

Sustainable development and its assessment

The article evaluates *the sustainable development concept and possibilities for assessment of sustainable development*. The concept of sustainable development and assessment of it and its dimensions are reviewed from the viewpoint of principles of environmental economics and sustainable development.

Keywords: economy, sustainable development, dimensions, assessment, indicators, indexes.

Straipsnyje nagrinėjama *darnaus vystymosi koncepcija ir jo vertinimo galimybės*. Darnaus vystymosi koncepcija ir jos atskirų matmenų įvertinimas atliekamas remiantis aplinkos ekonomikos ir darnaus vystymosi valdymo principų požiūriu.

Raktiniai žodžiai: ekonomika, darnus vystymasis, matmenys, vertinimas, indikatoriai, indeksai.

JEL Classifications: Q01/O47.

Introduction

The relevance and the main problem.

In the scientific literature, sustainable development has been analyzed in different qualitative aspects, such as *economic, social, ecologic, institutional, ethical, political*, etc. Comprehensive progress of society could be reached only by coordination of goals of economic effectiveness, social justice, and environmental protection. Therefore, the idea of sustainable development is an integral part of a successful society's development. The variety of the applied research techniques further confirms the

problematic nature of the concept of sustainable development and its assessment. In order to formulate reasonable objectives of sustainable development, to schedule effective means of their implementation, and to guarantee their realisation, clear criteria (indicators) of sustainable development are necessary. But still there is a lack of qualitative methodology of sustainability assessment, applicable in economic research.

The main research **problem** in this article is that we faces the theoretical issue with the conceptual description and evaluation of sustainable development and that circle of indicators and indexes suitable for

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assessment of sustainable development is not well-defined.

Research object is the concept of sustainable development, contents of sustainability assessment indicators and integrated sustainable development index.

The aim of the research is *to systematize sustainable development dimensions, to disclose the main problems caused by the application of indicators and indices for sustainability assessment and propose calculation methodology of the integrated sustainable development index.*

The following **objectives** were set in order to reach the aim:

- to analyze the concept of sustainable development, providing a systematic view of the dimensions of sustainable development;
- to discuss the concept of indicators and indices of sustainable development assessment;
- to propose calculation methodology of the integrated sustainable development index.

Research methods used were systemic analysis of scientific literature, general and logical analysis, comparison and abstraction. Also comparative analysis of statistical data was performed, as well as calculation and evaluation of indicator, which shows trends of country's sustainability.

The main dimensions of sustainable development

Historically, the concept of sustainability as primarily used in economics and ecology as well as in the interdisciplinary context. Further, the concept of sustainability has dispersed over many aspects of global and micro processes, including more and

more different sustainability drivers and possibilities of their interactions.

The *essence* of the concept of *sustainable development* is clear enough. Lithuanian and foreign scientific literature provides basically the same definitions of sustainable development that emphasise long-term development of national economy, thus striving for the rational coordination of economic, social, and environmental interests of society and ensuring wellbeing for present and future generations within the limits of allowable environmental impact (Čiegis, 2004; Rakauskienė, 2006; Burinskienė, 2003; Cole, 2007). It is thought appropriate to use the definition provided in *Brundtland commission's report "Our Common Future"* (1987), which discloses the idea of *sustainable development* best. It postulates that *sustainable development is the kind of development, which satisfies the current needs without endangering the future generations to satisfy their own.* This definition of sustainable development is the most frequently cited one and seems to be more exhaustive than the majority of others. The essence of *Brundtland's* statement is *fair distribution of natural resources both among different generations and among the present generation of people from the first, the second, and the third world, and finding a positive consensus between the environmental, the social, and the economic dimensions of environment.*

Thus, sustainable development is not about a choice between environmental protection and social progress, but rather more about striving for economic and social development that would be compatible with environmental protection.

As a general concept, sustainable development encompasses three fundamental approaches: *economic, environmental, and social development*; which are inter-

related and complementary. 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.

Of course, sustainability can be defined in relation to only one dimension (economic, environmental or social), therefore involving the sustainability of some economic systems, natural processes or social phenomena (Pierantoni, 2004). This interpretation focuses on an impact analysis and does not identify a long run analysis.

For the purpose of further analysis it is useful to compare three interpretations of sustainable development (*economic, ecological, and social*) found in contemporary literature. At the same time, 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.

1) **The economic sustainability** element is based upon R. 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 main goal of implementation of sustainability principles is safeguarding of an optimal amount of general capital (or sum of different kinds of capital) for the future generations.

2) **The ecological** approach to *sustainable development* pays most attention to *stability of biological and physical systems* and refers to C. Holling's (1973, 1978, 1986) et al. scientific works. 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. Thus, the significance of *preserving biological variety* is emphasised here in order to secure balanced nature, elasticity of ecosystems at a global level and their ability to adapt to changes in biosphere, as well as ability to secure future possibilities.

3) 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 (Chambers, 1989; Bohle et al., 1994; Ribot et al., 1996). Socio-cultural sustainability requires at least the preservation of certain *critical* components of *social capital*, the latter being understood as the ability of the society to solve social, economic, and environmental problems, and to be active in forming the development of the whole system (Berkes, Folke, 1994). It should be emphasised, that in a context of sustainable development, the role of social problems in a society is very important and most quickly understandable factor, which might have more influence on economic activity in a short run. (Ecological problems, according to the authors' view, show up in a long term and are often of a global character; this determines secondary understanding of

ecological problems among separate individuals, regardless of their influence on a whole society).

4) 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. *Institutional* structuring of ecologically sustainable programs implies making normatively-oriented decisions on various levels of social institutions and organizations concerning alternative scenarios of development by combining various functional decisions that take into account the environmental requirements (Čiegis, 2004). The ignorance of *institutional dimension* is one of the biggest shortages of management of implementation of society sustainable development.

We tend to think that the analysis of sustainable development should be based on the assumption developed by H. R. Jiliberto (2003), indicating that sustainable development is based not on the economic, social, ecological, or institutional dimension, but rather on their *system* as an *integrated whole*.

Summarising concepts of sustainable economic development, it should be noted that concept of development is more profound and comprehensive than economic growth. Economic growth usually is based on quantitative aspect, and development involves both quantitative and qualitative aspect (Čiegis, 2004). The further precondition of social existence, according to alternative economists (Daly, 1990), is not a previously dominated approach of quantitative *economic growth* in physical and monetary units

but a *qualitative development* striving towards perfection, harmony and deep self-cognition.

The concept of sustainability indicators and indices

If we cannot *measure* society's targets, it is impossible to *govern*. Therefore, if we want to manage sustainability, the society is in charge of formulating sustainability objectives, which should be constantly reviewed and assessed. It is clearly known that no intelligent decisions on sustainable development implementation can be made without using a set of reliable sustainability indicators. Indicators play a basic role in any strategy reporting and implementation audit.

Sustainability assessment currently arises as transparent, comprehensive, integrated, and provident decision-making approach (Gibson, 2005). Ignorance of sustainability turns our future into more risky one. On the contrary, understanding ecological limitations and clarifying possible risks allows making informative decisions. This reduces threatening uncertainties and opens up new possibilities. Thus, when concept 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. According to the World Bank, fundamental factor of good indicator is estimation of relationships between measurement of environmental conditions and practical political possibilities (World Bank, 1997). 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, Dahl, 2007). However, these indicators should not necessarily include all aspects of sustainability because, as R. Hueting and L. Reijnders (2004) argue, in that case they often become very subjective and meaningless.

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 (Alijošiutė, Ahvenharju, 2001). Such information derived from indicators is very useful in order to assess tools such as taxes, regulation or voluntary agreements, considering their validity and effectiveness to secure sustainability (Čiegis, 2009).

Making the concept of sustainable development operational raises important challenges in terms of measurement. Without indicators or a quantitative framework, sustainable development policies lack a solid foundation on which to advance. 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*.

Indicators should be characterised by the following features: simplicity, wide coverage, possibility of qualitative assessment that allows for setting trends. Integrated sustainability assessment itself is the most important and difficult sphere of potential indicator use because such an assessment should include wide spectrum of different problems and issues (Dahl, 2007).

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. Any separate aggregated indicator does not foresee interchange among three main dimensions analysed environmental economics: *effectiveness*, *justice* and *sustainability*. As P. Victor (1994) emphasises, aggregated indicators are useful only when we believe in high degree of substitution among produced, human, and natural capital. When limits of the substitution among these types of capital are confronted, then every of them should be expressed by a specific indicator.

When measuring sustainable development, it is common to choose and combine particular number of indicators for each of three (or more) dimensions: economic, ecological, social, 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 and Kates, 2003). Nevertheless, every indicator has its own advantages and disadvantages, thus, it is impossible to find a single indicator for all cases.

Sustainability indicators are multi-dimensional, multidisciplinary indices with sub-themes developed with care to evaluate and measure the status of an area in terms of progress towards sustainability (Ghosh et al., 2006). Scientific literature often analyses issue, to what extent various indicator sets contributes to sustainable development assessment. We conclude that there are no indicator sets that are

universally accepted, backed in compelling theory, rigorous data collection and analysis, and influential in policy. This is due to the ambiguity of sustainable development; the plurality of purpose in characterizing and measuring sustainable development; and the confusion of terminology, data, and methods of measurement.

Indicators must be linked to concrete and – where useful and feasible – to quantified goals. Current international sustainable development reporting consists mainly of bringing together some key indicators developed for each one of the three sustainable development „pillars“, i.e. combining environmental indicators, social indicators, and economic indicators. Sustainable development will, however, not be achieved simply by adding the three different sets of policy objectives, as this would result in a weak compromise. Better integration of policy objectives is needed, so that we could benefit optimally from their synergistic effects, taking trade-offs into account. By using a set of well-defined indicators, it becomes easier to communicate sustainable development, and in particular, the Local Agenda 21 implementation process (Čiegis, 2003).

In order to improve existing system of sustainability indicators, competing trends and their methodological requirements (indicators have to be important, correspond policy goals, they have to be informative (well-defining a problem), easy to understand and compute, logical, effective (information provided should pay-off), practical, reliable, summarising (they should cut variety and abundance of indicators not losing essential information at the same time), based on accessible data) should be taken into account. Although, it is not an easy task to define indicator set inherent to sustainable development.

Perfect indicators are uncommon, therefore, their development in general case involves methodological compromise among technical feasibility, public availability to use, and systemic consistency (Moldan, Dahl, 2007).

While discussing sustainability assessment tools, on the one hand, there is the demand for approaches that have more *specific* assessment performance (meaning more case- and site-specific). At the same time there exists the demand for tools that are *broader* in order to be accessible to a wider user group for differing case circumstances. There is also the need for more *standardised* tools that give more transparent results. Like the many facets of the concept of sustainability itself, proper tool development can only happen when all parameters are considered simultaneously.

Indicators should be *scientifically sound* as well. Every indicator needs a specific technique, which includes conception of indicator, its significance, measuring units, data sources, methods of data collection and analysis, evaluation criteria, etc.

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.

Sustainable development is a multi-dimensional issue involving huge amounts of complex information. There is the need to systematically reduce this information to a more concentrated form (in order to make effective decisions and as such indicators and indicator sets play a vital role). Such an information system could be seen as *pyramid of information aggregation* (PAS-TILLE, 2002), at the base of which are raw *data* and at the top are *indexes*.

Sustainability indicators can take a number of related *forms*:

- monitoring indicators,
- aggregate sustainable development indices,
- target (or goal) indicators,
- sustainability assessment criteria.

Solid analysis and measurement provide the basis for implementing sustainable development policies. Understanding sustainable development linkages and achieving the required policy trade-offs across the environmental, economic, and social spheres requires novel methodologies based on new types of statistical approaches.

Calculation of the integrated sustainable development index

Sustainable development is a consequent goal; therefore, it is important to measure what progress is being done towards it. In Lithuania a systematic analysis of sustainable development indicators does not receive too much of attention, therefore we face a problem of quantitative definition of state's sustainable development priorities and evaluation of their changes and prospects. In order to get the situation, which reflects the real state of national sustainable development, we propose to apply *the integrated index of sustainable development*, which involves economic, ecological, and social aspects of development.

The greatest advantage of a proposed original calculation methodology of the *integrated sustainable development index* I_{SD} is flexibility, for it can be applied for any period of sustainable development evaluation and various layers with a possibility to select a desired number of sustainability

aspects that reflect an evolution of a country the best. For instance, if a particular aspect of sustainability becomes not relevant for a country, it can be removed or replaced. On the other hand, if other important aspects of sustainable development appear, they might be included instead former ones or simply supplement the whole system of calculation by bigger amount of indicators.

It was difficult to calculate weighted index of each indicator because of data lack, therefore, method of equal basic weights was chosen, i.e. index of base year was apportioned for every of the three blocks, in which all the indicators were evaluated by equal weights. The assumption was made that basic indicators representing sustainable development are equivalent. Calculations would be more precise and the changes of indexes would be more realistic if weights of each indicator would be estimated by experts.

In order that every aspect of sustainable development would have equal influence on integrated index of sustainable development, equal number of indicators was chosen to reflect economic, social, and environmental state. Also indicators, which reflect both positive and negative influence on sustainability, were included by adding their values to or subtracting from the value of the base index accordingly. In order to get comparative index and avoid change of population indicators were calculated per particular number of population, per million Litass of GDP or as a percentage of a particular value. Reliability of the application of this index for the forecasting of sustainability trends in a longer run could be increased by using *discount principle*.

Calculations of the *integrated sustainable development index* I_{SD} showed that national development (its separate aspects)

during 2001-2005 was not even and sustainable, although general indicator of sustainable development increased rapidly. It is evident from the change of the equal weight index that the chosen economic indicators had the greatest positive change in 2001-2005, whereas the social development and ecological status was also improving, however with lower intensity. Even though the integrated index of sustainable development was growing in the period, we cannot state that Lithuania's development was sustainable, because it would contradict with the concept of sustainable development, since its components – economic efficiency, social justice and environmental condition – were not of equal value. Fast economic growth was happening at the expense of environmental condition and social development.

In order to show the flexibility of the offered calculation methodology of the *integrated sustainable development indicator*, one more example of the same indicator during the period of 2002-2006 is provided, including some other indicators. Calculation of an *integrated sustainable development index I_{SD}* , consisting of other indicators, showed that it was also growing during the studied period (2002-2006) and it, according to economic, social and ecological indicators, indicated the positive tendencies in Lithuania's sustainable development. However an analysis of Lithuania's sustainability index allows to state that ecological environment develops at the expense of social and economic environment, and this cannot be considered a positive practice if state's sustainable development is desired.

It should be emphasised that after the calculation of *integrated sustainable development index I_{SD}* in the first case, the conclusion was drawn that quick growth of

economy proceeded at the expense of both social development and environmental state. So, calculations showed that changes in a structure of the *integrated sustainable development index I_{SD}* might condition quite different findings and it again demonstrates an importance of a methodologically right selection of complementary parts (indicators describing different environments) of the *integrated sustainable development index I_{SD}* .

Conclusions

1. On the basis of the theoretical statements presented by advocates of various versions of sustainable development, 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 organization (institutional) dimension of sustainability*. These groups would then allow for further analysis of sustainable development as the interaction of the *ecological, economic, and social systems*.

2. The article is based on the assumption that sustainable development is based not on the economic, social, ecological, or institutional dimensions, but rather on their *system* seen as an *integrated whole*.

3. 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.

4. *Sustainability indicators* themselves are multi-dimensional, multidisciplinary

indices with sub-themes developed with care to evaluate and measure the status of an area in terms of progress towards sustainability.

5. Calculation methodology of the integrated sustainable development index could be applied for the evaluation of sustainable development changes.

6. The fact that changes in the structure of the integrated sustainable development index I_{SD} may lead to fairly different results shows the importance of methodologically right selection of components (indicators, characterising different environments) of the integrated sustainable development index I_{SD} .

References

1. Alijo iutė, A., Ahvenharju, S. (2001). Subalansuoti plėtra. – ECAT. Kaunas.
2. Berkes, F., Folke, C. (1994). Investing in cultural capital for sustainable use of natural capital. / In: Jansson A. M., Hammer M., Folke C., Costanza R. (Eds). Investing in Natural Capital: The Ecological Economics Approach to Sustainability. – Washington DC. P.128- 149.
3. Bohle, H. G., Downing, T. E., Watts, M. J. (1994). Climate change and social vulnerability: toward a sociology and geography of food insecurity // Global Environmental Change. Vol.4, issue 1. P. 37-48.
4. Burinskienė, M. (2003). Subalansuota miestų plėtra: monografija. – Vilnius: Technika.
5. Chambers, R. (1989). Vulnerability, coping and policy // IDS Bulletin. Vol.20. No 2. P. 1-7.
6. Cole, A. M. (2007). Economic growth and the environment. / In: Handbook of sustainable development. Edited by G. Atkinson, S. Dietz, E. Neumayer. – MPG Books Ltd, Cornwall: Bodmin, p. 240-253.
7. Čiegis, R. (2004). Ekonomika ir aplinka: subalansuotos plėtros valdymas. – Kaunas: Vytauto Didžiojo universiteto leidykla.
8. Čiegis R. (2009). Darnaus vystymosi vertinimas // Taikomoji ekonomika: sisteminiai tyrimai. (priimta spaudai).
9. Čiegis, R. (2003). Management Principles of Society's Sustainable Development and Transformation of Economy // Transformation in Business & Economics. Vol. 2, No. 2 (4). P.19-36.
10. Čiegis, R., Ramanauskienė, J., Martinkus, B. (2009). The Concept of Sustainable Development // Inžinerinė ekonomika (priimta spaudai).
11. Čiegis, R., Ramanauskienė, J., Startienė, G. (2009). The Theoretical Reasoning of the Use of Indicators and Indices for Sustainable Development Assessment // Inžinerinė ekonomika, (atiduota spaudai).
12. Dahl, A. L. (2007). Integrated Assessment and Indicators / In: Hak T., B. Moldan, A. L. Dahl. (Eds.). Measuring progress towards sustainability: assessment of indicators: a Project of SCOPE, the Scientific Committee on Problems of the Environment, of the International Council for Science. – Washington, DC. P. 163-176.
13. Daly, H. E. (1990). Toward some operational principles of sustainable development // Ecological Economics. No 2. P. 1-6.
14. Ghosh, S., Vale, R., Vale, B. (2006). Indications from Sustainability Indicators // Journal of Urban Design. Vol. 11 No. 2. P. 263-275.
15. Gibson, R. B. (2005). Sustainability assessment: criteria and processes. – London.
16. Hicks, J. (1946). Value and Capital (second edition). – Oxford, UK.
17. Holling, C. S. (Ed.). (1978). Adaptive Environmental Assessment and Management. – New York.
18. Holling, C. S. (1986). The resilience of terrestrial ecosystems: local surprises and global change. / In: W. C. Clark and R.E. Munn. (Eds.). Sustainable Development of the Biosphere. – Cambridge, UK: Cambridge University Press. P. 292-317.
19. Holling, C. S. (1973). Resilience and stability of ecological systems. // Annual Review of Ecology and Systematics. No 4. P. 1-23.
20. Hueting, R., Reijndres, L. (2004). Broad sustainability contra sustainability: the proper construction of sustainability indicators. Eco-efficiency as abandonment of the nature // Ecological Economics. Nr. 38. P. 311-315.
21. Jiliberto, H. R. (2003). Models for Regional Sustainability Assessment: the case of the region of Murcia, Spain. / Workshop 3: "Towards Regi-

- onal Sustainable Development: Evaluation Methods and Tools" June 11th – 13th 2003, Manchester.
22. Juknys, R. (2008). Darnus vystymasis. – Kaunas: Vytauto Didžiojo universiteto leidykla.
 23. Maler, K. G. (1990). Economic theory and environmental degradation: a survey of some problems // *Revista de Analisis Economico*. No.5. P. 7-17.
 24. Moldan, B., Dahl, A. L. (2007). Challenges to Sustainable Indicators / In: Hak T., B. Moldan, A. L. Dahl. (Eds.). *Measuring progress towards sustainability: assessment of indicators: a Project of SCOPE, the Scientific Committee on Problems of the Environment, of the International Council for Science*. Washington, DC. P. 1-26.
 25. Our Common Future. (1987). World Commission on Environment and Development.
 26. Parris, T. M., Kates, R. W. (2003). Characterizing and measuring sustainable development // *Annual Review of Environment and Resources*. Vol. 28 (13). P. 1-28.
 27. PASTILLE Consortium (2002). Indicators into Action: Local Sustainability Indicator Sets in their Context. Final report.
 28. Pierantoni, I. (2004). A Few Remarks on Methodological Aspects Related to Sustainable Development. / In: *Measuring Sustainable Development: Integrated Economic, Environmental and Social Frameworks*. – OECD.
 29. Rakauskienė, O.G. (2006). Valstybės ekonominė politika: monografija. – Vilnius: Mykolo Romerio universitetas.
 30. Ribot, J. C., Najam, A., Watson, G. (1996). Climate variation, vulnerability and sustainable development in the semi-arid tropics. / In: J. C. Ribot, A. R. Magalhaes and S. S. Pangides (Eds.). *Climate Variability, Climate Change and Social Vulnerability in the Semi-Arid Tropics*. – Cambridge.
 31. Solow, R. M. (1993). An Almost Practical Step towards Sustainability // *Resour. Policy*. No.19. P. 162-172.
 32. Solow, R. M. (1986). On the intergenerational allocation of exhaustible resources // *Scandinavian Journal of Economics*. Vol. 88, issue 2. P.141-156.
 33. Solow, R. M. (1974). The economics of resources and the resources of economics // *American Economics Review*. No.64. P. 1-14.
 34. Victor, P. A. (1994). Natural capital, substitution and indicators of sustainable development. Presentation at the 3rd Meet. ISEE, Costa Rica.
 35. World Bank (1997). Expanding the measure of wealth: Indicators of environmentally sustainable development / *Environmentally Sustainable Development Studies and Monographs Series*. No.17. Washington, DC.

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DARNUS VYSTYMASIS IR JO VERTINIMAS

S a n t r a u k a

Visapusė visuomenės pažanga gali būti pasiekta tik suderinus ekonominio efektyvumo, socialinio teisingumo bei aplinkos apsaugos tikslus. Todėl darnaus vystymosi idėja yra neatskiriama visuomenės sėkmingos tolimesnės plėtros dalis. Moksliniuose tyrimuose naudotų metodų įvairovė tik patvirtina darnaus vystymosi koncepcijos ir jo vertinimo prigimtį problemišumą. Norint suformuluoti pagrįstus darnaus vystymosi uždavinius, numatyti veiksmingas jų įgyvendinimo priemonės bei užtikrinti jų savalaikį įgyvendinimą, būtina turėti aiškius vystymosi darnumo kriterijus (rodiklius). Bet ir toliau pasigendama darnumo kiekybinio ver-

tinimo metodologijos, tinkamos ekonominiuose tyrimuose.

Straipsnio *tyrimo objektas* – darnaus vystymosi koncepcija, darnaus vystymosi vertinimo vertinimo rodiklių ir indeksų turinys ir problemos, su kuriomis susiduriama juos naudojant darnumo kiekybiniam ir kokybiniam įvertinimui.

Remiantis sukaupta teorine medžiaga, bus *siekiamą (tikslas)* atskleisti rodiklių ir indikatorių taikymo darnumo vertinimui svarbiausias problemas ir pateikti metodologinius jų sprendimo kelius.

Straipsnio *tyrimo uždaviniai* yra:

- išanalizuoti darnaus vystymosi koncepciją,

pateikiant sisteminių požiūrį į darnaus vystymosi atskiras dimensijas;

- *aptarti darnaus vystymosi vertinimo rodiklių ir indeksų sampratą;*

- *aptarti darnaus vystymosi rodiklių ir indeksų kūrimo metodologinius principus.*

Pačios darnaus vystymosi koncepcijos esmė yra gana aiški. Mokslinėje literatūroje Lietuvos ir užsienio autoriai pateikia iš esmės tuos pačius darnaus vystymosi apibrėžimus, akcentuojančius ilgalaikę šalies ūkio plėtrą, siekiant racionaliai suderinti visuomenės ekonominius, socialinius ir aplinkosauginius interesus, taip užtikrinant visuotinę gerovę dabartinei ir ateinančioms kartoms neviršijus leistinų poveikio aplinkai ribų.

Kaip bendra sąvoka, darnus vystymasis apjungia tris esminius požiūrius: *ekonominį, aplinkos ir socialinį* vystymąsi, įvardijamus kaip tarpusavyje susijusius ir vienas kitą papildančius. Todėl, tradiciškai darnaus vystymosi koncepcija apima tris lygiavertes komponentes – aplinkos apsaugą, ekonominę plėtrą ir socialinį vystymąsi, bei tris gerovės dimensijas – *ekonominę, ekologinę ir socialinę* – bei jų tarpusavio kompleksines sąveikas. Kitaip tariant, darnus vystymasis – tai savotiškas kompromisas tarp aplinkosauginių, ekonominių ir socialinių visuomenės tikslų, leidžiantis siekti visuotinės gerovės sau ir ateinančioms kartoms.

Rikia pažymėti, kad, apibendrinant darnaus ekonomikos vystymosi koncepcijas, galima pastebėti, kad vystymosi sąvoka yra gilesnė ir platesnė negu ekonominis augimas. Ekonominis augimas paprastai remiasi į kiekybinį aspektą, o vystymasis apima ne tik kiekybinį, bet ir kokybinį aspektą.

Darnumo vertinimas šiuo metu iškyla kaip skaidresnis, išsamus, integruotas ir įžvalgus sprendimų priėmimo požiūris. Todėl išsiaiškinus darnaus vystymosi koncepciją, toliau gali būti aptarti *darnumo rodikliai ir indikatoriai*, kurie turi išmatuoti žmogaus ir aplinkos sistemų bruožus bei procesus, užtikrinančius jų tęstinumą ir funkcionalumą toli į ateitį. Optimalūs darnumo indikatoriai yra tokie, kurie apima sistemos esminius bruožus ir parodo šios sistemos palaikymo ar pagerinimo moksliskai patikimą trajektoriją.

Bet nerealu tikėtis, kad egzistuotų *vienas vienintelis* darnaus vystymosi matas, galintis apimti viską, ką išreiškia terminas „darnumas“. Priešingai, esama alternatyvių indikatorių, kurių kiekvienas atspindi skirtingą sampratą to, kas svarbiausia darniam vystymuisi.

Siekiant gauti realią valstybės darnaus vystymosi padėtį atspindinčią situaciją, straipsnyje aptariams siūlomas taikyti *integruotą darnaus vystymosi indeksą*, kuris apimtų ekonominius, ekologinius ir socialinius vystymosi aspektus.