Competitiveness of Polish regions and eco-development

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Introduction

In economic theory, competitiveness is taken to refer to a variety of entities pursuing an economic activity. Hence, it also concerns regions. A competitive region is one that can work out a surplus of profits over the costs of its activity. Naturally, the higher the surplus, the more competitive the region.

Today, one of the most preferable ways of improving competitiveness is the application of rules of eco-development, or sustainable development, in the economy. The aim of this paper is to discuss the relationship between the competitiveness of Polish regions and their ability to achieve environmentally sustainable development.

Since the mid-1960s there has been a growing awareness of the fact that the existence of the present and future generations has been threatened by the overexploitation of the natural environment and its degradation. As a result, after the Rio de Janeiro Earth Summit in 1992, the international community has accepted a new conception of socio-economic development called sustainable development. Today it has become a binding norm in legal regulations and planning documents of many countries (cf. e.g. the Polish Constitution, article 5).

1. Sustainable development as a new paradigm

The huge academic output concerning sustainable development (SD) as well as the encouraging practical effects it has brought in some countries make it safe to state that SD has become a new paradigm for modern societies to follow in their development. So far, however, no way to make this conception operational has been worked out (cf. Fig. 1).

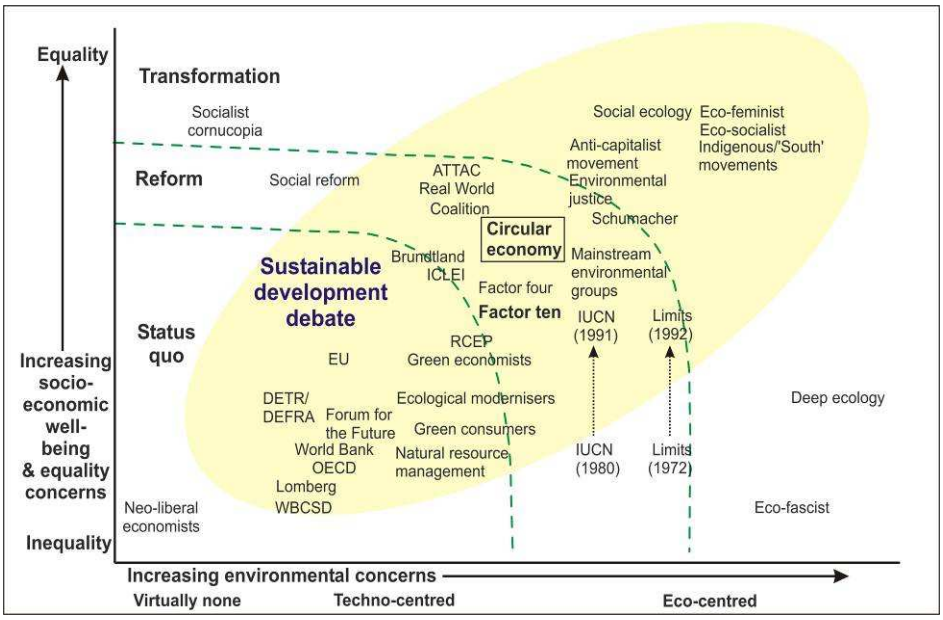

Fig. 1. Mapping of views on sustainable development
Source: Hopwood et al. 2005 modified

Fig. 1. is highly suggestive. It clearly confirms that a neoliberal economy generates socio-economic inequalities observable at the global scale. The tendency, on the one hand, to equalise those discrepancies and on the other to accommodate environmental values in production costs requires a reform of the production system, and more broadly, socio-economic reforms.

From the point of view of this paper, of special significance are the conceptions of sustainable development known as Factor 4, Factor 10, and the circular economy.

The Factor 4 conception was introduced into the literature by Weizsäcker et al. (1996) in their New Report of the Club of Rome. In general terms, it means a fourfold increase in the productivity of resources. In other words, the production process should generate four times more wealth from a resource unit. This can only be accomplished via technological progress. With reference to advanced economies, the requirements are even higher - they should achieve a factor of 10.

Another conception of sustainable development is that of a circular economy. Some of its characteristics will be presented in the next chapter of the paper.

One of the difficulties involved in SD concretisation is the multi-dimensionality of sustainability. Valentin and Spangenberg (2000) and Spangenberg (2004) have worked out a prism of sustainability, which is a systems approach to this problem. The dimensions they propose are linked to imperatives, which only define the themes of sustainable development (see Fig. 2).

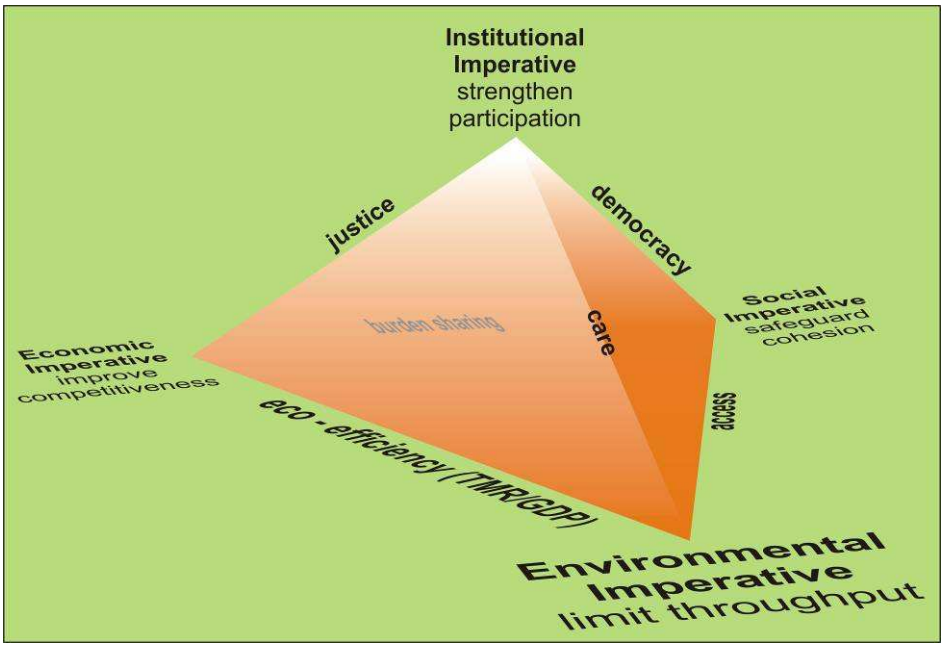

Fig. 2. Prism of sustainability: dimensions, interlinkages, imperatives.
Source: Spangenberg (2000: 382).

Two imperatives of sustainability are addressed here, viz. environmental and economic, because the competitiveness of regions is discussed in terms of a balanced use of the environment. The relationship between the economy and the environment is aptly described by the notion of eco-efficiency - environmental performance related to economic performance (Pinter 2006). A recognised measure of eco-efficiency is the Total Material Requirement (TMR), which comprises the cumulative volume of primary materials extracted from nature for the economic activity of a country (Bringezu, Schütz 2001).

In this paper, emphasis is placed on two aspects of sustainable development:

(1) ecological, or a reduction of human impact through the ecologisation of economic processes and the implementation of integrated systems of environmental protection, and

(2) civilisational, or a search for and implementation of new forms of economic development, new technologies, new forms of energy and social communication, and new forms of man's non-economic activity.

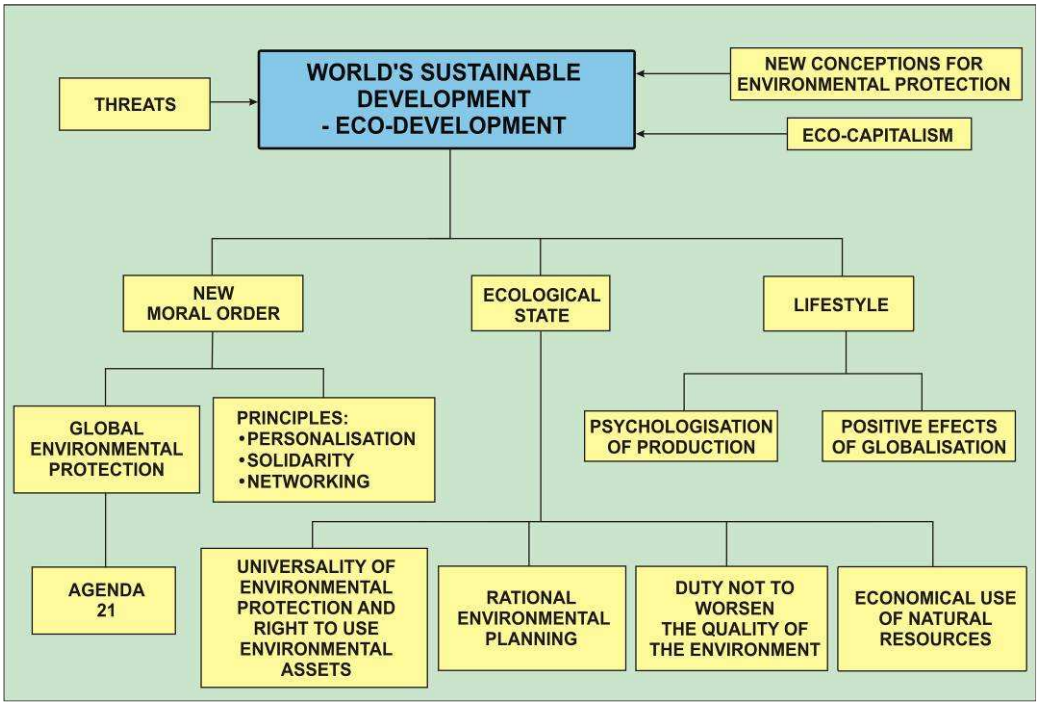

Fig. 3. Conceptual model of sustainable development
Source: Own compilation

A conceptualisation of sustainable development in a global approach is presented in Figs 3, 4 and 5.

A balanced development of the world depends on:

(1) the existing threats, such as:

- climate change,
- depletion of world's most important resources,
- an accelerated rate of species extinction - a decline in biodiversity,
- a fast rate of population growth, differing from region to region,
- ever-wider disparities between rich and poor - a conflict between civilisation of consumption and civilisation of poverty, and
- mounting terrorism driven by religious, nationalistic and racial motives

(2) new conceptions for environmental protection, and

(3) principles of eco-capitalism.

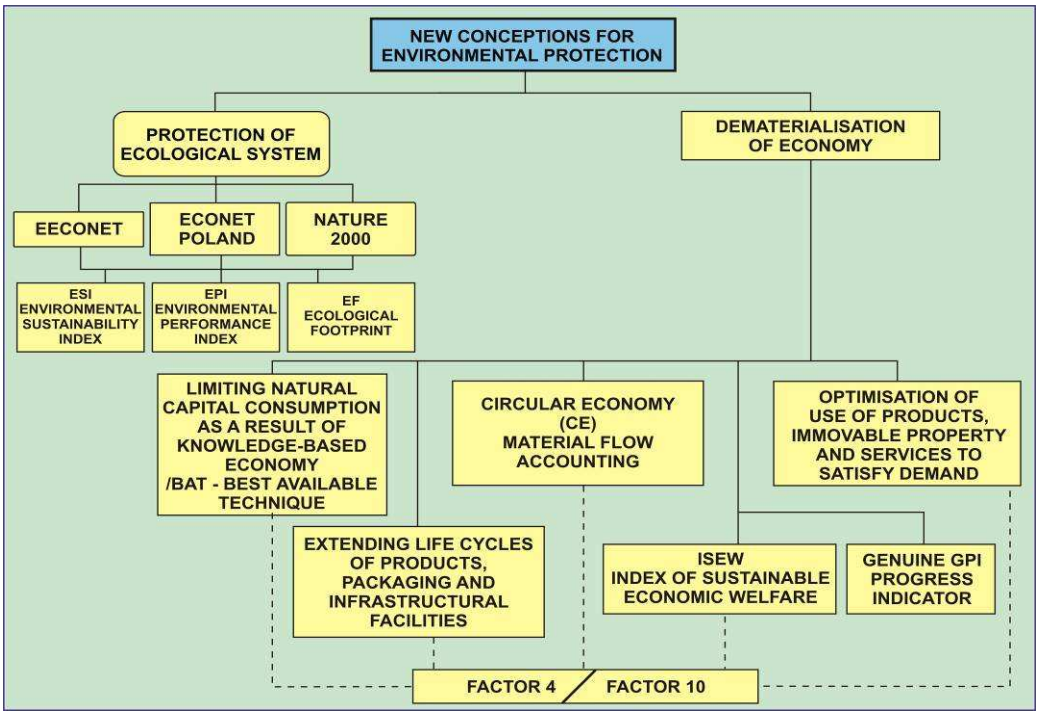

Fig. 4. Structure of a new approach to environmental protection
Source: Own compilation

By incorporating this model into its economic policy, each country or region improves its competitiveness (this thesis will be supported later on in the paper). Clearly enough, the implementation of the principles of sustainable development calls for both, new technological as well as organisational and institutional solutions. Hence, it depends, on the one hand, on the development of scientific research and an increase in the educational level of society, and on the other hand, on its organisation.

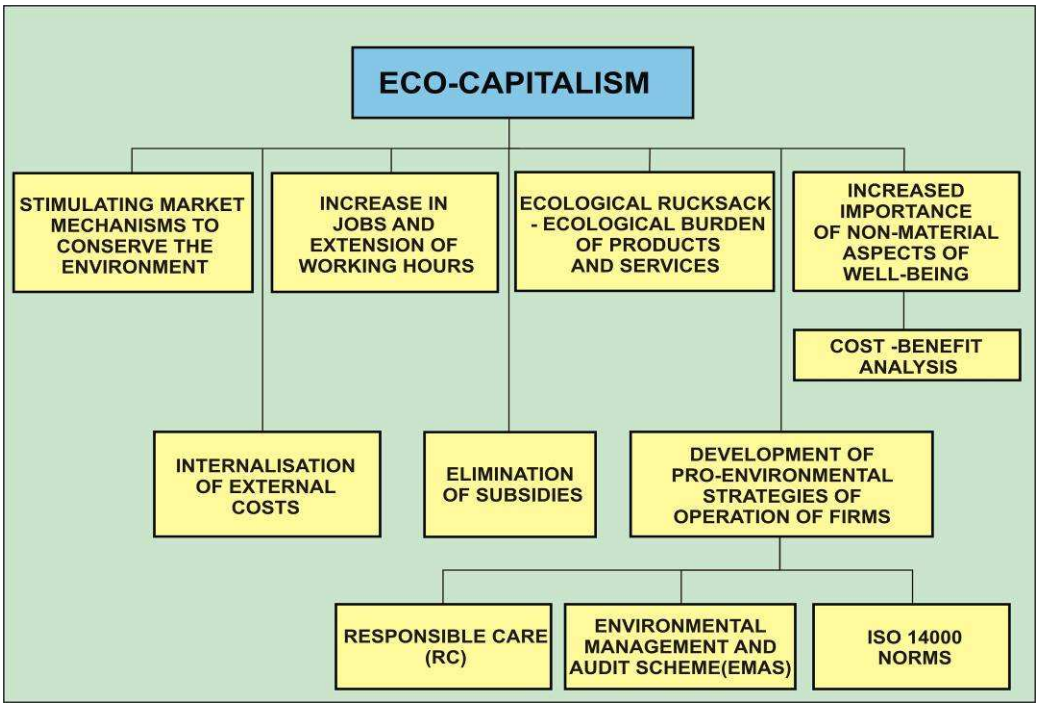

Fig. 5. Principal features of eco-capitalism
Source: Own compilation

2. Principles of the circular economy

One of the conceptually best developed economic theories fully compatible with sustainable development is that of a circular economy (CE) formulated by Pearce and Turner (1990). It is a model of economic development which aims at environmental protection, pollution prevention, and sustainable development through conservation of resources, reusing, and recycling in order to minimise pollution from the source and reduce overall waste per unit output. Each authority - national, regional or local - should be aware of the following points:

• The reuse and recycling of resources and waste promotes an efficient use of the existing resources.

• Protection of the environment and prevention of pollution are the foremost aims in developing a circular economy.

• A circular economy transforms the traditional patterns of economic growth and is not merely targeted at waste disposal; it also involves a transformation of the industrial organisation and allocation, urban infrastructure, environmental protection, technological standards, etc.

• Establishing a new economic development pattern means either an upgrading or replacing the existing production pattern. The circular economy model can ensure the benefits of environmental protection without compromising rapid economic growth. However, it may reduce the economic growth rate as measured by the traditional GDP (Luolin, Bilitewski 2005).

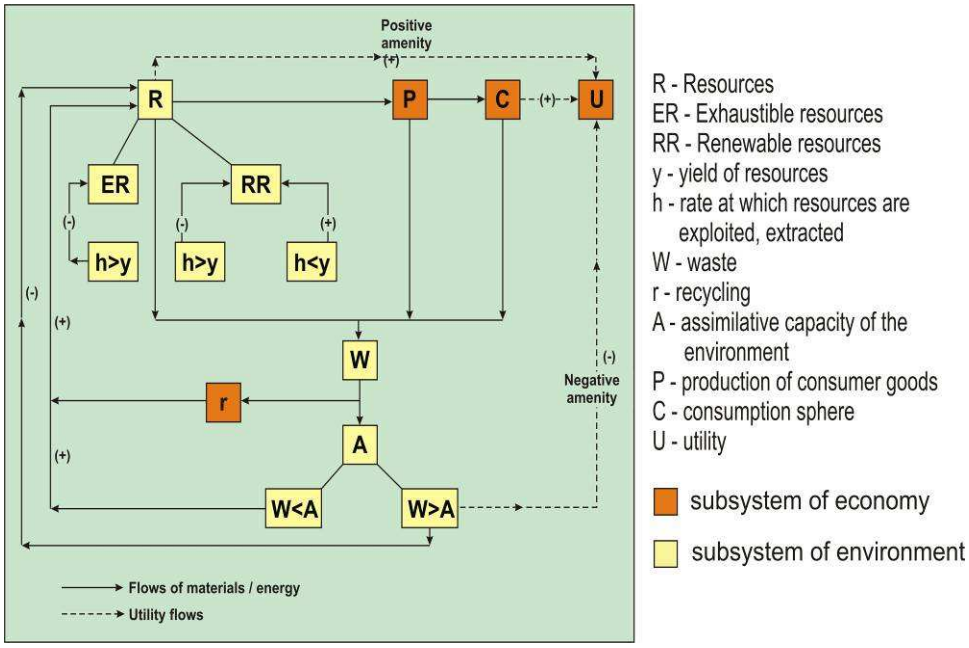

Fig. 6. Model of a circular economy
Source: Pearce D.W., Turner R.K., 1990

The concept of the circular economy is directly connected with that of Material Flow Analysis (MFA), and in consequence with the Total Material Requirement (TMR). It is easy to see that interactions between the subsystem of the economy and that of the natural environment can have a positive and a negative character. The main aim of the CE is to reduce the negative relationships as much as possible. For example, if the inequality W < A (see Fig. 6) is very great, the detrimental impact of W on the environment may be substantially reduced. On the other hand, it is even more important to keep renewable

resources at a high capacity level. This problem is closely connected with the production of renewable energy.

Therefore, there are two principal rules of the CE:

1. Always use renewable resources in such a way that the rate of use is not greater than the natural regeneration rate: $h < y$.

2. Always keep waste flows to the environment at or below the assimilative capacity of the environment: $W < A$.

3. Competitiveness and sustainability

In the modern world, one of the crucial features of any developing countries is its competitiveness. In this presentation, the competitiveness of countries, regions or any other spatial unit is understood as their ability to achieve success in economic competition through the process of adaptation to the changing economic, social and environmental conditions.

There is no doubt that the adoption of SD principles improves competitive ability, that is, an ability of regions or other units to mould their economic structure in such a way as to ensure them lasting, efficient growth as expressed by a high level of national income. In other words, a society following SD rules is a competitive society. Those mutual relationships are presented in a suggestive manner in Fig. 7.

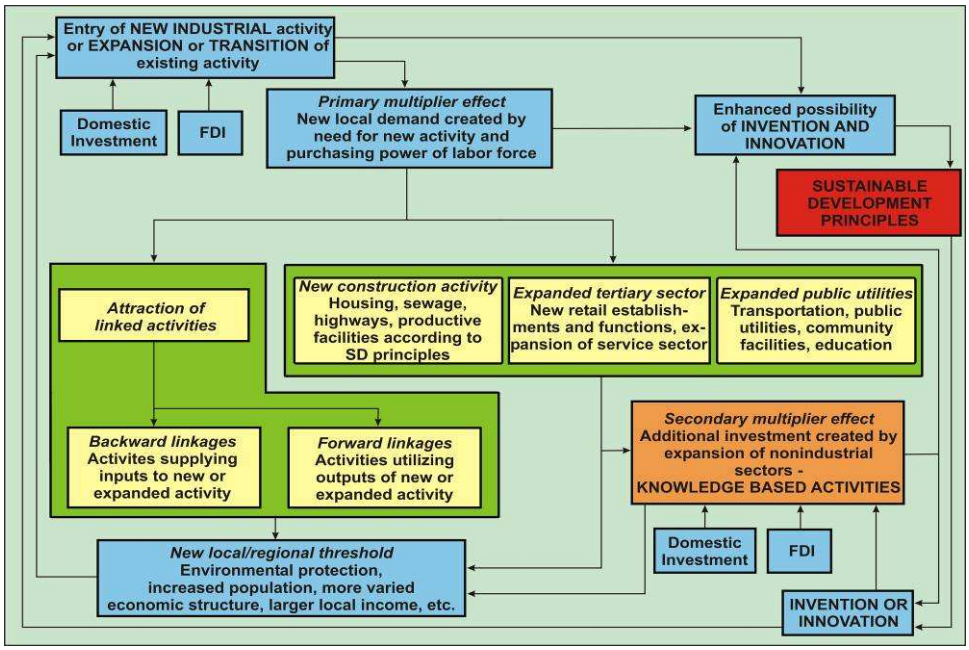

Fig. 7. Circular cumulative proces of growth and sustainable development
Source: Based on Lloyd P.E., Dicken P., 1972

It is obvious that the implementation of an innovative technological or organisational solution resting on sustainable development principles creates an opportunity of crossing a local or regional threshold - for example, energy deficiency.

The interdependence between the competitiveness of an economy and its ability to achieve environmentally sustainable development has been studied since 2001 by the Yale Center for Environmental Law and Policy and other organisations co-operating with it. The measures they employ are an Environmental Sustainability Index (ESI) and a Global Competitiveness Index (GCI) worked out by the World Economic Forum.

Fig. 8 presents the 2005 GCI and ESI values for 106 countries. Red denotes the EU states, green the G8 group, blue the G77 states, and black the remaining countries. The economies with the highest GCI and ESI figures are in the upper right quarter, while those with the lowest indices, in the lower left quarter.

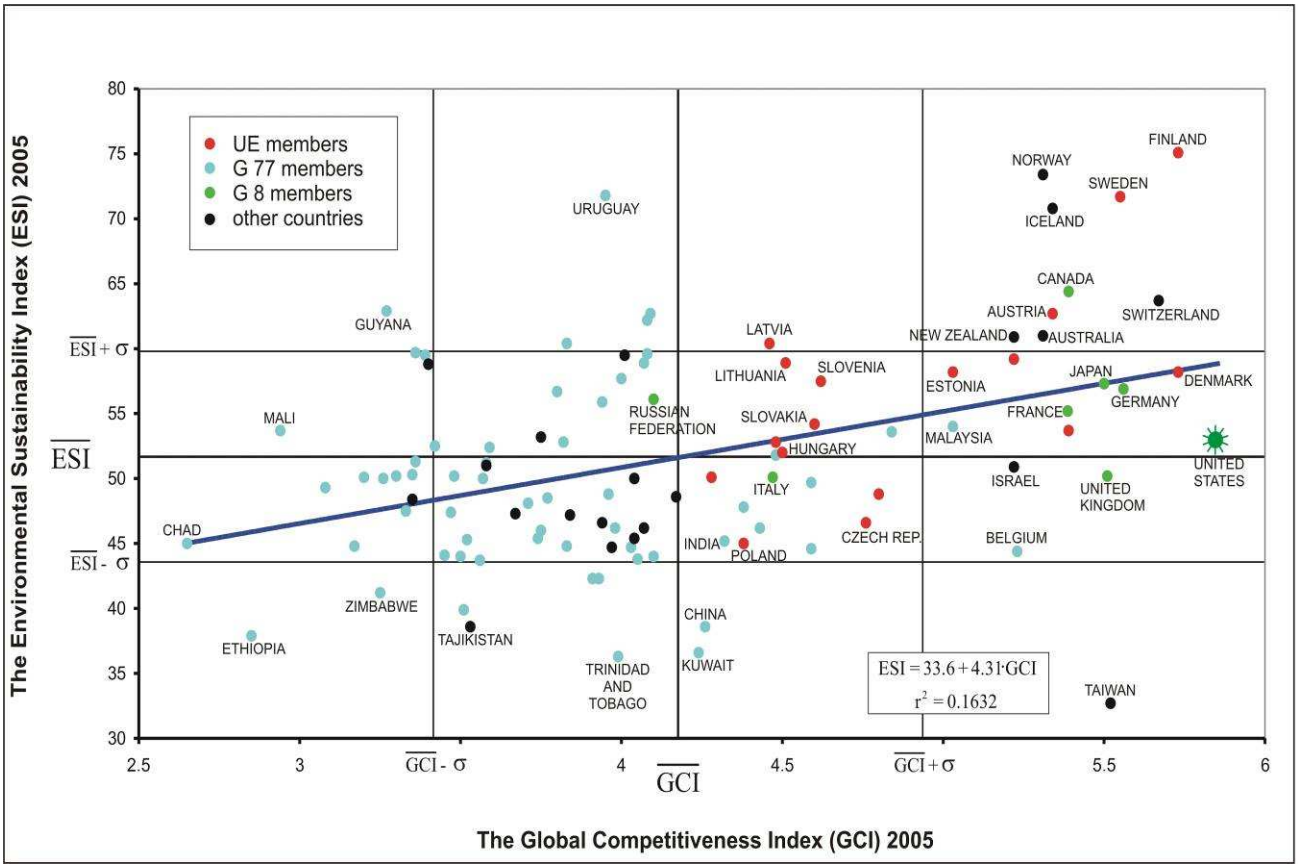

Fig. 8. Relationship between the GCI and ESI – a global view
Source: Own compilation

The highest-ranking countries of the world in terms of both indices include Finland, Sweden, Norway, Switzerland, Denmark, Austria, etc. Worth noting is the position of the USA, the most competitive economy in the world, but only near the mean-value line on the ESI diagram. In terms of competitiveness, the US economy is closely followed by those of Finland, Sweden, Switzerland, Germany, and Canada. On this basis one can formulate two general observations:

(1) an economy can achieve a high level of competitiveness without burdening its environment excessively, and

(2) sustainable development provides a basis for an economy to achieve the position of one that is the most competitive.

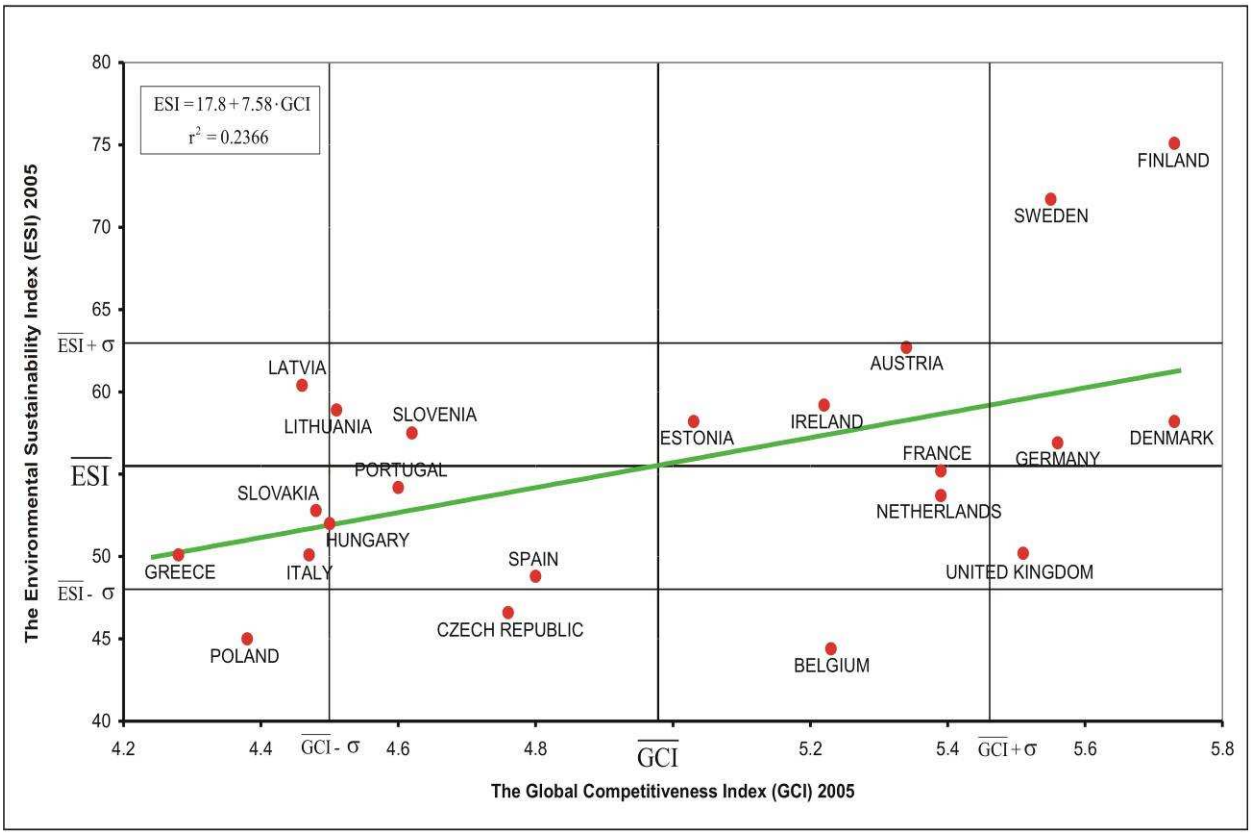

Fig. 9. Relationship between the GCI and ESI – a European Union view
Source: Own compilation

Fig. 9 presents the distribution of 22 EU states in the GCI/ ESI system. Naturally, the undisputed leader here is Finland. The country ranked the lowest in terms of the ESI is Poland, and in terms of the GCI, Greece.

The GCI mean-value line clearly divides the EU states into two groups: those with the most competitive economies, and these are the 'old' EU countries plus Estonia, and those showing poor competitiveness. This group mostly comprises the 'young' EU members, but one can also see Italy in this category.

In turn, the mean ESI value allows the identification of a group of economies with the highest level of environmental sustainability. Apart from Austria and Slovenia, these are countries lying in the north of Europe.

4. Sustainable development and competitiveness of Polish regions

To characterise the relationship between the competitiveness of Polish regions and their ability to achieve environmentally sustainable development, regional GCI and ESI indices were constructed by induction. To this end, use was made of Principal Components Analysis (Maćkiewicz, Ratajczak 1993).

To build the RCI, 79 variables were employed which characterised Institutions, Infrastructure, Macroeconomy, Health and primary education, Higher education and training, Market efficiency, Technological readiness, Business sophistication, and Innovation. The RESI, in turn, was determined using 81 variables in a Pressure-State-Response system. The environmental pressure indicators characterise the operation of societies leading to depletion of environmental resources and a deterioration in its quality. Indicators of the state of the

environment describe the quality of the environment and its resources. Response indicators refer to measures intended to ameliorate or neutralise the effects of the human impact on the environment (Borys 1999).

At the present stage of investigation, both indices are treated as tentative and are described as a Pilot Regional Competitiveness Index (P-RCI) and a Pilot Regional Environmental Sustainability Index (P-RESI). Therefore the results presented here cannot be treated as definitive statements about precise levels of competitiveness and environmental sustainability of the regions under study.

Table 1. P-RESI and P-RCI scores for Polish regions, 2005

REGION	Pilot-RESI	Pilot-RCI
Kujawy-Pomerania	44.9	15.6
Lower Silesia	37.6	26.1
Lublin	38.2	9.9
Lubuska Land	73.1	0.2
Łódź	54.2	18.2
Małopolska	30.2	25.8
Mazovia	36,9	100,0
Opole	41.6	0.0
Podkarpacie	56.9	14.7
Podlasie	79.8	5.7
Pomerania	41.1	16.0
Silesia	68.4	43.7
Swiętokrzyska Land	57.9	1.4
Warmia-Mazuria	88.1	2.2
West Pomerania	0.0	7.3
Wielkopolska	59.9	50.1

Source: Own calculation

The results listed in Table 1 show Mazovia to be unquestionably the most competitive region in Poland. A less competitive one is Opole, but it has to be added that the P-RCI = 0 for this region does not mean that it is not competitive at all. The P-RCI = 0 is only an effect of the normalisation procedure. Taking into consideration the P-RESI scores, Warmia-Mazuria can be seen to be the leader in the level of environmentally sustainable development, while West Pomerania shows the worst P-RESI figure.

Fig. 10 presents a two-dimensional classification of the Polish regions by the Pilot-RESI and Pilot-RCI criteria. There is a similarity between the two classifications: in as many as five cases the regions belong to the same class. This means that in five cases there is full consistency between the competitiveness of a region and its ability to achieve environmentally sustainable development. This is confirmed by the PRW metric (Palka et al. 2001), which equals:

$$PRW = |V_1| + |V_2| - 2V^{(1,2)}$$

where V_1 is the number of objects classed by RESI, V_2 is the number of objects classed by RCI, and $V^{(1,2)}$ is the number of objects grouped into the same class in both procedures. Since the maximum PRW value in the case of a total mismatch equals 32, the classifications of regions by RESI and RCI are 31% consistent.

Fig. 10 also shows that in six cases there is a shift in classification consistency by one class only (e.g., 2, 3 - Małopolska). If this 'near' consistency were taken into account, then PRW = 14, which means that the coincidence of the two classifications would equal 61%.

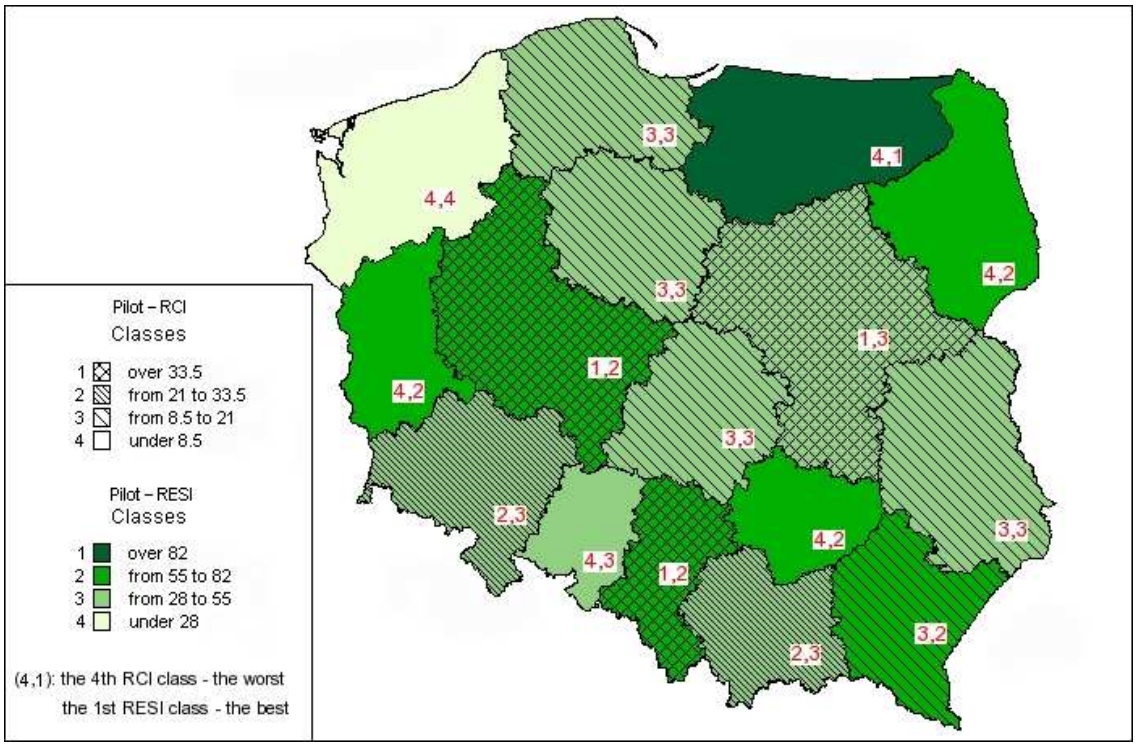

Fig. 10. Classification of Polish regions on the basis of RCI and RESI
Source: own construction

Fig. 11 presents a distribution of P-RESI values calculated for subregional units - poviats. This picture is more precise than Fig. 10 and offers a better explanation of the P-RESI distribution observed at the higher, i.e. regional, level. For example, on the basis of Fig. 11 it is easy to confirm that Warmia-Mazuria is a region with the greatest ability to achieve environmentally sustainable development.

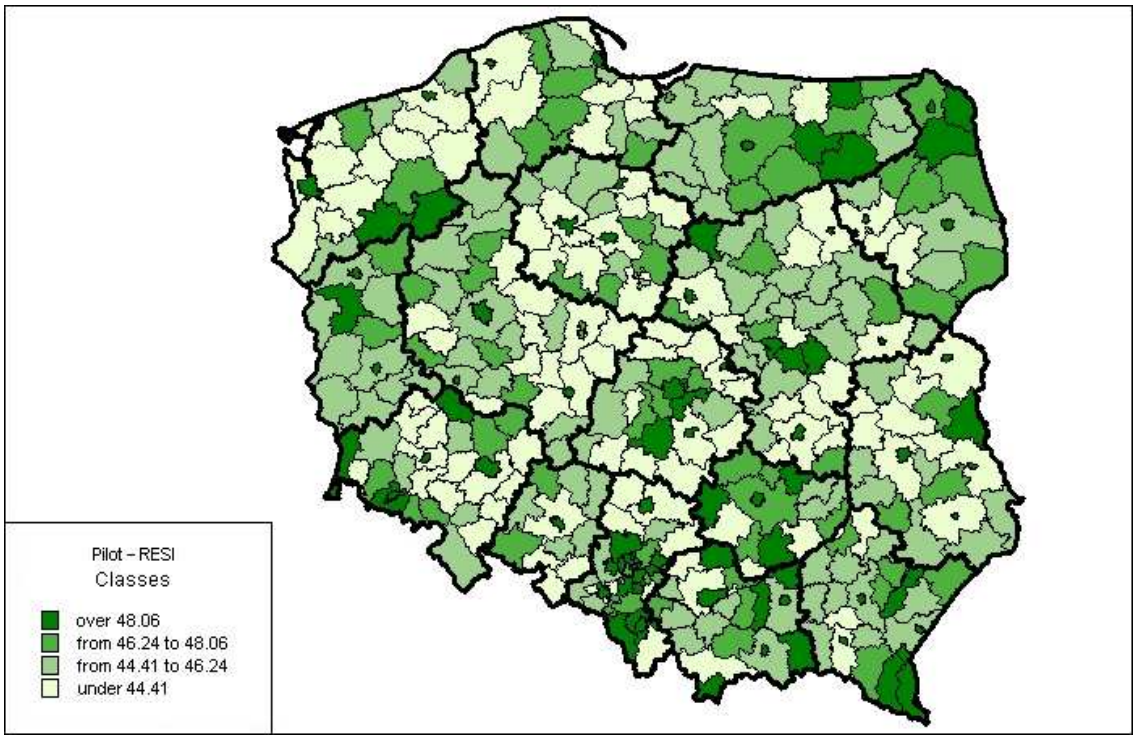

Fig. 11. Subregions – poviats characterised by P-RESI
Source: own construction

5. Conclusions

On the basis of the research results presented in this paper, it is possible to formulate the following final conclusions:

1. The introduction of the sustainable development conception into the economic planning of many countries and regions has caused an increase in the competitiveness of their economies. Today SD is treated as a new economic paradigm.

2. The modern understanding of the competitiveness of regions is broader than the classical one. This is again due to the ever wider introduction of the conception of sustainable development into the economic policies of individual countries. A state, a region or a sub-region will not develop or maintain a highly advanced, competitive economy if it is not going to pursue the principles of sustainability, that is, of eco-capitalism.

3. Empirical studies of this issue in a global or continental perspective have confirmed the interdependence between the competitiveness of an economy and its ability to achieve environmentally sustainable development.

4. The Polish regions are at a stage where they strive to transform their economies to meet the rules of sustainable development. Still, even today it is possible to note that the most competitive regions, viz. Mazovia, Silesia, Wielkopolska and Lower Silesia, show a tendency to apply SD principles in full.

5. The research has confirmed the need for a further improvement of the mathematical structure of both the ESI and GCI, so as to make them reflect in full the interdependences at the regional and - in the future - the local level.

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