

THE CONCEPT OF SUSTAINABLE ECONOMIC DEVELOPMENT AND INDICATORS ASSESSMENT

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The article evaluates the sustainable development and its indicators concept. According to the collected theoretical and practical material, systematization, dimensions of sustainable development, disclose the main problems caused by the application of indicators and indices for sustainability assessment, and the evaluation of Lithuania's sustainable development during the years 2003–2008 is reviewed.

Keywords: sustainable development, dimensions of sustainability, assessment, indicators, indexes.

Introduction

The Main Problem. In scientific literature, sustainable development has been analyzed in different qualitative aspects, such as *economic, social, ecologic, institutional, ethical, political*, etc. The variety of the applied research techniques further confirms the problematic nature of the concept of sustainable development and its evaluation. But the circle of indicators and indexes suitable for assessment of sustainable development is not well-defined.

The aim of this research is to systematize dimensions of sustainable development and to disclose the main problems caused by the application of indicators and indices for sustainability assessment.

The research object is the concept of sustainable development and the contents of indicators assessment sustainability.

The Tasks:

- to provide a systematic view of the dimensions of sustainable development,
- to discuss the concept of indicators and indices of sustainable development assessment,
- to carry out the evaluation of Lithuania's sustainable development during the years 2003–2008.

Traditionally, the concept of sustainable development involves three equivalent components: environmental, economic, and social development; as well as three dimensions of wellbeing, i. e. *economic, ecological, and social*, and their complex interrelations, including *institutional* aspects (Čiegis, 2009a). It is necessary to understand, that the conformity and usage of which to perceive sustainable development is not an easy task, as the three proposed elements of sustainable development have to be equally assessed.

The economic sustainability element is based upon R. M. Solow's (1974, 1986, 1993) amplified theory on capital convertibility and Hicks-Lindahl concept

of maximum income, which can be acquired by saving essential wealth (capital) resources for the benefit of future generations, (implementing the principle of fair distribution among generations). Economic sustainability seeks to maximize the flow of income and consumption that could be generated while at least maintaining the stock of assets (or capital), which yield beneficial outputs (Hicks, 1946; Maler, 1990).

The ecological approach to sustainable development pays most attention to stability of biological and physical systems and refers to C. S. Holling's (1973, 1978) scientific works. Therefore, ecological sustainability, concentrates on general vitality and health of ecosystems. According to this approach, the primary task of economic development is to determine the natural systems limits for various economic activities. In this case, the vitality of sub-systems becomes essential in the critical view of global stability of the total ecosystem.

Sustainability forces limitations upon the society's ability to exchange with the surrounding natural systems and upon the society's structure as well. People-oriented the social-cultural sustainability concept reflects the interface between development and dominating social norms and strives to maintain the stability of social systems. Social sustainability seeks to reduce vulnerability and maintain the health of social and cultural systems, and their ability to withstand shocks (Čiegis, 2004).

D. Helm (1998) stated that the implementation of any policy depends on the institutional aspect – the importance and significance of institutions in the policy, and the competence of these institutions. For this reason, the implementation of the policy of sustainable development requires the evaluation of the organization (institutional) sustainability dimension, since effective, properly functioning institutions are essential for sustainable development in the realization of the social, economic, and environmental aims set by the society. The ignorance of institutional dimension is one of the biggest shortages of implementation management of society sustainable development.

H. R. Jiliberto (2003, 2004) argues that it is necessary to overcome the flat vision of systemic relations. The relations identified in a sustainability analysis have not all the same relevance and the same meaning for the strategic instruments of regional sustainable development. Relations among identified sub-systems should be relocated in a logical structure, based on the intention of the cognitive tool being built. In order to attain this, a hierarchical framework with coherent sustainability logic is needed.

The methodology of the research was logic abstraction that encompasses generalizations on theoretical systems analysis of the environmental and ecological economics; this was based on the conclusions and reasoning of scientists from other countries. Dynamic and causal analysis of statistical data is used too. Sustainable development is quite a new area; therefore, design of indicators has an important role in defining sustainability itself. Indicators suggested in many other political spheres might be analyzed only if clear and comprehensive understanding of this sphere and its issues exists. Indicators are simple enough tool, which allows evaluating economic, social, and environmental goals of national development. If

environmental, social, and economic indicators are integrated into one, they form an index. Integrated indexes show various important qualitative sides of the researched phenomena and at the same time demonstrate how the changes of these indicators in time influence the dynamics of common integrated index change in time.

In order to get the real situation of the country's sustainable development, it has been suggested to apply integrated sustainable development index, which would include economic, environmental and social aspects of development (Čiegis, 2009).

Results

1. The Indicators and Indices of Sustainability

When the main dimensions of sustainable development is clarified, sustainability indicators and indices, which have to measure features and processes of human and environmental systems that should guarantee continuity and functionality, might be discussed (Čiegis, 2009b). Sustainability indicators are developed as simplified tool of communication, which helps to make political decisions for seeking sustainability. In order to achieve this goal, it is necessary to set a limited number of easy understandable indicators (Spangenberg, 2002). Optimal sustainability indicators are those that include essential features of a system and show scientifically sound trajectory of maintenance or improvement of this system (Moldan, 2007). However, these indicators should not necessarily include all aspects of sustainability. Actually, indicators are used in order to reduce amount of complex interrelationships by converting them into simple formulation, which makes assessments easier (Čiegis, 2004). In general terms, an indicator is a quantitative or a qualitative measure derived from a series of observed facts that can reveal relative positions (e.g., of a country) in a given area. When evaluated at regular intervals, an indicator can point out the direction of change across different units and through time.

In order to manage sustainability, society has to formulate clear and measurable goals of sustainability that should be continuously revised and corrected. The level, at which these goals are implemented, might be measured using sustainable development indicators, i.e. definable and measurable parameters, which values and trends show development of ecologic, economic, and social stability of particular region (Alijošiūtė, 2001). Thus, the significance of indicators as important instruments of sustainability implementation process is based on the need to measure and assess the progress of reaching goals.

There is no single measure of sustainable development that could involve everything the concept "sustainability" means. On a contrary, there are alternative indicators, each of which reflects different understanding of what is important for sustainable development. As perfect indicators are uncommon, therefore, their development in general case involves methodological compromise among

technical feasibility, public availability to use, and systemic consistency (Moldan, 2007).

When measuring sustainable development, it is common to choose and combine particular number of indicators for each of four (or more) dimensions: economic, ecological, social, institutional, etc. On a global level there are over 500 sustainability indicator efforts, which were developed by governmental and non-governmental organizations. Of this number, about 70 are global in scope, over 100 national in scope, more than 70 are state or provincial in scope, and about 300 are local or metropolitan in scope (Parris, 2003).

R. Juknys (2008) indicates the following characteristics of sustainability indicators: a) usefulness, b) simplicity, c) versatility, d) representativeness, e) sensitivity, f) consistency, g) qualitative form of indicators, and h) sufficiency of data time series. The index simplifies complex systems to often just one number. This can be useful for decision-makers, but if important pieces of information are missing or improperly represented in an index, it can give false signals to decision-makers.

2. Calculation methodology of integrated sustainable development index

The greatest advantage of the *integrated sustainable development index* proposed by this article is that this methodology is rather flexible, because it can be applied to any sustainable development evaluation period and various layers, by choosing the sustainability aspects which best reflect the country's development as well as the desired number of them. In a common case, integrated sustainable development index I_{SD} can be calculated with a help of following formula:

$$I_{SD} = \sum_i a_i I_i \quad (1)$$

where: I_i – indexes of separate sustainable development aspects; a_i – weights of separate sustainable development aspects' indexes (under the condition: $\sum_i a_i = 1$), I_{SD} – integrated sustainable development index.

Standard integrated sustainable development index includes three dimensions of sustainable development – economic, social and environmental:

$$I_{SD} = a_1 I_{EDI} + a_2 I_{SDI} + a_3 I_{EI} \quad (2)$$

where: I_{EDI} , I_{SDI} and I_{EI} are respectively the indexes of economic development, social development and environmental state; a_1 , a_2 and a_3 – the weights of economic development, social development and environmental state indexes (under the condition: $a_1 + a_2 + a_3 = 1$), I_{SD} – integrated sustainable development index.

Each of the three indexes (I_{EDI} , I_{SDI} and I_{EI}) in its turn consists of the whole array of indicators, which can be commonly expressed thus:

$$I_m = \sum_i a_i R_i \quad (3)$$

where: R_i – an index comprising a respective index; a_i – the weight of an indicator comprising a respective index (under the condition: $\sum_i a_i = 1$), I_m – a respective index.

Thus the indicators acquire the content of comparable scores (weights) and allow to analyze the growth of integrated index as a desirable process. As already mentioned, the proposed methodology is sufficiently flexible.

To summarize the methodology of sustainable development index calculation, it can be said that it has been created in accordance with the main dimensions (spheres) of sustainable development: economic, social and environmental spheres, which should constitute equal weight in the common index of sustainable development.

Using this integrated sustainable development index calculation methodology it was made the evaluation of Lithuanian sustainable development in 2003–2008 (Čiegis, 2009c).

Figure 1 shows the overall sustainable development index and the dynamics of its components calculated by the authors (social development index, the index of economic development and environmental index) during the 2003–2008 period.

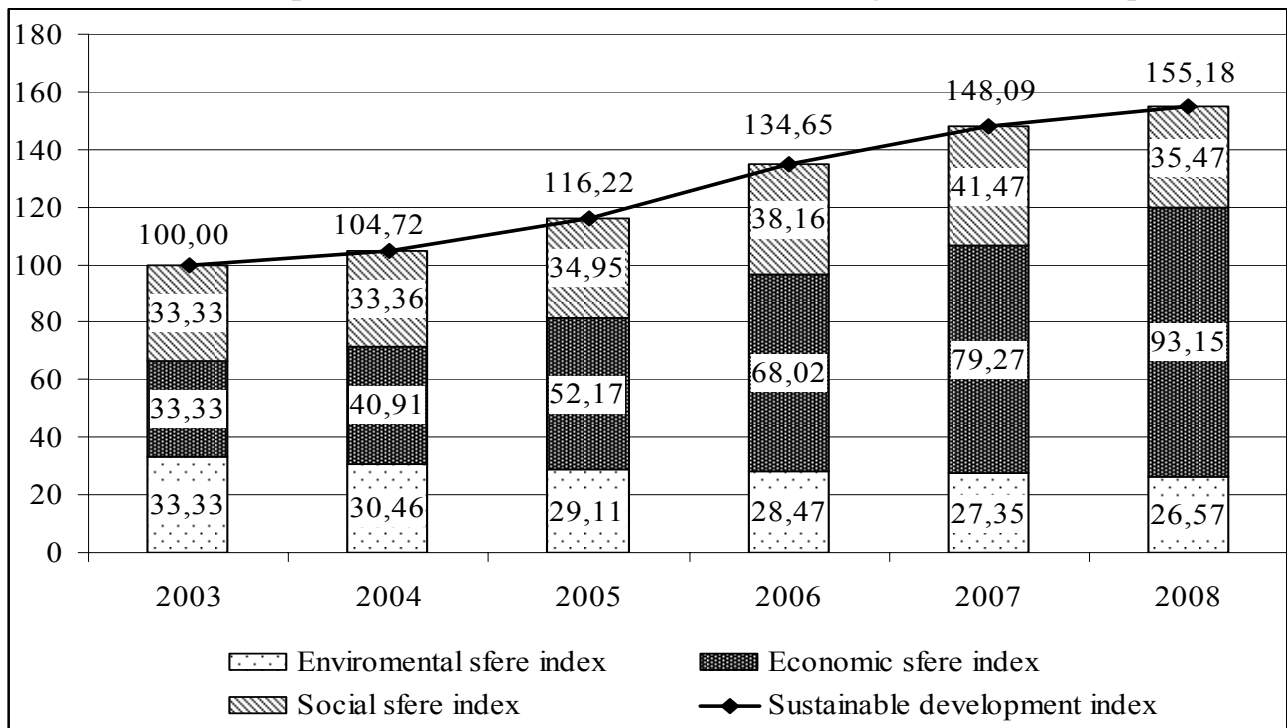


Figure 1. The changes in sustainable development index in the period of 2003–2008, in percents

As seen from data in Figure 1, sustainable development index in Lithuania during the analyzed period was increasing (an increase of 55.2 percent). This means that the state indeed pays attention to sustainable development that all three spheres are developing, that the living conditions are improving. However, it should be looked deeper in order to find out at what expense such improvement is taking place.

Since the beginning of this research it was made clear that all three constituent parts are equally important, therefore each sphere (economic, social and environmental) has an equal weight in the general sustainable development index, i.e. each sphere makes up 33.3 percent of sustainable development index.

But in Lithuania too much attention is given to the improvement of economic sphere, since the economic development index increased of 33.3 percent (basic value) to 93.1 percent during the period of 2003–2008. This means that during the period of crisis there are attempts to improve the economic situation of the country at the same time neglecting the improvement of residents' living conditions. Meanwhile the environmental sphere was completely forgotten during the whole analyzed period, because the environmental index fell of 33.3 percent (basic value) to 26.6 percent (or by 6.7 percent points). As can be seen, sustainable development was increasing at the expense of environmental and to some extent social spheres.

Summarizing the Lithuanian sustainable development analysis conducted in 2003–2008 it can be noticed that Lithuania's development was not sustainable, because the greatest attention was paid to economic sphere, totally or partially neglecting environmental or social spheres.

Conclusions

1. On the basis of the theoretical statements presented by advocates of various versions of sustainable development, four main groups of concepts of sustainable development may be identified: a) the economic approach to sustainability; b) the ecological approach to sustainable development; c) the social concept of sustainability; d) the institutional dimension of sustainability.

2. Society has to formulate clear and measurable goals of sustainability that should be continuously revised and corrected. The level, at which these goals are implemented, might be measured using sustainability indicators because there is no single measure of sustainable development that could involve everything the concept "sustainability" means.

3. The analysis of sustainable development in Lithuania during the period of 2003–2008 revealed that the country has not achieved sustainable development. The country oriented itself too much towards the improvement of economy, was negligent towards the environmental sphere and paid too little attention to the social sphere.

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DARNUS EKONOMIKOS VYSTYMASIS IR JO VERTINIMO RODIKLIAI

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Santrauka

Darnaus vystymosi dimensijų, apimamų sričių ir jų tyrimui naudotų analizės metodų įvairovė patvirtina pačios darnaus vystymosi koncepcijos bei darnaus vystymosi įvertinimo kompleksiška prigimtį. Todėl tyrimo problema tampa neaiškus kriterijų pasirinkimas ir jų įtakos galutinių rezultatų vertinimui. Straipsnio tikslas – susisteminti darnaus vystymosi dimensijas ir pasiūlyti darnumo vertinimo rodiklius ir indeksus, kurie yra patikimesni vertinant darnumą. Straipsnis parengtas sisteminės mokslinės literatūros analizės, bendrosios ir loginės analizės, lyginimo ir apibendrinimo bei abstrakcijos metodais. Taip pat naudota statistinių duomenų analizė. Siekiant gauti realią valstybės darnaus vystymosi padėtį atspindinčią situaciją, siūloma taikyti integruotą darnaus vystymosi indeksą, kuris apimtų ekonominius, ekologinius ir socialinius vystymosi aspektus. Siūlomos integruoto darnaus vystymosi indekso skaičiavimo metodikos didžiausias privalumas yra tai, kad ši metodika yra pakankamai lanksti, nes ją galima pritaikyti bet kokiam darnaus vystymosi vertinimo laikotarpiui ir įvairiems pjūviams, pasirenkant geriausiai valstybės raidą atspindinčius darnumo aspektus bei norimą jų skaičių.

Straipsnyje nagrinėjama darnaus vystymosi ir jo rodiklių koncepcija. Remiantis surinkta ir išanalizuota teorine bei praktine medžiaga, sisteminiu principu aptartos darnaus vystymosi dimensijos, išryškintos pagrindinės problemos, išskylančios taikant rodiklius ir indeksus darnumo vertinimui, bei pateiktas Lietuvos darnaus vystymosi vertinimas 2003–2008 metų laikotarpiui.

Raktiniai žodžiai: darnus vystymasis, darnumo dimensijos, įvertinimas, rodikliai, indeksai.

КОНЦЕПЦІЯ ЗРІВНОВАЖЕНОГО РОЗВИТКУ ЕКОНОМІКИ І ОЦІНКА ЙОГО ІНДИКАТОРІВ

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Анотація

Розглянуто різноманітність параметрів зрівноваженого розвитку економіки, охоплених ним областей і методів аналізу, що застосовуються для його дослідження. Систематизовано параметри зрівноваженого розвитку економіки та виявлено основні проблеми, що виникають при застосуванні показників та індексів для оцінки зрівноваженості. Розглянутий у статті об'єкт досліджень – концепція зрівноваженого розвитку економіки і його показники та індекси. На підставі зібраної та проаналізованого теоретичного та практичного матеріалу, за принципом системного підходу обґрунтовані параметри зрівноваженого розвитку, виявлено основні проблеми, що виникають при застосуванні показників та індексів для оцінки зрівноваженості, а також представлена оцінка зрівноваженого розвитку економіки Литви за період 2003–2008 рр.

Ключові слова: зрівноважений розвиток, параметри зрівноваженості, оцінка, показники, індекси.

КОНЦЕПЦИЯ УСТОЙЧИВОГО РАЗВИТИЯ ЭКОНОМИКИ И ОЦЕНКА ЕГО ИНДИКАТОРОВ

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Резюме

Основная рассматриваемая в статье проблема – разнообразие параметров устойчивого развития экономики, охватываемых ими областей и применяемых для исследования методов анализа – подтверждает комплексный характер самой концепции устойчивого развития экономики и методов его оценки. *Цель статьи* – систематизировать параметры устойчивого развития экономики и выявить основные проблемы, возникающие при применении показателей и индексов для оценки устойчивости. Рассматриваемый в статье *объект исследований* – концепция устойчивого развития экономики и его показатели и индексы. В ходе работы над статьей применялись методы системного анализа научной литературы, общего и логического анализа, методы сравнения, обобщения и абстрагирования, а также статистического анализа данных.

Рассматривается концепция устойчивого развития экономики и его показателей. На основании собранного и проанализированного теоретического и практического материала, по принципу системного подхода обоснованы параметры устойчивого развития, выявлены основные проблемы, возникающие при применении показателей и индексов для оценки устойчивости, а также представлена оценка устойчивого развития экономики Литвы за период 2003–2008 г.г.

Ключевые слова: устойчивое развитие, параметры устойчивости, оценка, показатели, индексы.