



Stanisław CZAJA

INTERPRETATION OF ECONOMIC AND ENVIRONMENTAL BARRIERS IN POLISH ECONOMIC AND ECOLOGICAL THOUGHT

Stanisław Czaja, Prof. – *Wrocław University of Economics*

Correspondence address:
Institute of Economics
Komandorska street 118/120
Wrocław, 53-345, Poland
email: stanislawczaja57@gmail.com

ABSTRACT: The economic and environmental barriers belong to the important problems of present economic sciences, especially the sustainable development economy. In the article author introduced the ways of understanding of the economic and environmental barrier in the Polish literature. He also talked over the chosen conceptions of the environmental barrier, introduced by some explorers and level of investigations over this type limits in Poland.

KEY WORDS: economic barriers, ecological barriers, the sustainable development economics

Introduction

Economic and environmental barriers are among the most interesting but also most important problems of modern economics and the economics of sustainable development. Their significance stems from at least two important reasons. Firstly, recognition of barriers allows understanding of the threats they pose to the desirable transformations (processes) in the mega system of economy, society and natural environment, and thereby creates conditions for limiting undesirable modifications of these processes. Secondly, identification of the barriers and the factors determining them creates a good situation for avoiding them, either by means of eliminating the reasons or through reducing the effects. This is especially desirable within the economics and strategy of sustainable development.¹

The objective of this study is to characterise and evaluate the main ways of understanding economic and environmental (ecological) barriers in economics and the economics of sustainable development. This is a vast research area, therefore the author limited himself to one issue. The research hypothesis is in the form of a question, 'Does the Polish economic and ecological thought employ unified interpretations of the notion of economic and environmental barriers?' The research has a character of an analysis of the achievements of the economic thought (*desk research*) as well as studies on the experience of the economic practice in Poland.

Ways of understanding economic and environmental barriers in Polish literature

In the Polish literature, the notion of barriers occurs most commonly on two basic levels:

- the level on which the issues discussed concern economic growth or more broadly social and economic development (discussions thus concern the population barrier, the barriers of labour force or human capital, technology, organisation, institutions and laws, and distribution; also, various determinants impeding the process of economic growth are

¹ The literature offers several ways of coping with barriers, such as, (1) pushing the barrier, mainly by means of new discoveries; (2) slowing down the rate of reaching the barrier, i.e. the critical level, by actions rationalising the use of a resource or by technological changes; (3) removal of a barrier also through discoveries and/or substitution of a missing element; or (4) avoiding a barrier by means of substituting an element that might generate barriers (Becla, Czaja, 2018).

pointed out, as for example: lack of capital, shortage of human capital, scarcity of natural resources, poorly developed institutional factors or a high natural growth);

- the level on which interrelations between management processes and the natural environment are investigated.

Research on the ways of comprehending economic and environmental barriers in the Polish literature reveals some essential sources of inspiration (table 1).

Table 1. Main impulses influencing Polish research on economic and environmental barriers

Impulse	Characteristics
Impulse 1	Effects of the discussion between D. Ricardo and T. Malthus and formulation of the Malthusian and Ricardian theorems
Impulse 2	L. Robbins' definition of economics based on scarcity and finiteness
Impulse 3	Empirical research by H. Barnett and Ch. Morse
Impulse 4	The emergence of global modelling and J. Forrester's World models
Impulse 5	Report of UN Secretary General U Thant and the 1st and 2nd report to the Club of Rome
Impulse 6	Stockholm Conference and its effects
Impulse 7	J. Kornai's concept of shortage economy
Impulse 8	The raw material crisis in Polish economy of the late 1970s and the 1980s
Impulse 9	The concept of sustainable development and the Rio de Janeiro Earth Summit
Impulse 10	Agenda 21 and experiences from implementation of the strategy of sustainable development (eco-development)

Source: author's own work.

Undoubtedly, it was the discussion between D. Ricardo and T. Malthus that had the greatest influence on the issues of environmental and economic barriers; this discussion resulted in the working out of two basic theorems in this matter: (1) the Malthusian approach, based on the assumption of the existence of an absolute impassable barrier, and (2) the Ricardian approach, according to which the management processes asymptotically converge towards the barrier and the growing costs of acquisition of a certain factor trigger off substitution mechanisms. This discussion, even though it took place in the first two decades of the 19th century, left a lasting mark on the economic and ecological thought. It could even be argued that all contemporary concepts of barriers in management processes have their sources in those theorems.

Another major impulse was the spreading of L. Robbins' definition of economics based on scarcity and finiteness. (Robbins, 1932) This concept, proposed in the early 1930s, became the leading approach to the subject of economics. In contemporary economics, these characteristics (scarcity and finiteness) are rather subjects of searching for optimal ways of managing resources, and not investigating barriers in the availability of such resources. Nevertheless, scarcity and finiteness make a good starting point to explore the issue of economic or environmental barriers, or management barriers in general.

In the mid-20th century, quite numerous studies were carried out in a lot of countries regarding the phenomenon of scarcity of mineral resources and fuels. Well known studies conducted by H. Barnett and Ch. Morse did not confirm either paradigm, the Ricardian or the Malthusian one, to the extent that was expected (Barnett, Morse, 1967). The studies themselves became, however, a very strong impulse to take up further studies on resource barriers, also in the Polish literature. This concerns in particular the ideas developed in papers by J. Dembowski and J. Czarkowski.

In the mid-1960s, computer models World were successfully designed at the MIT; they became, on the one hand, an impulse for the arrival of computer modelling and a formalised form of futurology, and on the other hand, opened new possibilities of studying economic and environmental barriers, especially in a more dynamic form.

The World models also provided opportunities to formulate cautionary forecasts for the human civilisation and to raise the issue of barriers in a new, neo-Malthusian, but also global, approach. There appeared the probably most famous UN Secretary General report in the history of this organisation – U Thant's report – as well as two most important reports to the Club of Rome, *The Limits to Growth* from 1972 and *Mankind at the Turning Point* from 1974. These documents were widely discussed around the world, and they even opened the Polish academic circles to the global perspective.

The summary of those discussions and at the same time the launching of a new stage in the studies on social and economic development and its barriers was the conference in Stockholm. It can be referred to as the Zero Earth Summit; as an effect of this conference, the idea of *Sustainable Development* was born.

In Poland, two other impulses were of greater importance than the Stockholm conference for the progress of the debate around barriers, and these were, the concept of shortage economy by J. Kornai (Kornai, 1977; Kornai, 1985), being the best model of the problems of centrally planned economy, and a series of raw material problems in the late 1970s and the 1980s. A good summary of those influences is the book by W. Herer and W. Sadowski,

Zderzenia z barierami rozwoju [Encounters with barriers to development] (Herer, Sadowski, 1898).

After 1990, an essential increase was noted in Poland's activity on the international scene. This was also the case in the course of preparations to the Earth Summit in Rio de Janeiro. This has translated into a rapid increase in interest in ecological issues including barriers (Ekologiczne, 1990; Ekologiczne, 1991).

The last essential impulse influencing Polish studies on economic and environmental barriers was the AGENDA 21 as well as the implementation experiences related thereto. They turned out to be extremely interesting; however, for different reasons, mainly cost-related, no major empirical research into ecological and economic barriers in Polish economy was carried out after 1995.

Careful and critical analysis of the Polish literature provides grounds to distinguish at least eight types of interpretation of this category (figure 1).

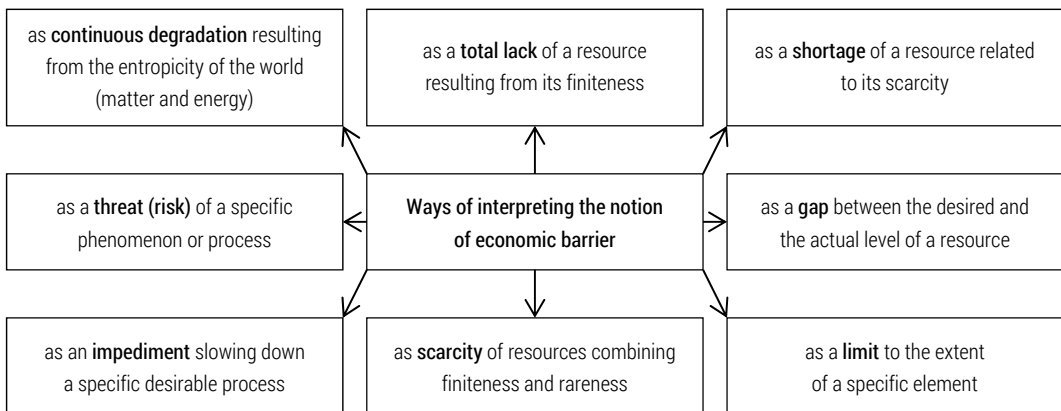


Figure 1. Ways of interpreting the category of economic barrier in Polish literature

Source: author's own work based on selected items in relevant Polish literature.

The first interpretation of an economic barrier – as a total lack of a resource – is associated with the quality of physical finiteness (limitation) of all resources, which was emphasised by T. Malthus,² and representatives of neo-Malthusianism in modern times. Such an approach can be found in *The Limits to Growth* and other cautionary forecasts (Meadows, 1973). This is one of the approaches to barriers most frequently used in the literature and eco-

² The physical finiteness of each form of matter or energy is confirmed in the first law of thermodynamics.

conomic discussions, especially with regard to ecological barriers in ecological economy and deep ecology, or limitations within the neo-institutional concepts of 'vicious circle of poverty'. This is, at the same time, an interpretation useful from the point of view of modelling these phenomena. It also has its social and political impact because forecasts of this type cause even more serious repercussions than extensive studies with a large number of data and conclusions.

The second way of interpreting treats a barrier as a shortage of resources related to their scarcity. This elementary notion does not only determine barriers but, more broadly, the essence of management. Scarcity is the expression of the relation between the required quantity of a specific resource and its available quantity. If this relation is greater than one, this means occurrence of the attribute of scarcity regarding the economic resource under consideration. In other words, the economic resource in question is a rare resource. This is an interesting basis of the Ricardian theorem. It allows for the possibility of changes in the level of scarcity caused by various reasons, such as for instance appearance of new resources, technological progress, growing possibilities of substituting resources with other ones or the impact of changes in prices and costs on the ways and scope of utilising a particular economic resource endangered due to a barrier. Such an interpretation is also the basis for contemporary modelling attempts in the dynamic theory of non-renewable resources (Dembowski, 1989).

The quality of scarcity is also associated with the third interpretation of a barrier as a gap. This is a disproportion between the desired and the actual level of the element concerned (e.g. a barrier), similar to rareness but treated as a dynamic process of becoming (Czaja, 1996). A gap may occur both as an effect caused by reasons independent of the management processes and as a very frequent consequence of the implementation of these processes. Gap is referenced as a form of barrier characterising poorly developed economies, underdeveloped regions or social groups exposed to poverty. This is thus a form of economic barrier used within the framework of the so-called theory of economic underdevelopment. In the modern literature, somewhat more attention is devoted to the consequences of the occurrence of gaps than to the reasons of their occurrence. This last problem is, however, more relevant to the issue of economic and ecological barriers.

The fourth way of interpretation treats a barrier as a limit to the extent of a particular element. This can be the lower limit that cannot or should not be crossed from the above, i.e. such a low level of a resource should be avoided. This can also be the upper limit signifying the level of the element (resource) concerned that is impossible to reach or absolutely critical. This approach is quite typical for a lot of modern concepts of social and economic develop-

ment, including sustainable development. Within their frameworks there are some impassable limits to exploitation of renewable and non-renewable resources or environmental services as well as degradation of components and elements of the natural environment, which set the principles of sustainability and the criteria of intra- and intergenerational justice. This kind of interpretation can be easily described mathematically (either in the form of a function or a numerical index), and therefore it is commonly used in models of ecologically determined economic growth (Czaja, 1993).

The scarcity interpretation is very readily used in economics and theories of social and economic development. Combining in itself the issues of limitations (physical finiteness) with scarcity, it does not require any in-depth explanation of the real sources of this barrier and at the same time corresponds to the 20th-century way of understanding the field of economics originating from the concepts of L. Robbins and T. Koopmans. According to it, economics is the study of the allocation of scarce resources between alternative ends. Thus, this is rather a problem of decision-making and optimisation, and not a social, ethical or ecological one. The barrier is a limitation in an optimisation task.

Treating an economic barrier as an impediment to economic growth (social and economic development) is typical for adherents of treating the functioning of economy as a dynamic process. In the Polish literature, this idea was initiated by M. Kalecki. In this approach, the barrier is a process slowing down the desirable social and economic transformations, the said process being also related to the latter ones. This relation does not feature prominently in the conception of barrier as a gap. An impediment is a mechanism that to a smaller or greater extent hinders the process of economic growth (a specific 'ball and chain') while a gap is an increasing divergence between the elements of this process, one that should not take place (it is undesired both as an effect of economic growth and from the point of view of stabilisation of sustainability of this process).

Economic or environmental barriers are occasionally also interpreted as a difficult-to-predict threat understood in the form of growing risk or uncertainty of management. The currently best, in my opinion, concept, originating from F. Knight, allows for distinguishing a situation of risk from uncertainty, mainly as an effect of the information differences regarding the fact whether the probability distribution for the occurrence of a given element is known or not. In the case of risk we know it, at uncertainty we do not. The apparent randomness of the occurrence of a given barrier, difficult to interpret based on the conventional determinism, finds its explanation on the basis of the theory of deterministic chaos as the effect of sensitive parameters at bifurcation points. The eighth and last interpretation of economic (or

environmental) barriers is of a fatalistic, albeit also realistic, character, being based on the effect of two laws of thermodynamics, and the law of entropy in particular. According to the same, barriers are the effect of inevitable degradation (the increase of entropy) of all material and energy forms of reality. It also implies atrophy of symbolic relations existing between them (Czaja, 1995). With such an approach barriers cannot be avoided in any way. We can, however, slow down the rate of their appearing through appropriate action. In this case it is necessary to follow certain principles of managing resources (capitals) including natural ones (natural capital), as e.g., (1) the principle of maintaining a balance between resources and uses; (2) the principle of not depleting natural resources, especially the core natural capital; (3) the principle of maintaining diversity of the components of natural capital; (4) the principle of substituting natural capital with other forms of capital; (5) the principle of minimising entropy sources; (6) the principle of rational utilisation of natural capital resources, i.e. application of the criterion of maximising utility gained from natural capital; and (7) the principle of effective utilisation of elements of natural capital, i.e. the criterion of surplus of benefits over costs (Czaja, 2007). From the point of view of the processes of social and economic development, additional significance in this interpretation of barriers is taken on by their determinants, being at the same time barriers, such as, (1) the entropical and temporal finiteness of the physical world; (2) entropical and spatial finiteness of the physical world; (3) the resource finiteness of the world with regard to matter and energy; and (4) assimilation limitation of the natural environment; as well as principles of conduct, such as, (a) the principle of intra- and intergenerational justice; (b) the principle of minimising entropy and applying entropical and ecological rationality; (c) the principle of global and local horizon; and (d) the principle of sustainable development (Czaja, 1997).

Conclusion

The problem of understanding economic (or environmental) barriers is one of the most important issues of the contemporary economic and economic and ecological thought, and especially economy of sustainable development. In the world literature, a lot of studies can be found, devoted to comprehending barriers as well as to their occurrence in the social and economic reality. Also the Polish literature contains numerous studies on these matters. Their critical analysis reveals some interesting issues.

Firstly, barriers should be perceived in a two-fold form – as a process and as a phenomenon. The first aspect deals with barriers as constraints that

'become'. This combines the static dimension and the dynamic one, while in the phenomenal aspect the barrier appears. Literature research shows that the same barrier can be understood in a variety of ways within the framework of the above aspects.

Secondly, an element that is becoming extremely essential is the control of the barrier-forming processes. Such control requires:

- developing knowledge on the relations existing in the mega system of economy, society and natural environment;
- creation of a system of measures and indicators similar to business barometers for evaluating threats associated with economic or environmental barriers;
- building adequately efficient systems of responding to the barriers appearing and their effects.

Thirdly, the appearing of economic or environmental barriers is above all the effect of long-term changes in the importance of the individual groups of economic resources in the management processes, changes in the scope of substitutability and complementarity between these resources, or in the technological progress; and in the short-term, not insignificant are the price/cost ratio, market competition and applicable legal and institutional regulations (Czaja, 2002).

The objective that was assumed in the study has been achieved. The research hypothesis, 'Does the Polish economic and ecological thought employ unified interpretations of the notion of economic and environmental barriers?', has been proven to be wrong. Thus, the answer is as follows, 'The Polish economic and ecological thought employs a variety (the author has identified eight kinds) of interpretations of the notion of economic and environmental barriers. However, the problem lies not in wrong (incorrect) understanding of economic or environmental barriers but in the incomplete approach to this very complex matter. There are a lot of relevant proposals in the Polish literature.

We only need to extend our understanding of economic barriers, which includes economic and environmental barriers.

The diversity of treating economic barriers is not an error or a cognitive obstacle. It is merely an expression of the complexity of the phenomenon itself; and it draws the researchers' attention to the need for developing methods of studying it. The most difficult challenge is here the overlapping of the static dimension (resources – the existence of a barrier) and the dynamic dimension (process/streaming – the becoming of a barrier).

Literature

- A. Jankowska-Kłapkowska (ed.) (1991), *Ekologiczne bariery wzrostu i rozwoju społeczno-gospodarczego w Polsce*, Kraków
- Barnett H., Morse Ch. (1967), *Ekonomika zasobów naturalnych*, Warszawa
- Becla A., Czaja S. (2018), *Bariery ekologiczne a współczesny rozwój społeczno-gospodarczy*, Wrocław, in preparation for printing
- Becla A. (2002), *Klasyfikowanie barier ekologicznych. Wybrane zagadnienia*, G. Dobrzański (ed.) *Teraźniejszość i przyszłość ekorozwoju w Polsce*, p. 78-90
- Czaja S., Becla A. (2007), *Ekologiczne podstawy procesów gospodarowania*, Wrocław
- Czaja S. (1995), *Entropia jako podstawa analizy ograniczoności zasobów naturalnych*, „Ekonomia i Środowisko” No. 1(6), p. 9-19
- Czaja S. (2002), *Historia gospodarki i gospodarowania*, Wrocław
- Czaja S. (1997), *Teoriopoznawcze i metodologiczne konsekwencje wprowadzenia prawa entropii do teorii ekonomii*, Wrocław
- Czaja S., Fiedor B., Graczyk A., Jakubczyk Z. (1996), *Luka energetyczno-ekologiczna (na przykładzie gospodarki polskiej)*, Opole
- Czaja S., Fiedor B., Jakubczyk Z. (1993), *Ekologiczne uwarunkowania wzrostu gospodarczego w ujęciu współczesnej teorii ekonomii*, Białystok-Kraków
- Czarkowski J. (1978), *Wizja świata. Proroctwa i prognozy*, Wrocław-Warszawa-Kraków-Gdańsk
- Dembowski J. (1989), *Zarys ogólnej teorii zasobów naturalnych*, Warszawa
- Fiedor B. et al. (1991), *Określenie aktualnych i przewidywanych na przyszłość barier ekologicznych wzrostu (rozwoju) w Polsce oraz barier gospodarczych dla ochrony środowiska* in: A. Jankowska-Kłapkowska (ed.), *Ekologiczne bariery wzrostu i rozwoju społeczno-gospodarczego w Polsce*, Kraków, p. 231-244
- Herer W., Sadowski W. (1989), *Zderzenia z barierami rozwoju*, Warszawa
- Kornai J. (1977), *Anti-equilibrium. Teoria systemów gospodarczych. Kierunki badań*, Warszawa
- Kornai J. (1985), *Niedobór w gospodarce*, Warszawa
- Meadows D., Meadows D., Randers J., Behrens W. (1973), *Granice wzrostu*, Warszawa
- Mesarović M., Pestel E. (1977), *Ludzkość w punkcie zwrotnym*, Warszawa
- Piontek F. (ed.) (1990), *Ekologiczne i pozaekologiczne bariery wzrostu gospodarczego w Polsce*, Wrocław-Warszawa-Kraków-Gdańsk-Łódź
- Robbins L. (1932), *An Essay on the Nature and Significance of Economic Sciences*, London