06	40.63	45.31	100
Aircraft noise (small airports)	21.43	57.14	21.43	100
Railway traffic noise	20	31.43	48.57	100
Road traffic noise	31.37	21.57	47.06	100

Table 6. Spatial distribution of social groups according to the above environmental factors, Source: Faburel et Gueymard (2008)

The first global reading of this table confirms the first conclusions. There is indeed a rising linear correlation between environmental factors and socio-economic situations. We observe (gray boxes) that for almost the totality of positive environmental factors, so-called well-off municipalities are much better represented. Symetrically the same observation can be made for poor municipalities.

To validate and further investigate these findings, we then extended these crossings to all the different classes of environmental objects, corresponding to the three classes of distinction (*supra*). In order to easily spot the constitutive environmental factors of the various socio-economic categories, we decided to think in terms of the representation interval (under or over-representation), with reference to the weight of each of the groups in the sample. When assembled, these representation intervals enable the establishment of a hierarchy of the most structuring objects for each group, thus highlighting, via comparison, the environmental factors that appear as the strongest vectors of socio-spatial differentiation.

The table below presents this hierarchy of objects, generated by the digressive classification of representation intervals of groups, from the strongest over-representation to the strongest under-representation.

Socio-economic groups		
Well-off	Average	Low income
Listed sites (e.g.: ZPPAUP) (+) 3	Green components (+)	Seveso (+) 1
Green spaces (+) 4	Air traffic noise (small airports) (+)	Railway traffic noise (+) 2
Overall pollution (+)	Waterways and bodies of water (-)	Local pollution (+) 3
Waterways and bodies of water (-)	Green spaces (-)	Road traffic noise (+) 4
Green components (-)	Listed sites (-)	Air traffic noise (major airports) (+) 5
Road traffic noise (-)	Overall pollution (-)	Flooding zones (+)
Local pollution (-)	Air traffic noise (major airports) (-)	Overall pollution (+)
Flooding zones (-)	Seveso (-)	Green spaces (+)
Air traffic noise (small airports) (-) 6	Flooding zones (-)	Green spaces (+)
Air traffic noise (major airports) (-) 5	Railway traffic noise (-)	Air traffic noise (small airports) (-)
Railway traffic noise (-) 2	Road traffic noise (-)	Listed sites (e.g.: ZPPAUP) (-) 7
Seveso (-) 1	Local pollution (-)	Green components (-) 6

Table 7. Environmental profiles of socio-economic groups, Source : Faburel et Gueymard, 2008

In view of this classification and also going out from the strongest absolute difference in terms of representation (gray boxes), we observe differentiated environmental profiles, profiles with several characteristics. The first characteristic confirms noted disparities, by making them explicit:

- The group of well-off municipalities is defined primarily by a strong under-representation of Seveso class industrial risks, and of railway noise. Only then do we find a strong over-representation of listed sites (listed sites and historic monuments, protected areas, protected urban architecture and landscape heritage areas - Zones de Protection du Patrimoine Architectural Urbain et Paysager), and green spaces; this is followed by a strong under-representation of aircraft noise (from both major airports - Roissy CDG and Orly - and small ones, commercial for instance), all variables taken together.
- On the other hand, the group of municipalities designated as low income is above all affected by an over-representation of harms: Seveso class industrial risks, railway traffic noise, local pollution (nitrogen dioxide levels close to roads) and by road traffic noise. In a smaller measure, this group is also characterized by the presence of aircraft noise generated by the major airports. Only then is it characterized by an under-representation of green components (natural and agricultural spaces, allotment and private family gardens, hippodromes, golf courses, etc) and of listed heritage sites.
- The group of municipalities designated as average is mainly characterized by a much smaller number of discriminating factors, be they positive or negative.

The second characteristic, and perhaps the newest one, is that in fact, at the scale of the three groups, four environmental objects powerfully structure the expected difference between the environmental offer of the most well-off municipalities and the poorest: listed heritage sites, Seveso class industrial risks, railway noise, noise generated by the major Parisian airports.

Finally, a third major characteristic: environmental degradations (expressed in technical and normative terms) appear to be the primary structuring factors of the general assessment, whether positive (due to absence) or negative (due to presence). These factors confirm the results of past studies on environmental issues, notably designating transportation noise as the first source of environmental disqualification; we think they shed another novel light, and perhaps an essential one: at regional scale, and above all with reference to the "extreme" social groups, the presence or absence of degradations seems to play a more important role in structuring and social differentiation than the presence or absence of amenity factors. Thus, it would seem that the repulsion caused by environmental nuisances and degradations may give us a better understanding of environmental disparities mechanisms at the scale of the Ile-de-France region than the attraction operated by certain settings, notably those we designate as natural (green spaces, waterways).

This said, how does the environment intervene concretely in household choices and strategies? Is avoidance of nuisances and pollution actually more important than the search for amenities? How do environmental experiences and satisfaction, and more generally the living environment, intervene? Do they confirm or invalidate the geography we have devised? And on the basis of what other factors, indicators and methods?

3.3 Towards environmental inequalities in terms of lived experience and satisfaction: the structuring role of felt environmental experience and the capacity to act at the local scale

3.3.1 A population survey: presentation of the method, the thematic fields and the locations selected

Six municipalities were selected on the grounds of the regional environmental typology, ensuring that the number of questionnaires were kept at a minimum (100). We privileged the choice of municipalities of clearly differentiated environmental types (good, average, bad). While globally environmental criteria predominated, we took care to retain for each environmental category binomes of municipalities equally close socially, guaranteeing a certain internal comparability for each of the groups. But we also sought to vary the history and the dynamics proper to each of these territories, by selecting municipalities from different departments in each category.

In this case we opted for the three “first ring” (première couronne) departments of the Paris agglomeration. In 2008, these departments were home to 37 % of the regional population (11.6 million people). Together, they represent the diverse social and environmental situations encountered throughout the region: residential areas that are sometimes identical to those of the peri-urban areas of the “outer ring”; an environmental offer (e.g.: woodlands) that is to a certain extent comparable to municipalities more remote from Paris; or – as a last example – certain links with or proximity to agricultural areas. Moreover, these three “first ring” departments differ clearly as to their trajectories:

- economic (type of activities and development, for example a very different industrial past),
- social (socio-professional aspects, for example municipalities that may be situated at the extremes in terms of tax base),
- urbanistic (morphotypes, with for example very variable proportions of collective and social housing),
- and thus environmental (amenities/disamenities, with for example strong differences in terms of protected areas, or transport-related nuisances, industrial risks, etc.).

On the basis of these diverse crossed criteria we retained:

- for municipalities of good environmental quality: Sceaux (Hauts-de-Seine - 92⁸ department) and Vincennes (Val-de-Marne - 94 department),
- for municipalities of low environmental quality: Asnières-sur-Seine (Hauts de Seine - 92) and Noisy-le-Sec (Seine-St-Denis - 93),
- for municipalities of mixed environmental quality: Choisy-Le-Roi (du Val-de-Marne - 94) and Epinay-sur-Seine (de Seine-St-Denis - 93).

The questionnaire addressed the inhabitants (average length 45 minutes), and consisted of 75 questions, 23 of which were open (verbal qualification). It was structured around our queries on the satisfaction and lived experience of the environment and established an analytic register for a different geography of environmental inequalities, notably pointing towards two major explanatory dimensions:

⁸ Cf. Maps 1 and 2 to localize precisely the different departments involved in the survey.

Municipalities	Asnières-sur-Seine	Noisy-le-Sec	Choisy-le-Roi	Epinay-sur-Seine	Sceaux	Vincennes
Population 2005	82 800	38 600	36 300	50 800	19 400	47 200
Gross income per inhabitant 2003	1403,16	899,58	1038,98	837,94	2136,68	1806,92
Unemployment rate 1999 (in %)	11.6	15.56	13.76	18.84	6.88	9.51
Property owners 1999 (in %)	37.86	33.26	37.90	34.91	46.75	43.84
Social housing 2005 (in %)	21.89	42.05	34.44	38.06	22.55	6.07
Presence of a Zone Urbaine Sensible	yes	yes	yes	yes	yes	no

Table 8. Socio-economic characteristics of the municipalities surveyed, Sources: RGP (1999 et 2005), DGI (2003), DGI/DGC (2006)

- the felt environment, including affective relation to place, territorial anchoring... notably via residential trajectories or sensible perceptions of the near environment;
- people's involvement and their willingness/capacity to take action at local level for example, or via their attitude towards public action, the public authorities or provisions for participation.

We must also specify that the questionnaire was established after a preliminary phase of 50 exploratory interviews conducted in the 6 selected municipalities; these enabled us to fine-tune the potential role of certain local factors, and to test the wording of some questions.

Finally, eight major thematic headings structured the questionnaire (Appendix 1 presents the overall structure of the information collected and the variables tested):

- Residential trajectory of the person and the household, length of residence (seniority) and assessment of the neighbourhood
- Motivations and criteria for the decision to live in given municipality
- Representations of the quality of the environment and of the living environment (at different scales)
- Environmental experience, perception and satisfaction levels (at local and urban scale)
- Projects of residential mobility, motivations and conditions
- Spatial practices (work, services/equipment, tourism)
- Opinions on territorial action at different scales and points of view about relations with the public authorities

These seven headings were completed by a further one establishing the major socio-economic characteristics of individuals and their households (professions and socio-professional categories, educational level, age, sex, type of housing, occupational status, length of residence – seniority - in the municipality).

As stated in the introduction to this third part, these eight headings and the whole survey as such call upon and cross contributions from several scientific disciplines:

- from cognitive psychology, notably for the parameters of satisfaction and mastery of the private character of the environment,
- to political sociology, in order to grasp the social relations to territorial action, the modalities of its construction, and the criteria that legitimize it,
- via psychology and social geography, for the analysis of the weight of representations, but also of the identity factors of attachment to the living space,
- and via spatial economy to assess the structuring role of socio-economic factors in the distinctive construction of urban areas.

We opted for a quota-based sampling method, with three criteria: distribution by professions and socio-professional categories (in French: PCS); distribution by age, and by gender. For these three criteria, the 600 persons surveyed are representative of the municipal populations. Moreover, various filtering criteria were applied (sampling objectives):

- the age of surveyed individuals: only persons aged 18 and over were selected, in order to guarantee a certain stability relative to choice and particularly to residential choice;
- a minimal length of residence (seniority): individuals with less than one year of residence in their current home were excluded from the sample, in order to ensure that they had a certain experience of the environment, the neighbourhood and the larger living environment;
- homogeneous infra-municipal distribution, in order to ensure complete coverage; to this aim, quotas were established by sector (function of the number of sectors to be surveyed and the environmental characteristics of the neighbourhood)

Appendix 2 presents an example of municipal breakdown by surveyed neighbourhood and socio-environmental characteristics.

3.3.2 Between environmental repulsion and attraction: the weight of sensory interpretative environmental filters for residential choices

Firstly, 58.2% of the persons surveyed declared that they were attentive to the quality of the environment when choosing their home. This means that the environment is the 4th major criterion, behind the internal characteristics of housing and the price variable, but more important than the offer of services, shops and facilities, than the neighbors and/or nearness to family/friends, or parameters relative to the general atmosphere in the neighbourhood. This result fully complies with what numerous surveys conducted in several European regions over the past 15 years have demonstrated (see for instance Bonaiuto, Fornara, Bonnes, 2003), and confirms the argument voiced in the previous part of this chapter: the environment is increasingly important for lifestyle choices of European populations.

In a next step, an analysis of environmental factors for these criteria enabled a more precise view of what makes up the environment and its quality.

Setting aside the financial and material constraints liable to influence their choice, we see that persons are above all likely to avoid disagreeable factors (e.g.: repulsive effects of pollution, nuisances and risks). Firstly, this validates the observation made previously on the basis of standard indicators and the disparities thus observed. Here too we must note, with reference to factors of attraction, that parameters relating to the sensory atmosphere (ex: tranquility) constitute another privileged register: the presence of nature in the

neighbourhood, the view, cleanliness, architectural quality and low building density. Thus, perceptual operations, the dimensions of experience and sensibility do indeed operate as primary interpretative filters of environmental quality, at least when planning to move house. This is certainly one of the first contributions of the survey to our overall issue. We shall return to this question later.

	Number	Proportion
Housing quality	392	65.33
Price of housing or rent	381	63.50
Nearness to collective transport	377	62.3
Environmental quality	349	58.17
Presence of shops and services	307	51.17
Nearness to place of work or study	290	48.33
Image and mood of the neighbourhood	266	44.33
Building density and quality of architecture	243	40.50
Safety	204	34.00
Proximity to good schools	175	29.17
Presence of friends or family	143	23.83
Neighbours	129	21.50
Presence of sports and cultural facilities	111	18.50
Total / surveyed	600	

Table 9. Criteria privileged by households in the choice of their current home, Source : Faburel et Gueymard (2008)

	Number	Proportion
No traffic noise	297	52.2
No factories in the vicinity	280	49.2
Green spaces	270	47.5
Cleanliness	268	47.1
No air traffic noise	264	46.4
Presence of trees, vegetation in the neighbourhood	258	45.3
View	197	34.6
No rail traffic noise	192	33.7
No flooding risks	183	32.2
Quality of local architecture	164	28.8
Low building density	164	28.8
Air quality	135	23.7
Presence of waterways and bodies of water	78	13.7
Total / respondents	569	

Table 10. Environmental criteria linked to the choice of future housing, Source: Faburel et Gueymard (2008)

From the point of view of the environmental inequalities problem we address, we prolonged the analysis by crossing future criteria of residential choice with socio-

professional categories of households (PCS). The strongest attraction and repulsion between on the one hand the different social categories, and environmental objects on the other hand, were recorded using the Correspondence Factor Analysis, with the Maximum Percentage Deviation as indicator (PEM). Two response modalities (yes/no) were systematically associated with criteria that proved significant: yes designating a significant relation to choice, no to non-choice.

Profession and socio-professional category	Question	Modality	Effectifs	Khi2	PEM	Test Khi2
Craftsmen/tradesmen, shopkeepers, heads of businesses	No railway traffic noise	Yes	14	3,325	29	••
Managers and higher level intellectual jobs	No railway noise	Yes	43	4,909	19	•••
	No road traffic noise	Yes	56	1,513	17	•
	Low building density	Yes	37	4,412	15	•••
	Quality of local architecture	Yes	36	3,63	14	••
Intermediary professions	No flooding risk	No	85	2,808	45	•••
	No railway noise	No	78	1,076	26	•
	Low building density	Yes	41	6,174	18	•••
	No air traffic noise	No	65	1,087	18	
	Quality of local architecture	Yes	37	2,983	12	••
Employees	Presence of green spaces	Yes	53	2,223	19	••
	No factories in the vicinity	Yes	53	1,501	16	•
Workers	Quality of local architecture	No	68	1,188	38	••
	Cleanliness	Yes	52	6,453	34	•••
	No road traffic noise	No	55	4,46	33	•••
	No factories in the vicinity	No	52	1,563	22	•
	Presence of green spaces	Yes	43	1,008	14	
	No flooding risk	Yes	32	1,954	12	•
Retired persons	Low building density	No	128	1,697	32	•••
	Cleanliness	No	103	2,994	23	•••
	No flooding risk	Yes	65	6,117	16	•••
	No factories in the vicinity	Yes	82	1,041	10	

Table 11. Environmental objects designated as important in the choice of new housing, according to socio-professional category, Source: Faburel et Gueymard (2008)

These various relations highlight the oppositions between social categories, notably between the categories that are most emblematic of problems of inequality. Among the objects that embody these oppositions, we note that:

- Road traffic noise seems to structure a difference between the richest and the poorest. Avoidance factor for managers and upper level intellectual professions, it has no repulsive effect on workers.
- Railway traffic noise, and less importantly air traffic noise, distinguishes between the middle classes (intermediary professions) and the richest (managers).
- The quality of the local architecture (and in a lesser measure building density) distinguishes, via its attractivity or lack of it, management and upper level intellectual professions, as well as the intermediary professions, from workers.
- Finally, the presence of a factory here differentiates employees from workers, both low income groups (PCS). In fact, since the factory is part of the worker's social universe, this result appears highly plausible.

Thus, though the "objects of opposition" generated here are not all identical to those identified previously as structuring the social composition of space at regional scale (a reminder: listed heritage sites, Seveso type industrial risk, railway traffic noise, airway traffic noise from major Paris airports), we observe:

- an a priori global correspondence between objectivized environmental quality and motivational objects,
- and above all, a strong structuring of social distribution due to repulsion, i.e. the avoidance of certain potentially disagreeable environmental factors.

It would therefore seem that negative environmental factors do indeed introduce greater spatial social distinctions than positive objects, actively contributing to selection mechanisms and consequently to the construction of the geography of environmental inequalities. However, and this is the third point, and doubtless the most important one, we must again admit that the parameters of sensory atmosphere (sight and sound) constitute an important register, an interpretative filter for the assessment of the environment – both positive and negative. Above all it distinguishes – via its statistically validated presence or absence – between the rich and the poor. For us this was a strong incentive to pursue our analysis by examining environmental satisfaction, and understanding the social factors of its construction.

3.3.3 On the inequalities of felt and lived experience: The primary role of local attachment, of sensible operations and of political involvement

Several questions attempted to evaluate the environmental satisfaction of households: variables of numerical assessment on a scale from 0 to 10, addressing a list of environmental objects (positive and negative), but also open questions on what was perceived as agreeable or disagreeable (cf. Appendix 1).

Following a factorial analysis (AFC) based on the responses to these questions, we used classification methods enabling us to establish sub-populations, depending on how close their responses were to each other. This generated three sub-populations, homogeneous in size: the dissatisfied (A : 24.3%, n=146), the more or less satisfied (C : 39.8%, n=239), the very

satisfied (B: 35.8%, n=215). We then operated various crossings with the explanatory dimensions established by the body of information (corpus) generated by the survey. Numerous differences appear behind these 3 great levels of satisfaction: different residential trajectory/seniority (with as a modulating factor the degree of attachment to the municipality), different modalities and factors of residential choice (for example the choice or rejection of a home), different representations of the environment (positive/negative, local/global, bio-centred/anthropo-centred), different spatial and leisure practices (e.g.: use of green spaces), different relations to public involvement (confidence in elected representatives, membership in or cooperation with an association) and different socio-economic characteristics (for details cf. Faburel and Gueymard, 2008).

Above all, the three categories of satisfaction (and their associated socio-spatial profiles) with professions and socio-professional categories (PCS), enabled us to note the existence of environmental inequalities of the lived environmental experience. First of all, there are indeed notable social differences of the felt experience depending on socio-professional category. A priori, the most affluent social categories are proportionally much more satisfied with their environment than the poorest categories, and this within the same municipality. It appears that the socially most vulnerable are proportionally the most dissatisfied.

	Dissatisfied	Moore or less satisfied	Very satisfied
Craftsmen/tradesmen, shopkeepers, heads of businesses	25.9	33.3	40.7
Managers and upper-level intellectual jobs	14.6	44.8	40.6
Intermediary professions	20.6	47.1	32.4
Employees	33.3	40.6	26.0
Workers	48.8	32.9	18.3
Retired persons	15.9	36.3	47.8
Other persons with no professional activity	17.5	40.0	42.5

Table 12. Level of environmental satisfaction by socio-professional category, Source: Faburel et Gueymard (2008)

However, beyond generally confirming the overall link between environmental satisfaction and the usual social indicators, certain results generated by the measure of satisfaction directly question the conventional measure of environmental inequalities (i.e. mainly technical physico-chemical approaches aiming for normative action for protection). If a priori the most vulnerable socially are proportionally the most likely to be dissatisfied with their environment, some questions still have to be answered. Notably, the distribution among the different satisfaction levels of professions and socio-professional categories highlights a large diversity of situations, with strongly contrasting felt experiences which did not allow us to establish a clear (unequivocal) relation to the environment by social category. In other words, satisfaction may vary strongly at an identical social level and at a comparable educational level. At municipal and infra-municipal scale, and again going out from the 3 different categories of environmental quality:

- 45.6 % of very satisfied individuals do not live in a municipality designated as having very good environmental quality,

- 41.2% of persons living in municipalities of good environmental quality appear to be not fully satisfied with their environment, and 6% are totally dissatisfied.

These fine distinctions put the explanatory scope of “objective” environmental satisfaction characteristics into a more relative perspective, and queried the instruments used to measure environmental inequalities.

Continuing the analysis of the different explanatory dimensions of environmental satisfaction, we finally attempted to establish a hierarchy of the variables which, by crossing all the explanatory dimensions arising from the questionnaire’s thematic headings (particularly the relation to the living environment and the ways of life), appear to structure and discriminate between the different groups most strongly. Again using the Maximum Percentage Deviation (PEM), we then established a decreasing classification of the variables most strongly associated with the environmental satisfaction of the persons surveyed.

Variable	Deviation	Khi2	Test Khi2	PEM
Expectations as to improvement of environmental quality	19	14	...	42
Feeling of being "at home"	80	63	...	40
Regret at having to move	78	36	...	35
Confidence in the municipal elected representatives	106	73	...	35
Regret at having to leave the neighbourhood	87	82	...	32
Criteria of residential choice: environmental quality	80	32	...	32
Municipality of residence	101	72	...	30
Living in a ZUS classified neighbourhood	20	18	...	30
Reference to ideal living environment: here	42	18	...	30
Municipal environmental characteristics (3 categories characterized “objectively”, see above)	96	46	...	29
Attachment	75	44	...	29
Membership in association	45	12	...	27
Confidence in local public authorities	61	41	...	27
Frequency of use of green spaces	62	38	...	26
Criteria relative to residential choice: the image and atmosphere of the neighbourhood	39	10	...	25

Table 13. Classification of explanatory variables of environmental satisfaction (global PEM),
Source : Faburel et Gueymard (2008)

Once again, environmental satisfaction seems to imply objective environmental endowment, here expressed by the variables “municipality of residence” and “municipal environmental

characteristics”, and we note a certain correspondence between such endowment and its lived experience; once again, declared satisfaction appears to be socially anchored; nonetheless this classification casts a few interesting lights, above all putting the weight of strictly socio-economic criteria into a more relative perspective, and generating other, potentially more promising types of determinants within detailed local situations.

1. As a matter of fact, it appears that environmental satisfaction is above all strongly linked to the emotional identity-related aspects that accompany a living environment – including so-called low-quality environments: to regret moving from the house and the neighbourhood, the chosen environment, the current place of residence considered as the ideal living environment, the strength of the attachment to it. All these elements are expressed above all in terms of being “at home”.
2. In this register of lifestyles, sensory parameters that qualify the surrounding atmosphere and the perceptual operations and dimensions of experience are the primary filters to interpret environmental quality and the resulting satisfaction or dissatisfaction (frequency of using green spaces, criteria of atmosphere in the residential choice).
3. Finally and above all, this satisfaction seems to depend on the confidence of the persons in collective means of action and particularly in the elected local representatives, and their capacity to respond to expectations relative to environmental matters and the living environment. While association-based involvement, and in consequence the evaluation of provisions for public participation, seem to express a commitment that seemingly unfolds in a more political dimension relative to environmental satisfaction and social inequalities as they are experienced, it also appears to ground it.

Thus, it appears that environmental satisfaction depends less directly on socio-economic variables, or on “objective” environmental characteristics, than on the differentiated capacities and aptitudes of persons (who are, let us remember, socially unequal, cf. 2nd part) to control their local environment and act upon it, thus confirming a number of relevant findings from cognitive psychology and political sociology.

Once crossed, these three types of results make apparent the strength of affective mechanisms and political involvement to influence the relation to the environment. They also point towards the growing weight, running across all social categories, embodied at the local scale by the “universe of what is near”, in the assessment of the environment and the desired changes (cf. 2nd part).

4. Some practical indications for evaluation and implementation, with a view to the sustainable development of European regions: From socio-spatial disparities to territorialized environmental injustices

The research summarized here confronted statistical data on so-called environmental inequalities on the scale of the Ile-de-France region with the environmental experience of the region's inhabitants. The research aimed to build a different geography of environmental inequalities, taking into account the lived and felt environment, through local experiences, satisfaction, and place attachment relative to the environment. A further aim was to improve the understanding of the operative mechanisms, notably residential ones, in the phenomena of spatial polarization for environmental reasons at regional scale. Our two working hypotheses were:

- the register of personal lived experiences and of environmental satisfaction constitutes a non-negligible source of information which, due to its territoriality and resulting transversality, distinguishes between environmental qualities, thus pinpointing disparities, inequalities and even injustices in this area;
- the subject-individual, via his lived environmental experience and the cognitive and social transactions he operates, constitutes together with his immediate living environment, a pertinent scale of observation to highlight certain relevant determining dynamic factors of inequalities, in order to perhaps differently ground territorial decision making.

The first stage was based on crossing two typologies, one environmental, the other social, going out from previously existing statistical data. This led – classically – to the observation of a growing correlation between the environmental and social characteristics in the Ile-de-France. This distribution confirms the situation of certain areas in the nearer suburbs, which used to be industrial, but also that of peri-urban areas absorbing the dispersion of low-income populations to areas which may have been subject to recent deterioration (e.g. certain parts of the eastern Seine-et-Marne). Above all, as of this stage, it became clear that it would be easier to understand residential choices and the resulting geography, more via the repulsive effects of environmental damage and deterioration than via the attractiveness of certain elements, notably those called natural here (green spaces, waterways). It also generated a list of environmental objects and factors that make a place attractive or undesirable.

The second step was to select six municipalities close to Paris considered as representative of the different environmental disparity situations identified. A survey based on a semi-open questionnaire was conducted with 600 inhabitants, face to face (average length 45 minutes), to gather information concerning the environmental experiences and satisfactions of the households concerned, their real life situations and perceptions of environmental quality and of their living environment, their residential itineraries and attachments, places, practices, and relations to public action. The survey confirmed our argument that people are more likely to make their residential choices to avoid nuisance factors; with traffic noise or the bad quality of local architecture (and to a lesser extent, the presence of an industrial sites) as the major arguments. It also showed that environmental satisfaction is probably strongly linked to territorialized experiences and expectations relative to the lived and felt environment: the capacity of the near environment to provide a feeling of “*being at home*”, and confidence that elected representatives (above all municipal) will do something about these expectations.

These results elucidate the strengths and weaknesses of the conventional approach to environmental inequalities, founded (if we remember) on a static reading of quantified physico-chemical (e.g.: exposures) and socio-economic facts (e.g.: income level). The situations described are situated at least as much in the domain of sensible, symbolic and axiological relations and transactions of local societies to their living environment, as in the more conventional domain of the physical or social components of local places, which are often largely accounted for: thresholds of chemical exposure for air quality (with, for instance, short interest in health effects) ; data probabilities of risks occurrence, flood risks and hazards for instance (with, for example, no more interest in local history, social habits or economical activities linked to rivers); acoustic levels for noise nuisance (with well-known

gaps between doses and annoyance); distance for the accessibility of urban amenities, of green spaces...

To this aim, considering the logic of decision makers and the cultures in the urban field, we now wish to propose a few approaches that would improve the inclusion of environmental inequalities from the perspective of sustainable development (Faburel, 2011). One way would be to focus on lifestyles and people's experiences linked to the environment, and their attachment to a particular place. Another way should adopt a participatory rather than a structural approach to the investigation of exclusion and capacity forms of involvement (i.e. Sen's *capabilities*) instead of more conventional behavioural markers of urban inequality (such as moving house, for example). How can this be done? First empirically, then politically.

Certainly one must be careful when generalizing these results. There is no way in which a local survey of 600 persons could be representative of a population of over 4 million (3 "first ring" departments), and even less of the 11.6 million inhabitants of the Ile-de-France region. As the objective of our study was exploratory, it became imperative to structure spatial scales to account for the role of ecological dynamics and social transitions in shaping environmental challenges and their differential impact within society (for this see for instance Marcotullio and McGranahan, 2007, or World Bank, 2007). Moreover, we must admit that certain standard indicators have undeniable predictive power, for example when evaluating the increasingly significant weight of so-called environmental disqualifications on the repulsive effect of certain environmental situations, e.g. in the residential choices of households.

But, as for the less static and descriptive, more dynamic and "pro-active" interpretation of our approach, it addresses both the production of scientific knowledge and its usual divisions/habits by scientific discipline, as well as the still dominant worldwide system of environmental evaluation, i.e. mainly technical approaches aiming for normative and strictly protective action, usually at project, national or continental levels (*Environmental Impact Assessment, Strategic Environmental Assessment...*). Following in the steps of Krieg et Faber on the subject of environmental inequalities, who proposed some interesting views on the cumulative indicators of social vulnerability inspired by the *capabilities* of Sen and on environmental hazards (2004), and in the wake of Bonaiuto et al. (2003) on the importance of place attachment in households' residential choices, let us cite two examples taken from our work.

Like others, we have stated that the registers of perceptions, of the sensible, and of involvement were a powerful force structuring the lived environmental experience, to the extent that in adapting to great environmental disparities (and to an environment of so-called bad quality), the resulting appropriation ("to make it one's own") may play an essential role. Here appropriation implies mechanisms which in certain cases could easily be defined by already existing classical indicators, or as readily grasped via certain adjustments. For the first, the length of residence (seniority), which is often included in surveys on social issues (for instance housing and environment surveys) may reveal the attachment to the place of residence and a grounding in it; given the confidence granted to territorial players (confirmed by numerous official barometers) this generates means of action seen as addressing environmental problems and allowing for an assessment of the level of personal involvement. For the second, the variable "presence of a garden or terrace", for example, constitutes a true environmental relay for certain people, whereas for others it

acts as a compensatory factor within the domestic sphere. This may be more important than the distinction by type of housing (house/apartment) or by status (owner/tenant/rent-free) which surveys habitually use to distinguish socially between populations and/or to typify relations to the environment.

Similarly and perhaps even more central to the issue of environmental inequalities, or at least to the various aspects addressed in the 2nd part, a gap revealed in the survey enabled us to query the pertinence of the official statistical classifications generally proposed or used. The analysis shows that the rich are not systematically the most satisfied with their environment. Our results allowed us to cast a light on a social category which is often ignored in socio-economic approaches to the environment: non-working persons (retired persons of all social origins and others not gainfully employed). In fact, the differentiation relative to environmental satisfaction may have less to do with differences between professions and socio-professional categories (PCS), or between managers and workers, for example, than with the opposition between non-working/working persons, with the retired dominant in the first group, and workers in the active population. We will have to understand how time set free by retirement, or links between age and local attachment, may generate possibilities of involvement in environmental issues and challenges.

As we can see, information on the living environment, through local experiences, satisfaction, place attachment relative to the environment enabled us – under the condition of using complementary indicators - to obtain additional elements for a finer assessment of local disparities (neighbourhood, municipality, inter-municipality). The type and nature of environmental objects in these contexts, the importance of certain morphological and socio-economic factors, as well as the environmental perceptions and beliefs that underlie relations with local policies also provide a basis for action addressing environmental inequalities in a sustainable development perspective.

The information arising from the population's *on site* felt experience raises queries that are pertinent to an empirical measure of environmental inequalities (e.g.: what observation indicators) and for analytic frameworks (e.g.: what conceptions of the environment, of justice, of the individual, should be privileged). To a large extent, these questions still have to be resolved. In a wider sense, it addresses the systems of knowledge of the environment and their capacity to perceive what makes people "inhabit" a given place, their sensible lived experience, attachments, involvement, and thus the types of inequalities in this field.

It is true that, as stated by Charles: *"Although the environment is recognized as an object of universal concern, concrete measures relative to it, its consideration at a finer scale and the subjective dimensions that constitute it are largely underestimated and ill perceived."* (2001, p. 21). In fact, although it has shown itself to be effective to a certain extent (see predictive power above), the environment is still viewed in terms of overlapping technical and legal norms, which do not disclose the ways in which it is "lived", nor its interfaces with other territorial characteristics. The instruments to measure these aspects are still inadequate.

Last but not least, via this cosmopolitical approach to the environment and the socio-spatial changes that accompany it, we move away from the dominant approach to both inequalities, the environment and justice, i.e. from a strictly egalitarian reading of social disparities in terms of the environmental endowment of places, and towards a more dynamic analysis of inequalities, which are (as already stated) *"the result of unequal access to the diverse resources*

offered by a society”, and thus to apprehend by means of a survey and qualify the territorialized phenomenon they constitute via lived experience.

In so doing, we move from only “combining” environmental degradation and socio-historical spatial disqualification (disparities) to what we see as a first evaluation of injustices through the different ways in which the inequalities thus evaluated make their entry into politics. Doubtless, as we have shown, because of the vital queries addressing the inaptitude of the current and official environmental assessment system to describe a fully territorialized phenomenon, i.e. the shortage or inadequacy of evaluation tools. But also because the factors and mechanisms used in in our work refer directly to action and its recent changes and trends via the symbolic and axiological dimensions thus highlighted.

For instance, in this new geography the structuring role of the repulsive nature of certain damages is particularly linked to the installation of so-called high-impact equipment (industrial sites, transportation infrastructures...). Let us assume that attractivity founded on exceptional elements (sites and monuments, green components) perhaps less explains the inequalities that have been pointed out than the repulsive effect of certain degradations. Are not then public and private policies responsible for the installation of this equipment and above all for monitoring compliance with the relevant environmental standards? Are they not directly implicated, owing to their history, notably that of the State with its enterprises and services? This makes clear the impact of past arbitration, and the responsibility of public and private authorities, with their underlying conceptions of social and spatial justice, for these decisions.

Along the same lines, the influence on environmental satisfaction arising from differentiated judgments, expectations and capacities for commitment to local action, could involve inhabitants in novel ways, both via their own experience of unequal environmental situations, via forms of involvement which such situations increasingly generate, or as vital resources for participatory projects in local forms of action. In short, environmental satisfaction also addresses new forms of institutional and territorial governance of projects, and their regulation.

In fact, municipal collective bodies are confronted and must often manage growing spatial inequalities which mix socio-urban and economic stakes with increasingly environmental ones (concentration of economic activities, the social specialization of space, social disqualification and environmental degradation). Thus, today they must take a greater interest in instruments of evaluation and intervention to counter the mechanisms of socio-spatial segregation and reverse the lot assigned to certain portions of the territory which cumulate economic and social problems and environmental handicaps.

All this reinforces the idea that environmental injustice might well represent, over and above merely social disparities relative to exposure, *“the social and territorial inequalities of capacities and means given to populations and local public authorities to act in view of improving their lived and felt environment”* (Faburel, 2008). We are close here to the readings proposed by Schlosberg (2004) or Jamieson (2007): environmental justice needs to address not only the distribution of environmental harms and benefits, but also people’s participation in decision-making processes, including recognition of people’s particular identities and visions of a desirable life. This is also an extension of the interpretation of inequalities given by Mitchell and Walker (2003), and born of the *Environmental Justice* movement in the

English speaking countries: *“Unequal capacities to act upon the environment and address public authorities in order to change the living environment”*.

Such an extension would in fact mark the appearance of an updated conception of the environment (and of justice), accounting for the importance it assumes for our social cognition, practices and projections. As shown in the first part of our chapter this qualification is better adapted to the changes that the environment now imposes upon our societies, and might offer a more perceptive view of action, particularly in the urban regions where socio-spatial dynamics and segregation mechanisms are particularly strong and go back a long time.

Without this growing awareness one may well wager that the question « Evaluate, but for what purpose? » remains unanswered. For example, without fine-tuning the noted disparities highlighted by the first stage of our study (according to which 2 750 000 persons in the Île-de-France are victims of such situations), the costs of public and private intervention will act as an obstacle to action for a long time. As we see, the increasingly frequent current efforts to define and observe environmental inequalities are not able to counteract the objectives of targeted action in multi-player systems, nor their underlying conceptions of the environment (and of justice).

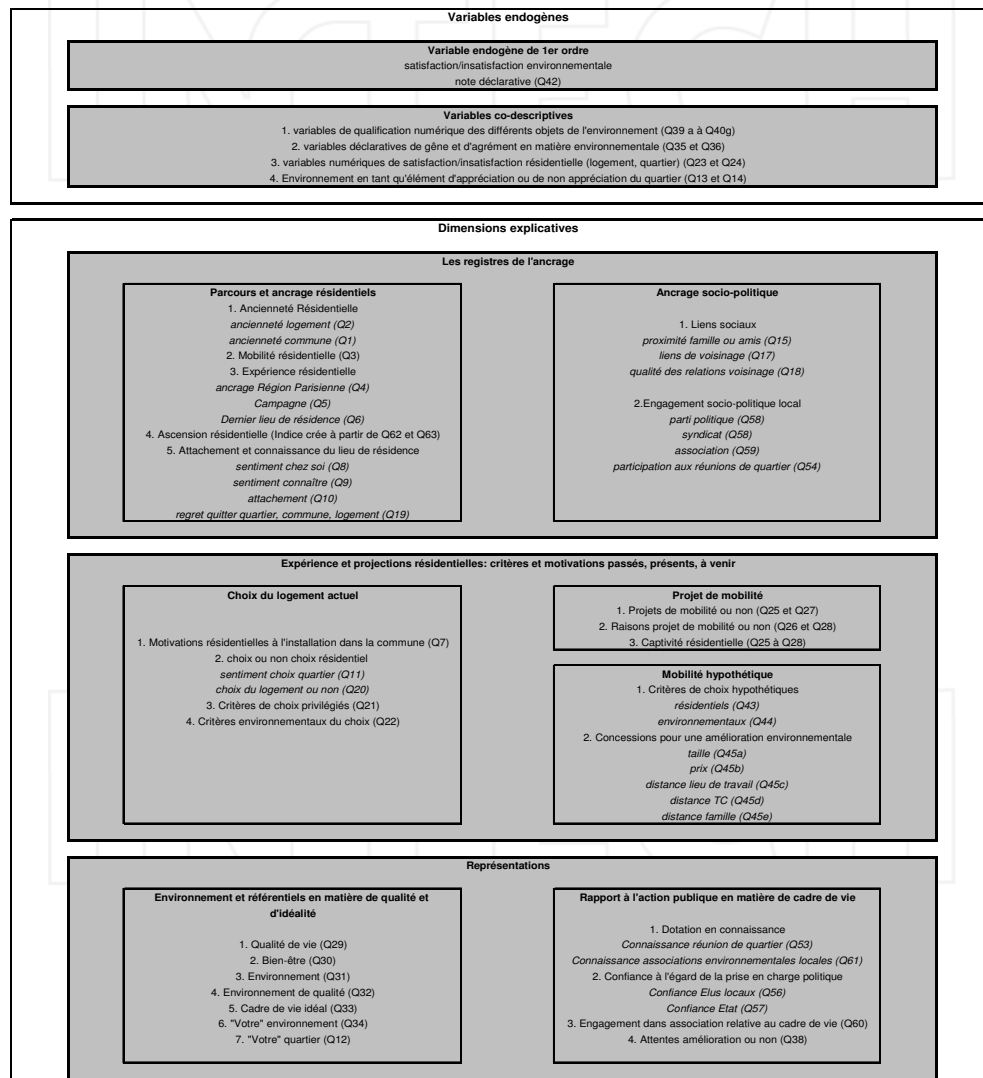
Here is where this more pro-active qualification sheds a light on potential levers for sustainable development for European regions, balancing between institutional and bottom up approaches to sustainability. However, this is perhaps less a question of sustainable development consisting of themes and pillars side by side, than of increasingly inclusive and plural, mixed dimensions, i.e. of a *“conceptual framework within which the territorial, temporal, and personal aspects of development can be openly discussed”*. These would include ‘Place’, ‘Permanence’, and ‘Persons’ (Seghezso, 2009). In an intersecting perspective combining different sciences and policies (Stengers, 1997), cross-disciplinary research should contribute to defining integrated, locally based issues relative to social and spatial aspects.

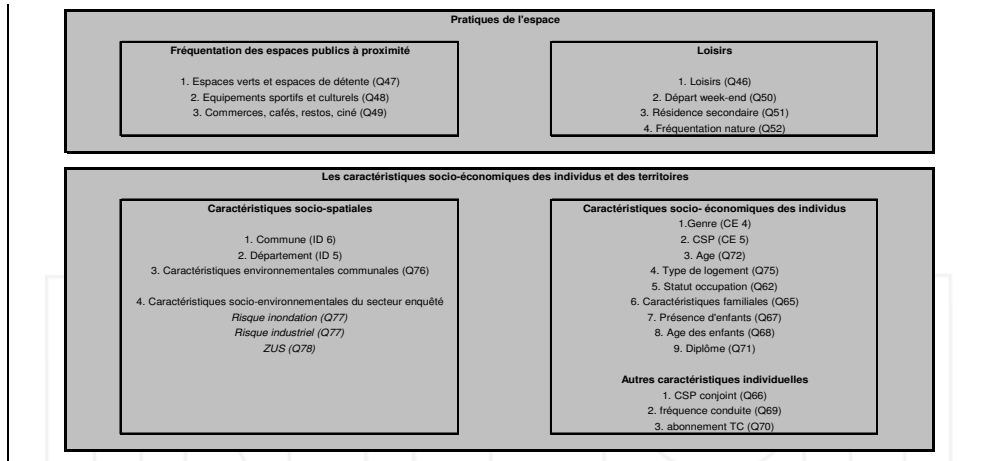
These could be used by decision makers in the field of environmental justice: experimental knowledge (for instance landscaping experiments), real participatory approaches (ex: diversity of collaborative initiatives with inhabitants and their empowerment, see for instance Cruikshank, 1999), and new subjects (well-being, sustainable/eco neighbourhoods, ecological housing). Let us also note as a last example in this perspective, that health progressively imposes itself as a paramount subject in the analysis of environmental injustice. Far from its purely biomedical and quantitative (epidemiological) aspects, this approach is evolving rapidly to view health primarily as well-being in the larger sense (e.g. emotional dimensions). Crossing it with ecological findings (Corvalan et al, 2005), it thus emphasizes its fundamental and qualitative links with poverty, participation, or the sustainability of territories (Sen, 2002).

In fact, if within the framework of the territorialization of urban action via sustainable development, as well as within that of a democracy willing itself to be more participatory (notably owing to environmental stakes, see for instance Dietz and al., 2008), poorer populations are not given the capacity of involvement, notably to make a political issue of environmental inequalities (cf. sanitary whistle blowers), certain well-known socio-economic mechanisms and the non-environmental character of dominant conceptions of social justice will continue to segregate populations and spaces, notably due to residential mobility, competitive policies, property or finance based reasons behind the installation of equipment generating negative external effects.

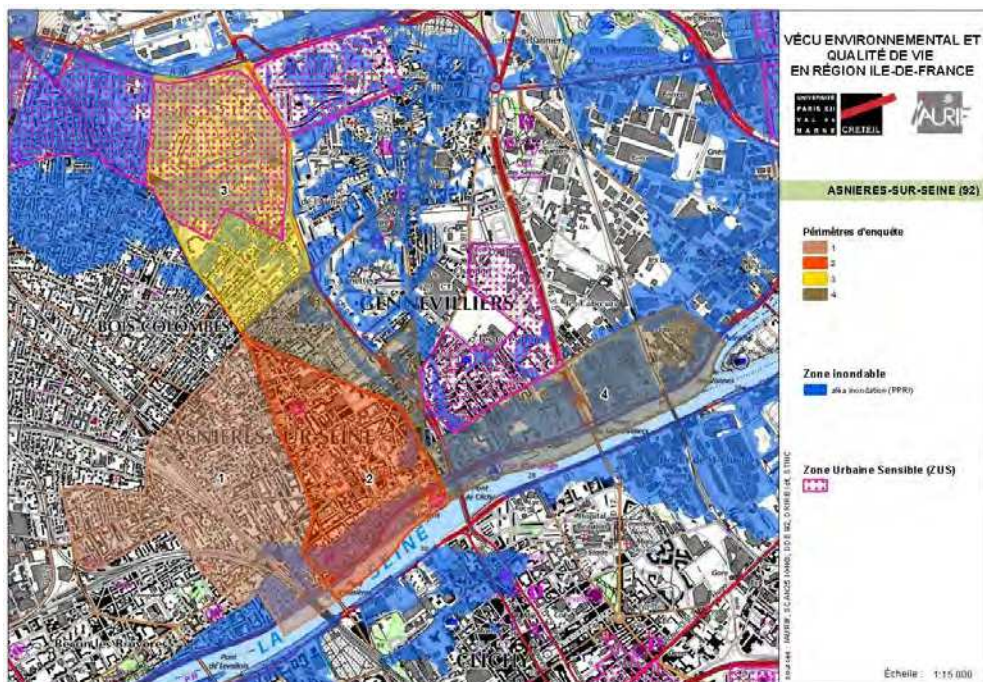
In consequence, the sustainable city should take a real interest in the long-term dynamics, past and future, of the environmental marginalization of certain of its places and populations, and protect them: against spatial fragmentation, social segregation, environmental gentrification. In any case this could prove more useful than uniquely institutional answers which have in the end doubled environmentally based social vulnerability; imposing limits on action in favor of mixity in housing policies, and enhancing the weight of the market in the attractiveness competition between various places or regions...

5. Appendix 1





6. Appendix 2



The lived environment and quality of life in the Ile-de-France (Paris) region

7. References

Ascher F., 2004, Les nouveaux principes de l'urbanisme, L'Aube, 110 pages

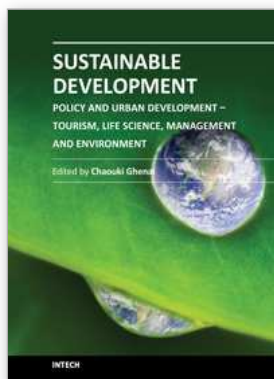
- Baumol W.J. and Oates W.E., 1988, *The Theory of Environmental Policy*, Cambridge University Press, Cambridge, UK, 299 pages.
- Beatley T., 2010, *Biophilic Cities: Integrating Nature Into Urban Design and Planning*, Island Press, 200 pages
- Beatley T., 2000, *Green urbanism: learning from European cities*, Island Press, 2000 - 491 pages
- Beck U., 2004, "The Truth of Others: A Cosmopolitan Approach", *Common Knowledge*, 10(3), pp. 430-449
- Beck U., 2001, *La société du risque. Sur la voie d'une autre modernité*. Editions Aubier, Coll. Alto, 521 p. Traduction de World Risk Society, Cambridge, Polity Press (1999).
- Beck U., 1995, *Ecological politics in an age of risk*, Wiley-Blackwell, 216 pages (see chapter 7, "Technocratic challenge to Democracy", pp 158-184).
- Berger M., 2004, *Les périurbains de Paris. De la ville dense à la métropole éclatée ?*, CNRS Editions, 176 p.
- Boltanski L., Thevenot L., 1991, *De la justification. Les économies de la grandeur*, Paris, Gallimard, Coll NRF Essais, 483 p.
- Bonaiuto M., Fornara F., Bonnes M., 2003, "Indexes of perceived residential environment quality and neighbourhood attachment in urban environments: a confirmation study in the city of Rome", in *Landscape and Urban Planning*, n°65, pp. 41-52.
- Bullard B. (ed.), 1994, *Unequal protection: Environmental Justice and Communities of Color*, San Francisco, Sierra Club Books.
- Bullard R., 1990, *Dumping in Dixie: Race, Class, and Environmental Quality*, Boulder, CO: Westview Press.
- Bullard R.D., 1983, "Solid Waste Sites and the Black Houston Community", *Sociology Inquiry*, 53, pp. 273-288.
- Charles L., 2001, « Du milieu à l'environnement », in Boyer M., Herzlich G., Maresca B. (coord.), *L'environnement, question sociale. Dix ans de recherche pour le ministère de l'environnement*, Paris, ed. Odile Jacob, 229 p.
- Charvolin F., 2003, *L'invention de l'environnement en France, La découverte*, 127 p.
- Choffel P. (coord.), 2004, *Observatoire national des zones urbaines sensibles*, Paris, Editions de la Délégation interministérielle à la ville, 252 p.
- Corburn J., 2005, *Street Science. Community Knowledge and Environmental Health Justice*, MIT Press, Cambridge, London.
- Corvalan C., Hales S., McMichael A., 2005, *Ecosystems and human well-being: health synthesis. A report of the Millennium Ecosystem Assessment*, World Health Organization, Geneva.
- Cruikshank B., 1999, *The Will to Empower: Democratic Citizens and Other Subjects*. Cornell University Press, Ithaca.
- Deboudt P., Deldrève V., Houillon V. et Paris D., 2008, « Inégalités écologiques, inégalités sociales et territoires littoraux : l'exemple du quartier du Chemin Vert à Boulogne-sur-Mer (Pas-de-Calais, France) », *Espace, Populations, Sociétés*, n°1, pp. 173-190.
- De Palma A., Motamedi K., Picard N., Waddell P. (2007), "Accessibility and environmental quality: inequality in the Paris housing market", *European Transport*, 36, pp. 47-74
- Diamantopoulos A., Schlegelmilch B., Sinkovics R. et Bolhen G. (2003), "Can socio-demographics still play a role in profiling green consumers ?", *Journal of Business Research*, 56, pp. 465-480.

- Diebolt W., Helias A., Bidou D. et Crepey G., 2005, *Les inégalités écologiques en milieu urbain*, Rapport de l'Inspection Générale de l'Environnement et du Conseil Général des Ponts et Chaussées, 68 p.
- Dietz Th., Stern P. C., National Research Council (U.S.), Panel on Public Participation in Environmental Assessment and Decision Making, 2008, *Public participation in environmental assessment and decision making*, National Academies Press, 305 pages
- Dobré M., Juan S. (dir.), 2009, *Consommer autrement - La réforme écologique des modes de vie*, Paris, l'Harmattan, 312 p.
- Dobson A., 1998, *Justice and the environment*, Oxford University Press, Oxford.
- Dozzi J., Lennert M. et Wallenborn G. (2008), « Inégalités écologiques : analyse spatiale des impacts générés et subis par les ménages belges », *Espace, Populations, Sociétés*, n°1, pp. 127-143.
- Environmental Protection Agency - EPA, 1995, *Environmental Justice Strategy*, Note, EPA, Washington, 41 p.
- Faburel G., Gueymard S., 2008, *Vécu environnemental et qualité de vie en région Ile-de-France. Une approche des inégalités environnementales*, Rapport final du CRETEIL pour le Programme Politiques Territoriales et Développement Durable, Ministère de l'Ecologie, du Développement Durable, des Transports et du Logement, mai, 133 p.
- Faburel G., Maleyre I., 2007, « Dépréciations immobilières, polarisation sociale et inégalités environnementales pour cause de bruit des avions », *Revue Développement Durable et Territoires*, mai, 17 p.
(<http://developpementdurable.revues.org/document2775.html>)
- Faburel G., 2011, "How to green our urban spaces (people participation, experiences and attachment to place)? Environmental conceptions in public policies and local perspectives for spatial justice in France", 10th Conference on Environmental Justice and Global Citizenship, Mansfield College, Oxford, july, 16 p.
- Faburel G., 2010a, « Inégalités et justice environnementales », in O. Coutard et J-P. Lévy (coord.), *Ecologies urbaines*, Economica, coll. Anthropos, Chap. 13, pp. 214-236.
- Faburel G., 2010b, « Débats sur les inégalités environnementales. Une autre approche de l'environnement urbain », *Justice spatiale/spatial justice*, n°2, *Justice spatiale et environnement*, octobre, pp. 102-132.
- Faburel G., 2008, « Les inégalités environnementales comme inégalités de moyens des habitants et des acteurs territoriaux. Pour que l'environnement soit un réel facteur de cohésion urbaine ? », *Revue Espace - Populations - Sociétés*, n° 2008-1, pp. 111-126.
- Fairburn J., 2008, 'Adressing environmental justice : a UK perspective', *Colloque Inégalités environnementales et risques sanitaires*, Agence Française de Sécurité Sanitaire, Environnementale et du Travail, Paris, 10 avril, 9 p.
- Fisher F., 2000, *Citizens, experts and the environment. The political of local knowledge*, Duke University Press, 328 p.
- Giddens A., 1991, *The Consequences of Modernity*, Stanford University Press, 188 pages.
- GIEC - Intergovernmental Panel on Climate Change, 2007, *Climate Change 2007: Synthesis Report*, Intergovernmental Panel on Climate Change, 32 p.

- Gueymard S., 2009, Inégalités environnementales en région Ile-de-France : répartition socio-spatiale des ressources, des handicaps et satisfaction environnementale des habitants, Doctorat d'aménagement, d'urbanisme et de politiques urbaines, Institut d'Urbanisme de Paris, Université Paris XII, 387 p.
- Guillerme A., Jigaudon G. et Lefort A-C., 2004, Dangereux, insalubres et incommodes. Paysages industriels en banlieue parisienne XIXe-XXe siècles, Champ Vallon, Collection Milieux, 343 p.
- Haanpää L., 2007, 'Consumers' green commitment: indication of a postmodern lifestyle', *International Journal of Consumer Studies*, Volume 31, Issue 5, pp. 478-486.
- Harvey D., 1992, "Social justice, postmodernism and the city", *International Journal of Urban and Regional Research*, 16, pp. 588-601
- Hirschman Albert O., 1970, *Exit, Voice and Loyalty. Responses to Decline in Firms, Organizations and States*, Cambridge, MA, Harvard University Press, 284 p.
- Jagers S. C., 2009, 'In search of the ecological citizen', *Environmental Politics*, Volume 18, Issue 1, pp. 18-36.
- Jamieson D., 2007, 'Justice: the heart of environmentalism', In Sandler, R. and Pezzullo (eds) *Environmental justice and environmentalism: the social justice challenge to the environmental movement*. MIT Press, 352 p.
- Kohlhuber M., Mielck A., Weiland S. K. and Bolte G., 2006, "Social inequality in perceived environmental exposures in relation to housing conditions in Germany", *Environmental Research*, Vol. 101, Issue 2, pp. 246-255
- Krieg E.J., Faber D.R., 2004, "Not so Black and White: environmental justice and cumulative impact assessments", *Environmental Impact Assessment Review*, Vol.24, pp. 667-694.
- Kruize H., 2007, *On environmental equity - exploring the distribution of environmental quality among socio-economic categories in the Netherlands*, KNAG / Copernic institute, Utrecht, Pays Bas, 219 p.
- Laigle L., 2005, *Les inégalités écologiques de la ville : caractérisation des situations et de l'action publique*, Rapport Ministère de l'Ecologie, programme Politiques territoriales et développement durable, 122 p.
- Lascoumes P., 2001, « Les ambiguïtés politiques du développement durable », *Université de tous les savoirs, La nature et les risques*, Vol. 6, Odile Jacob, pp. 250-263.
- Latour B., 2004a, "Whose Cosmos, Which Cosmopolitics? Comments on the Peace Terms of Ulrich Beck", *Common Knowledge*, 10(3), pp. 450-462.
- Latour B., 2004b, *The Politics of Nature*, Cambridge MA: Harvard University Press, 326 p.
- Laurent E., 2010, *Social - Ecologie*, Flammarion, 230 p.
- Laurent E., 2009, « Ecologie et inégalités », *Revue de l'OFCE*, Presses de Sciences Po, 2, n°109, pp. 33-57.
- Laurian L., 2008, "Environmental injustice in France", *Journal of Environmental Planning and Management*, vol.51, n°1, janvier, pp. 55-79
- Lolive J. et Soubeyran O. coord., 2007, *L'émergence des cosmopolitiques*, La Découverte, 383 p.
- Lolive J., 2010, « Mobilisations environnementales », in *Ecologies urbaines*, Coutard O. et Lévy J-P. (coord.), Economica, coll. Anthropos, pp.
- Marcotullio, P. and McGranahan, G. eds., 2007, *Scaling urban environmental challenges: from local to global and back*, Earthscan, London, 212 pages.
- Martinez-Alier J., 2002, *The Environmentalism of the Poor*, Edward Elgar, Northampton.

- Mazmanian D. A., Kraft M. E., 1999, *Toward sustainable communities: transition and transformations in environmental policy*, MIT Press, 323 pages.
- Mitchell G., Walker G., 2003, *Environmental Quality and Social Deprivation*, technical report E2-O67/1/TR, The Environment Agency, Bristol, 61 p.
- Préteceille E., 2003, *La division sociale de l'espace francilien. Typologie socioprofessionnelle 1999 et transformations de l'espace résidentiel 1990-1999*, Rapport de recherche, Observatoire Sociologique du Changement, Paris, 146 p.
- Portney Kent E., 2003, *Taking sustainable cities seriously: economic development, the environment, and quality of life in American cities*, MIT Press, 284 pages.
- Puech M., 2010, *Développement durable : un avenir à faire soi-même*, Le pommier, coll. Méléto, 226 pages.
- Pye S., I. Skinner, N. Meyer-Ohlendorf, A. Leipprand, K. Lucas et R. Salmons, 2008, *Addressing the social dimensions of environmental policy - A study on the linkages between environmental and social sustainability in Europe*, European Commission Directorate-General "Employment, Social Affairs and Equal Opportunities, 148 p.
- Riddell R., 2007, *Sustainable urban planning: tipping the balance*, Wiley-Blackwell, 335 pages
- Rizk, 2003, « Le cadre de vie des ménages les plus pauvres », Insee Première n° 926, octobre, 4 p.
- Rawls J., 1971, *A Theory of Justice*, Cambridge, Massachusetts: Belknap Press of Harvard University Press.
- Rosanvallon P., 2008, *La contre-démocratie : la politique à l'âge de la défiance*, Seuil, Paris, 344 p.
- Roseland M., 1997, *Eco-city dimensions: healthy communities, healthy planet*, New Society Publishers, 1997 - 211 pages.
- Roussel I., 2010, « Les inégalités environnementales », *Air Pur* 76 - Inégalités environnementales, inégalités de santé, pp.5-12.
- Rumpala Y., 2010, *Développement durable ou le gouvernement du changement total*, Editions Le Bord de l'eau, collection « Diagnostics », 450 pages.
- Saint-Julien T., François J-C., Mathian H., Ribardièrre A., 2002, *Les disparités de revenus des ménages franciliens en 1999. Approches intercommunales et infracommunales, et évolution des différenciations intercommunales (1990-1999)*, Paris, Direction Régionale de l'Équipement d'Ile-de-France, 108 p.
- Schroeder, R., St Martin, K., Wilson, B., Sen, D., 2008, "Third World environmental justice", *Society and Natural Resources*, 21, pp. 547-555.
- Sen A.K., 2002, "Why health equity?", *Health Economics*, Vol. 11, pp. 659-666.
- Sen A.K., 2009, *The Idea of Justice*, Harvard University Press, 468 p.
- Sen A.K., 1993, "Capability and Well-being", in Martha C. Nussbaum and Amartya K. Sen (eds), *The Quality of Life*, Oxford: Clarendon Press, pp. 30 - 53.
- Schlosberg D., 2004, 'Reconceiving environmental justice: global movements and political theories', *Environmental Politics* 13, pp. 517-540.
- Shirazi R., 2011, 'Sustainability and the Hegemony of Technique. Towards a new approach to cultural sustainability', *Inter-disciplinary.net 10th Global Conference: Environmental Justice and Global Citizenship*, Mansfield College, Oxford, United Kingdom, july, 10 p.
- Stengers I., 1997, *Sciences et pouvoirs. La démocratie face à la technoscience*, Paris, La Découverte, Coll. Sciences Sociétés, 116 p.

- Theys J., 2010, « Les conceptions de l'environnement », in *Ecologies urbaines*, Coutard O. et Lévy J-P. (coord.), Economica, coll. Anthropos, pp. 16-34
- Theys J., 2007, "Pourquoi les préoccupations sociales et environnementales s'ignorent-elles mutuellement. Essai d'interprétation à partir du thème des inégalités écologiques », in P. Cornut, T. Bauler et E. Zaccai (coord.), *Environnement et inégalités sociales*, Editions de l'université de Bruxelles, pp. 24-35
- Tiebout C., 1956, "A pure theory of local expenditures", *Journal of Political Economy*, vol. 64, pp. 416-424.
- UK Environment Agency (2007), *Addressing environmental inequalities: cumulative environmental impacts*, Science report, 81 p.
- Villalba B. et Zaccai E., 2007, « Inégalités écologiques, inégalités sociales : interfaces, interactions, discontinuités », *Revue Développement durable et territoires*, Dossier 9 Inégalités écologiques, inégalités sociales.
<http://developpementdurable.revues.org/document3502.html>.
- Wheeler S. M., Beatley T., 2004, *The sustainable urban development reader*, Routledge, 2004, 348 p.
- Wenz, P.S., 1988, *Environmental Justice*, State University of New York Press, Albany, 217 p.
- World Bank, 2007, *Poverty and the environment: understanding the linkage at the household level*, World Bank, Washington, DC.
- Young I.M., 1990, *Justice and the Politics of Difference*, Princeton University Press, 294 p.



**Sustainable Development - Policy and Urban Development -
Tourism, Life Science, Management and Environment**

Edited by Prof. Chaouki Ghenai

ISBN 978-953-51-0100-0

Hard cover, 478 pages

Publisher InTech

Published online 24, February, 2012

Published in print edition February, 2012

The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

How to reference

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Guillaume Faburel (2012). The Environment as a Factor of Spatial Injustice: A New Challenge for the Sustainable Development of European Regions?, Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, Available from: <http://www.intechopen.com/books/sustainable-development-policy-and-urban-development-tourism-life-science-management-and-environment/the-environment-as-a-factor-of-spatial-injustice-a-new-challenge-for-the-sustainable-development-of->

INTECH
open science | open minds

InTech Europe

University Campus STeP Ri
Slavka Krautzeka 83/A
51000 Rijeka, Croatia
Phone: +385 (51) 770 447
Fax: +385 (51) 686 166
www.intechopen.com

InTech China

Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821