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Evolution of Research and Evaluation Methodology of Sustainable Development of Social and Economic Systems

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Abstract. Theoretical concept of sustainable development was formed in the second part of 20th century but the modern state of economical, ecological and social spheres of our life proves that the efforts of all scientists from different countries and from different areas of science must be combined together to develop its main ideas. In particular in international and national practice there exist many points of view how to measure sustainable development of social and economical systems on international, national, regional, municipal and local levels. We have many systems of indicators but they are static and will not enable us to investigate and evaluate sustainable development as dynamic process. Use of dynamic method and creation of dynamic system of indicators can help to avoid this disadvantage.

Key words: Sustainable development · Social and ecological and economic system · Methodology of scientific research · Dynamic method · Tempo parameters

INTRODUCTION

The methodology was not an easily-born child and was born by joined efforts of scientists from many countries of the world and specialists from many areas. In terms of concept of sustainable development every object of economy is viewed as indivisible social-ecological-economical system. That is why instead of traditional aims of economical growth and profit the first place was given to aim to preserve integrity of ecosystem, of living environment and increasing of quality of life. "Profit is of importance but the access to education, ability to lead long and healthy life, to influence the decisions made by society and live in the society where they respect and appreciate every person is not of less importance." Therefore economical growth must be regulated by ecological and social norms (or standards).

The problem of how to measure sustainable development is one of the most often discussed ones in this area; the object of discussion here is the possibility of such measurement and the tools that can be used for it - the set of quantity and quality indicators. Existing systems of measurement are static ones (based on static parameters) and can be used for measurement of the situation as we know it (as it is) in every particular period of time. But DEVELOPMENT - is intrinsically dynamic process, therefore it must be evaluated in dynamic parameters. In this respect we face scientific problem of providing theoretical and methodological rationale for use of dynamic method for measurement and evaluation of sustainable development of social and economical system.

Brief Review of Existing Approaches to Build a System of Indicators to Monitor Sustainable Development: The first systematic research in this area was made in 1970 by G. Forrester who built the first global model of world dynamics. It was based on the 5 main interdependent variables: 1) population of Earth, 2) capital investments (funds that characterize the level of economical development that changes natural resources, 3) the use of non-renewable resources, 4) pollution of the environment (waste products resulted from mankind activity that can not be processed by nature), 5) and production of food [2]. Then this model was used by G. Medows in 1972 to predict that in 75 years all resources will be exhausted and the lack of food becomes catastrophic if the growth of population is not strictly controlled [3].

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By now two main methodological approaches to measurement of sustainable development have formed. The first one is to build a system of indicators of sustainable development - these are indicators taken from primary information which can be used to judge about the current state and/or change of parameters of sustainable development (ecological, economical, social ones). This approach is used to form official systems of indicators adopted by UN, EU, World Bank and many others.

For example, in 1995 the UN Committee on sustainable development guided by 21st century agenda (Agenda 21), taking into consideration large number of initiatives from different countries had adopted working program which included general list of "parameters" of sustainable development and so-called methodological lists for every of them. All indicators were structured according to the following scheme: "incoming influence - state - control" [4]. In the Declaration of the Millennium adopted by UN in 2000 the system of indicators for monitoring of sustainable development processes had the structure "aims - objectives - indicators". [5] Annual Report of the World Bank "Indicators of World Development" includes the information about more than 2000 indicators in 214 countries of the world. The principle of systematization of data can be described by logistic scheme "group - parameter/indicator" [6]. The indicators system of EU is meant for monitoring sustainable development strategy of EU countries [7]. In the report published by EuroStat every 2 years they cover the following areas: social and economic development; sustainable production and consumption; social integration; demographic changes; public health care; changing of climate and energy; natural resources; global partnership; effective management.

The second approach suggests calculation of aggregated (integral) index which enables to define the degree of sustainability of social and ecological and economic systems as a whole. Here the authors use the method of multi-dimensional comparative analyses when the indicators are changed in form to be compatible with each other (they are standardized) by comparison with some benchmark value (see, for example [8, pages 19-20]) or with the best value in the sample of the countries, regions, cities etc. under consideration (see, for example [9,10]).

The outline of many variants of evaluation of sustainable development demonstrates not only interest of people in evaluation of this process but achievements of researchers on their way towards development of ultimate, reliable and easy-to-understand indicators of sustainable development But we have to say that most authors used static system of indicators which characterizes the state of social and economic system only at the particular moment. But for any social and economic system it is true that it changes its state with time, influenced by different factors of external and inner environment. Therefore *sustainable development should be understood as the combination of processes leading to positive changes and technologies that brought these changes, aiming for harmonization of relationship between economic and ecological and social spheres to satisfy the need of social and ecological and economic system for long-term existence. (detailed description and reasoning of this is given in* [11, page 51]). Taking into consideration the fact that sustainable development is dynamic process we need an appropriate system of indicators to evaluate dynamics of economic, social and ecological spheres in its mutual interrelation and to measure the sale of unevenness of development of these inside social and economic system.

Use of Dynamic Method in Evaluation of Sustainable Development of Social and Ecological and Economic Systems: Static approach means that economic events must be investigated accordingly to their current state regardless of changes in time. The concept of balance between mutually interconnected phenomena of economical existence corresponds to this approach better. Use of dynamic method allows economic phenomena to be investigated in terms of their change in time. What is of most importance here is the mode of functioning of systems, the process of change of economic elements and relations between them.

In the author's opinion method of dynamic norms (standards) has big potential for use in practice. Initially proposed by Syroezhin I. M. - the aim was to update the system of indicators of effectiveness and quality [12]. This method was also used by Zhmaeva I. V. [13] in development of organizational and economic mechanism of balanced planning of high-tech production, by Tonkikh A.S. in modeling efficient management of corporative finances [14].

The method is based on use of tempo characteristic among which the most spread are the rate (speed) of change which are the relation of the indicator for current period to indicator for previous or basic period. The degree of speed of change which is more than 1 indicates the growth of current indicator's value in comparison with previous one. Otherwise - it shows that the value of indicator that corresponds to current period has decreased in respect to previous period.

The method of dynamic norms suggests that tempo characteristics must be placed in some order. The order of values of dynamics observed in the system of parameters must characterize the structural changes taking place in the system. Therefore when we chose and place in order some parameters observed in the system we can build a benchmark dynamic model of some continuous change of structural characteristics of the system. This model will be dynamic norm (standard) in the form of integrity of indicators placed in order accordingly to tempo of growth in such a way that the perseverance of this order within long time provides for the best functioning mode of social and economic system. Efficiency and effectiveness of functioning of the system can be evaluated by comparison of this benchmark and current modes of functioning.

The advantages of method of dynamic norms (standards):

- This method allows to form the aggregate of indicators which reflect different (economical, social and ecological) aspects of functioning of complex systems and get integral value of its activity;
- Every indicator keeps its own role, the effect of mutual elimination of "positive" and "negative" changes of their values can be avoided;
- To compare in dynamics those indicators which can not be compared in statics (for example compare quantitative and qualitative indicators, indicators with different units of measurement) and give full quantitative and qualitative analysis of the results of system's functioning having only limited set of basic indicators;
- To provide simultaneously evaluation, diagnostics and analysis of effectiveness of functioning of social-ecological-economic systems;
- Interpret the results in order to give grounds for management decisions for future period to converge benchmark and current modes of system's functioning.

Besides that the advantage of this method is its flexibility because dynamic norms if necessary can be easily transformed by change of set of indicators and the way of putting them in order in the benchmark model of functioning mode.

This method can be used on global, regional, industry level as well as on the local level for evaluation of efficiency of separate companies and their complexes. Method enables to compare the results of evaluation of functioning mode of social-ecological-economical systems in terms of their sustainable development with corresponding data for previous years to reveal tendencies of strengthening/weakening of the balance as well as with the results of functioning of analogous systems in compatible periods of time to define rating of the system under investigation (country, region, city, industry, company). But the most important is that the method directs the persons who make decisions towards the end result corresponding in the context of sustainable development to the highest level of concord of social, ecological and economical aims and interests inside the system under consideration. In this regard it can be effectively used in planning for developing scientifically grounded programs of sustainable development as well as for evaluation of quality of those programs which are in force to find out if the measures proposed correspond to the aims of sustainable development.

This method corresponds to the modern stage of development of scientific knowledge which exists in inter-discipline problems-oriented forms of research activity, and the obtained data about an object are correlated not only with the particularities of means and operations of activity but with value and aim structures.

CONCLUSION

In the present work we propose to broaden the research methodology of sustainable development of social-ecological - economical systems by use of method of dynamic norms (standards). This method is aimed to form dynamic model of normative (benchmark) mode of activity of social and ecological and economical system; investigation of actual mode of activity and building its dynamic model; comparison of benchmark and actual functioning modes, quantitative and qualitative evaluation of how close to each other they are judging from the level of efficiency and effectiveness of functioning; analysis and interpretation of the results to give grounds to future management decisions aimed to converge benchmark and actual functioning modes of the system. By use of this method sustainable development of social-ecological-economical system can be properly described by dynamic model in which different separate dynamic parameters of economical, ecological and social component are in specific collaterally subordinated order.

REFERENCES

1. Diener, E. and M. Seligman, 2004. Beyond Money: Toward an Economy of Well-Being. Psychological Science in the Public Interest, 5(1): 1-31.

2. Forrester, G., 2003. World Dynamics: translation from English, AST.
3. Meadows, D., 1972. The Limits to Growth. Univers Books, New York.
4. Indicators of sustainable development framework and methodologies: United Nations. - New York, 1996. Date Views 08.08.2013 www.rrojasdatabank.info/susun6.htm
5. United Nations Millennium Declaration. Date Views 12.08.2013 www.un.org/ millennium/ declaration/ ares552e.htm
6. World Development Indicators. Date Views 18.08.2013 data.worldbank.org/sites/default/files/wdi-2012-ebook.pdf
7. Sustainable development indicators. Date Views 19.08.2013 epp.eurostat.ec.europa.eu/ portal/ page/ portal/ sdi/indicators
8. Uskova, T., 2005. Theory and Methodology of Management of Sustainable Social and Economic Development of a Region, PhD thesis, Vologda, 2010.
9. Boyko, E., 2008. Main Approaches to choosing of Indicators of Sustainable Development: International and National Practice. Date Views 21.08.2013 www.nbuv.gov.ua/portal/natural/Nzvdpu_geogr/2008_15/osnovnue%20podxodu.pdf
10. Customized Sustainability Indicators - a Tool for Assessing City Development. Slavka Macakova, ETP Slovakia. Date Views 14.08.2013 spb.org.ru/ndc/work2_4.doc
11. Alferova, T., 2012. Conceptual Modeling of the Definition of Category “sustainable development”. Economic Theory Magazine, 4: 46-52.
12. Syroezhin, I., 1980. Updating System of Efficiency and uality Indicators. Economics.
13. Zhmaeva, I., 2005. Organizational and Economical Mechanism of Balanced Planning of High-tech Production in Conditions of Open Innovations, PhD thesis, MSU, Moscow.
14. Tonkikh, A., 2006 Modeling of Efficient Management of corporative Finances. EκAterinburg-Izhevsk.