

INTERACTIONS BETWEEN REGIONAL AND SECTORAL ASPECTS OF SUSTAINABILITY

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Regions can show very diverse characteristics in their endowment of natural resources and other particularities, which will inadvertently lead to a territorial sectoral specialisation. Some regions will be more adapted for agricultural activities, others will be better for industry, yet others still will be ideal for services, including tourism. In their quest to transitioning to sustainable development, regions must look at their stock of natural, social and economic capital, and find the best strategy for sustainable development based on comparative and absolute advantages. Regions should not only look at their own assets, though, but identify partners with similar goals or interests, and engage in active collaboration. A 'critical mass' of human, natural and economic capital is needed for regional development, an absence of which all but forbids a successful transition to sustainable development. Furthermore, experiences gathered over decades and centuries of activities should be carefully considered in setting out the paths for sustainability. Presently, an emerging trend is a convergence between regional development and sustainable development. Reflecting on the particularities and the various forms of capital assets of the region, and considering the newest trend, a recommendation on a model of sustainable development is offered for the Island of Crete.

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Sectoral Specialisation of Regions

The sustainable development of the various economic sectors depends greatly on the particularities and natural resources of a region, but also on the absolute and comparative advantages the region can forge from these specificities. This leads to the sectoral specialisation of regions.

Interactions and correlation of regional and sectoral aspects of sustainability are particularly close in the secondary sector, as well as some branches of the tertiary sector of the economy. These observations can be demonstrated by numerous examples.

Focusing more closely on the primary sector, it becomes obvious that development in the various agricultural branches relies heavily on the natural particularities and resources. Soil, topography, climate and water all play a crucial role. Typical examples both include olive production in the

Mediterranean, as well as viticulture in various regions of different countries, such as is the Eger Wine Region.

A large proportion of global olive and olive oil production is concentrated around the Mediterranean. Countries around the Mediterranean Sea possess 98% of the global stock of olive trees, and account for 93% of the global olive oil production (Babanassis et al., 2011, pp. 319-320). The largest producer is Spain, followed by Italy, Greece, Tunisia, Syria and Turkey, all with large volumes of output. Morocco, Portugal, France and Cyprus have a more moderate output. Quite clearly, climatic and other natural particularities give the Mediterranean the absolute advantage in olive production, and absolute monopoly globally, which is reflected in sectoral specialisation. Olive production is a good example of sustainability, as agricultural traditions are passed down the generations, spanning thousands of years, and olive trees can also live for several centuries. A similar phenomenon of sustainability is inherent to numerous historical wine regions.

Consumption of olive oil has a positive influence on health and longevity. Research on the effects of the Mediterranean diet on cardiovascular diseases show a reduction in the incidence of these ailments. This is because olive oil is a good source of antioxidants, and it has anti-thrombotic and anti-inflammatory effects. Other components of the Mediterranean diet include plenty of vegetables, fruits, cereals and legumes, as well as red wine, all of which contribute to the positive effects of olive oil.

Processes contributing to the sustainable development of agriculture:

- Development of biological and environmentally friendly plant and animal products.
- Certification of agricultural products and foods.
- Protection of soils from erosion, preservation of soil fertility through irrigation, flood protection and other soil improving systems.
- Restriction or outright banning of using polluting pesticides.
- Protection of forests, national parks and NATURA areas by fire prevention systems, rational forestry and by other means.
- Rational management of natural resources, i.e. rational use of water reserves with new technologies, significant investments in dams, flood prevention and irrigation systems, restriction of squandering water assets, appropriate price policies, as well as strategies which ensure that water demand adapts to water supply, rather than vice versa.

Mining and the construction industry directly rely on ores and mineral resources. The energy sector faces a strong correlation between regional and sectoral factors. Hydroelectric power plants tend to be close to waterfalls, coal-fuelled thermoelectric plants are generally located close to coal mines. Solar, wind and

geothermal energy production directly depends on the particularities of the region. Numerous examples back this up, both in Greece, Hungary and other countries.

An important aspect of sustainability is the *development of the green energy sector*. Perhaps the most essential tool to ensure a transition to sustainability is the *transition from non-renewable resources to renewables* in the energy sector. Further crucial elements include energy saving and energy efficiency. Regrettably, on a global scale, this transition is only in its beginning stages. Priority must be given to the development of non-polluting or less polluting industries.

According to a May 2011 report by the United Nations, the world's energy balance is as follows: 34.6% petroleum, 28.4% coal, 22.1% natural gas, 12.9% renewables, and 2% nuclear energy. The composition of renewables at the time was 10.2% bioenergy, 2% water, 0.5% wind, 0.1% solar energy, 0.1% geothermal energy, 0.002% tidal and wave energy. A rather pessimistic prognosis in this report forecasts a measly 15% share of renewables in the total energy balance by 2050 (TO VIMA, 2011).

The European Union's strategy for the energy sector is in accord with the requirements of sustainability, insofar as it targets the spread of renewable sources of energy, de-carbonisation of energy production, increasing energy efficiency, reducing energy use and the reducing the emission of greenhouse gases by 20% by 2020.

Greece has favourable environmental conditions for the establishment of a sustainable green energy sector. The annual hours of sunshine are amongst the highest in Europe. It also has good opportunities for better exploiting its wind, water and geothermal assets for energy production. It is predicted that Greece could cover much of its energy needs from these sources. Use of these resources in practice is very limited. In Greece, the proportion of renewables in energy generation is much lower (9.63%) than the European Union average (16.96%). In contrast, lignite plays a more crucial role in energy generation (48%), followed by natural gas (17.8%) and petroleum (8.7%). Renewable sources of energy are dominated by wind power at 78%, followed by hydroelectric generation at 12%, solar energy at 7.4% and bioenergy at 2.7% (Babanassis et al., 2011, pp. 205–206).

An increased rate of development has been observed during the past years.

It is anticipated that Project Helios will contribute greatly to the development of the Greek green energy sector. This project is a Helleno-German cooperation, which targets the power output of 10 000 MW, which is approximately equal to the current energy generation potential of Greece. Solar panels covering an area of some 20 000 hectares would provide the energy for this project. According to plans, Greece would have a 70% stake in this project.

Sectoral development in the manufacturing industry does not depend solely on the natural particularities of the regions, but on a host of other factors too, such as production optimum, returns to scale, transportation infrastructure, proximity of markets, etc. There are avenues for development in the manufacturing industry too. Decarbonisation and similar measures can reduce industrial pollution. Priority must be granted to non-polluting or less polluting sectoral development. Potential for the creation of new industries exists in the sector of renewable energy sources, in processing waste and other pollutants, in recycling, but also in biological purifiers. A reduction in the use of natural resources may be achieved by the miniaturisation of products and the further development of smart technologies.

Branches of the *tertiary sector* of the economy face a strong interaction between regional and sectoral specificities, particularly in tourism and logistics. A large fraction of global tourism is concentrated in countries and with desirable marine beaches, favourable climate and a rich cultural heritage. Much of global trade is carried out via sea transportation. Also these claims can be demonstrated with several examples.

The Mediterranean is the largest centre of tourism. In 2007, 240 million tourists, some 26.6% of tourists from all over the world chose this region as their destination, generating a revenue that amounted to a 24.6% share of the global total (Szeimenisz & Szeitisz, 2011, p. 4, 48). According to prognoses, the Mediterranean is set to preserve its leading position in global tourism. This advantage can be traced to four favourable factors: expansive and beautiful beaches, countless islands, a favourable, warm and sunny climate, and a rich cultural heritage that spans from the antiquity through the middle ages to contemporary traditions and artifacts.

Some 4/5ths of global trade is carried out via naval transportation. The Mediterranean plays a key role in shipping as well, since it is wedged between Europe, Asia and Africa, and it connects to three oceans and seas: the Atlantic Ocean towards Gibraltar, the Indian Ocean through the Suez Canal, and the Black Sea through the Bosphorus and the Dardanelles. Typically 3 000 vessels fare the Mediterranean Sea every day, carrying passengers, petroleum, natural gas and other goods, covering roughly 65% of Europe's energy demand. Greece has assumed a leading role in marine transportation, as 18% of the world's naval fleet is in Greek ownership. It can be anticipated that the Mediterranean Region's role in shipping will gain strength as international trade grows, as energy demand increases, and as new sources of petroleum and natural gas must be tapped to satisfy demand. Part of the satisfaction of demand will be by networks of pipelines, which will also go via the Mediterranean.

The future of the Mediterranean Region largely depends on the protection of the marine environment. Shipping, tourism, industrial waste and other factors may cause a catastrophic situation. Academic Paulos Sakellaridis and other

futurologists are talking about the “impending death of the Mediterranean”. Italy’s former environment minister, Alfonso Epecoraro Scanio said: “A state of emergency should be declared over the whole of the Mediterranean. If this does not happen, it will be threatened to become like the Black Sea, which shows no sign of life at a depth of just 150 metres” (TA NEA, 2007).

As a continuation, a few measures are mentioned, which are aimed at quelling the sources of pollution and protecting the Mediterranean environment.

- Removal of polluting industrial, agricultural and other activities from the Mediterranean coast.
- Reduction and termination of the pollution caused by fluid pollutants arriving from the 75 tributary rivers and the Black Sea, flowing into the Mediterranean.
- Banning dumping waste from vessels into the Mediterranean
- Biological cleaning, recycling and incineration of wastes and pollutants from settlements and hotels on the coast of the Mediterranean.
- A more rational exploitation of the Mediterranean for tourism and other polluting industries.
- Alleviation of the exponentially growing demographic pressure on the Mediterranean Sea.

The services-based tertiary sector of the economy contains more and less polluting branches. Information technology, modern telecommunication systems and other similar technologies pertain to a less polluting branch. The accumulation of electronic waste and an increased use of mobile telephones may pose a threat to public health. Some traditional activities, like banking, are also less polluting. Generally, a large proportion of other services will cause severe pollution, and their sustainability may only be secured through drastic measures. Transportation by private vehicles and by commercial vehicles is one of the greatest sources of air and noise pollution, but it also pollutes in other ways. Solutions to these problems may come in the form of pollution fines and taxes, the use of incentives and motivations, the use of less polluting vehicles and the development of the public transportation infrastructure.

Some thoughts about the new regional sustainable development models

Regional development models are based on the cohesion between long-term strategic goals of complex development and the tools in achieving this. They include not only economic development, but also the development of education, culture and technology, the protection of the environment, the improvement of the quality of life.

Several *regionally specialised development models* exist across the world: agrarian regions, industrial regions, touristic regions and complex development regions can all be named. According to Imre Lengyel: “[...] Regions were typified based on two dimensions, population density and GDP growth, into the following categories: cosmopolitan regions, special urban regions, dynamic regions, balanced regions, recreational regions, rural regions. Based on the results of research conducted using econometric methodologies, NUTS2-level EU regions were placed in four categories, which take part in the international competition based on different advantages (Fenyővári & Lukovics, 2008, Figure 4.12.):

- *Non-productive regions*
- *Regions as production sites*
- *Regions as sources of increasing returns*
- *Regions as hubs of knowledge [...]”* (Lengyel, 2011, pp. 178-179)

Several criteria must be taken into consideration when designing new development models:

- The first criterion consists of the *production factors of the region*, which play a crucial role in establishing their specialisation. Traditional production factors of sustainable development are connected to the given region, to space, and to location: production factors (soil, water, etc.), human resources and economic activity. Management of these resources occurs on regional and local level. Capital and new, dynamic factors of production, such as knowledge, new technologies, information and management are more mobile, unfixed factors. This category includes such new sources of sustainable development such as silicon, optical fibres, radio magnetic waves and knowledge. Silicon is a fundamental material for microelectronic equipment. Optical fibres are essential to modern telecommunication. Radio magnetic waves are used for communication habitually. These three development resources are to be found in nature in plentiful quantities, and they do not pose a danger to the environment. Human knowledge is a key production factor of a knowledge-based economy. This special resource expands rapidly, and the volume of human knowledge doubles in roughly 5-10 years.
- Positive and negative experiences with old regional models, and the valuable experiences that can be deduced from them, are the second factor that need to be considered. The first experience is that nature and the carrying capacity of the region must be respected. Primarily this refers to natural resources. Irresponsible soil management, overuse of fertilisers and the extensive cutting down of forest destroys soil fertility and increases erosion. Water management must

consider the scarcity of available water resources. Therefore, a new water management strategy must be adopted, in which water demand adjusts to water supply, and not vice versa.

- Another experience is that *regional development based on monocultures needs to be avoided*. Neither agricultural nor industrial development ought to be based on a single product, as this cannot secure a persistent dynamic development. If demand for the product sags on the domestic or international markets, price revenues drop, and so does production, employment and the quality of life. Therefore, focus must be directed at the *creation of complex regional development models*. Securing a *critical mass* of human, natural and economic capital, *essential for regional development, is crucial*. This is particularly of great importance on the local level and in the case of smaller region. The critical mass of the inhabitants of the region or locality, with all their needs and demands, form the basis of the optimal regional level development of schools, hospitals, transportation and other infrastructural areas.
- The third factor relates to the *new trends in regional development*. The most prominent new tendency is the *coupling of sustainability and regional development*. Factors of sustainable development are linked to fixed locations: soil, sources of water and other natural resources, the climate, human resources and economic activities. Management and exploitation of territory and resources is carried out on a regional or local level. The new trend is a *transition from models organised along a top-down approach to regional development models based on local collaboration*. This means an increase in the importance of the role played by regional and local governments, corporations and other institutions in the planning process, development, financing and execution of regional development strategies. Another current tendency is the *increase in the role of competitiveness in regional development*. As a consequence of international integration and globalisation, competition thrives between nations, but also between nations. Previously, the main goal of regional development was the reduction of differences in development between regions. In our age, regional competitiveness has come to the forefront. An important new trend is the preservation and reinforcement of territorial cohesion. The European Union's strategic documents point at these goals as essential.
- In conclusion, we must also consider the *new avenues of regional development strategies*. According to István Bartha, we can identify several strategies, as a consequence of "regional development strategies [... are] interrelations and combinations of goals (and

means) in space and in time”. We can identify strategies based on the theory of poles of growth, strategies based on setting various goals simultaneously, and spatial development strategies based on the activation of local resources found in the region. A more novel version of this strategy is usually referred to as innovation oriented spatial development strategy, one that “aims to achieve its goals by relying on the intensified exploitation of local resources through innovation” (Bartke, 2009, pp. 146-147)

A dynamic regional development strategy that has been gaining space in our present age is based on knowledge, on new technologies and on innovation. This is in concord with the new knowledge-based economy and information society that has been developing in recent years. This strategy aims at creating knowledge centre regions, knowledge creating regions and knowledge using regions¹. Knowledge-based development may contribute to the creation and widespread implementation of new regional, national and international models of sustainable development.

Preservation of *spatial cohesion* depends on the moderation of the inter-regional differences in development and quality of life, and on the improved access to healthcare, education, transportation, telecommunications and other services in every region. Special sustainable development models ought to be created and implemented in some underdeveloped regions. Such regions are typical across Europe, and they include the several hundred Greek islands and mountainous territories, as well as the rural homesteads across Hungary.

Adopted in Rio de Janeiro, Agenda 21 incorporates the local programme, fundamental principles and key indicators of sustainable development. Local and regional sustainable development programmes are in place in several countries, with greater or smaller success^{2,9}.

I would like to mention the example of the development model of the Island of Crete. The Foundation for Mediterranean Studies has organised a scientific conference on Crete in early 2011, on “Sustainable Regional Development Models, the Example of Crete”. A presentation was delivered at this conference by Professor János Szilávik and György Horváth, entitled “The Local and Micro-Regional Level of Sustainable Development”. The aim of this conference was to contribute to creating a model of sustainable development for the island of Crete. The obvious starting point was to look at the particularities of Crete. With an area of 8 336 km² and a population of 606 274 (in 2008), 59% of the population dwells in cities, while the remaining 41% lives in rural areas. It is blessed with an expansive shoreline, a pleasant climate with plenty of sunshine. Its

¹ See more detail in Lengyel, 2011, pp. 179-186.

² See more detail in Valirakis & Babanassis, 2012, pp. 85-116., 243-262.; Lengyel, 2011, pp. 79-80., 221-222., 234-235., 283-284., 343-364.

infrastructure includes two airports and several sea ports. Two universities, a university college and several educational and cultural institutions can be found here. Crete is in a favourable geostrategic location in the middle of the Mediterranean, wedged between three continents: Europe, Asia and Africa. Its development is at medium level, with an annual per-capita GDP of 18 260 euro (in 2008), a figure reaching 90% of the average of Greece, and a proportion of 85% of the European Union (EU-27) average. Crete ranks in fourth position among Greece's 13 regions in terms of GDP, contributing with some 4.9% to the country's Gross Domestic Product. However, as of 2010, Crete only assumes a rank of 245 from 271 EU regions, based on complex development indicators. This complex indicator encompasses economic performance, technology, investment, infrastructure, education, healthcare and employment aspects, a weighted average of 12 indicators. Based on this international competitiveness indicator, Crete scores a measly 21% of the Utrecht Region in the Netherlands (taken to be 100% for reference). 80% of Crete's GDP is generated in the tertiary sector, particularly from tourism, 10% from the primary sector, and 5% from the secondary sector (Greek counties, 2009, p. 64.; Valirakis & Babanassis, 2012, pp. 49-54).

These particularities and specificities and other factors have urged conference participants to recommend a sustainable development model for Crete that unites the benefits of two strategies:

The first strategy is a traditional development strategy that is based on local factors of production and comparative advantages: agriculture, livestock raising, fishing, tourism, sea trade and culture must be developed in harmony and maintaining proportionality, whilst avoiding a "monocultural" development based solely on tourism and most certainly causing a destruction of the carrying capacity of the environment. A production and consumption basket must be established for Crete, which is to include its best and most unique plant and animal products, as well as touristic and cultural services.

The second strategy is a new dynamic development strategy, based on knowledge, research, emerging technologies and innovation, by establishing new and dynamic comparative advantages, through the collaboration of the University of Crete, the Technical University of Crete, the Technological Educational Institute of Crete, the Mediterranean Agronomic Institute of Chania and other scientific and cultural institutions.

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