

## DEVELOPMENT OF SYSTEM ANALYSIS IN ECONOMICS

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**Abstract.** In spite of a big age of economics its complex systemization becomes reality only in current millennium. Beginning of 2000s is associated with changes of dominant paradigms in many fields of human activities, including education. In this period a new discipline appeared in studying plans of preparing professional economists. This discipline is called “System analysis in economics”. The Department of mathematical modeling economic processes in Financial University prepared methodical base for this discipline. Later this material got common social respect. In the present article we describe the main stages of system approach’s development and expansion in the problem field of economics.

**Keywords:** theory of systems, system analysis, system economics, system management.

As a particular discipline “Theory of systems and system analysis” appeared in studying plans of economists’ and managers’ professional education not long ago. It was in the beginning of current millennium. And our university (in that period it was an academy) had a straight relation to this process. In that period there was the Department of mathematical modeling economical processes. The Department prepared studying program of this discipline and its methodical base. In 2005 these materials were published inside the university, and then in 2007 they were published as a fundamental student book in “Finance and statistics” editorial house.

Publishing this material, which was originally oriented to the economic problem field, played a big role in developing and popularizing this discipline in economical specialties.

In the following 2–3 years a discipline named “System analysis in economics” appeared in different variants in job studying plans of all economical specialties and educational programs. However, faculties’ administrators didn’t understand the whole integrative character of this discipline and included it in studying plans of the first courses. It lowered the results of studying this discipline. For the best understanding methodology of system analysis there should be knowledge of basic elements in many connected studying disciplines, such as higher mathematics, philosophy, economics, theory of probabilities and mathematical

statistics, theory of quantities and algebra of logic, general management, etc. The experience has shown that the best results of studying this discipline are demonstrated by bachelors of the 3<sup>rd</sup> and the 4<sup>th</sup> courses and by magisters of course.

Scientific and educational society provided big hopes with the appearing of a new integrational discipline in studying plans of economists. It was expected that success of system methodology in studying nature and space, projecting and creating big technical systems in the nearest time would give the same effect in economical field. There was faith that finally we’d be able to give more system character and organization to reforms and restructuring in national economy. However, the representatives of system approach tried their best to adapt its methodology to the economic problem field, and finally they were more and more convinced that in present system paradigm it was impossible.

It appeared, that economics systems are different in roots from natural and artificial systems, which were the objects system analysis, it’s creating, development and improvement. In these types of systems basic connections between the elements have natural base: the like-charged particles attract each other and oppositely charged particles repel each other, water molecule always includes two atoms of hydrogen and one atom of oxygen, a wolf hunts for a hare, etc.

So far, for successful exploring natural and artificial system it is enough to identify the basic connections between the elements and include them into the relevant experimental model. Then you may use it for many times so as to find the truth, construct new mechanisms, make synthesis and restructuring explored system.

Differently from natural and artificial systems, basic connections in economic systems don't have natural base. They have *cultural base*. It means that in fact they are absent. They exist only in imagination of humans, who are the active elements of economic systems. In mentality of the active elements there are deeply rooted relations to other active elements. These relations cause real activity or passivity of active elements, which immediately impacts the present state of the explored system. No doubts, that it also impacts future of the system.

We may conclude, that for successful exploring economic system analytics should take in account cultural connections between the elements instead of natural connections. And here we meet two problems which are very difficult for being overcome. First: in methodological apparatus of system analysis created to the present time there are no instruments for finding and identifying cultural connections between the elements of explored systems. Second: connections between active elements change constantly, and it is impossible to identify the dominant one in certain moment of time.

For overcoming these problems there should be a new paradigm and – so far – a new theory of systems and system analysis, originally oriented to cultural specifics of the economic systems. And we should be thankful to wisdom of our university's management in that period. In highly ballasted stream of scientific information it was able to find the start-ups of newborn theory of systems. Our management invited representative of this theory, famous scientist George Kleiner to constant work and comfortable conditions for further development and practical realizing his scientific achievements in studying process. According to the order of rector from May, 18, 2009 the Department of System Analysis in Economics was established. It united the best forces of academic and university science which were present in that period. Just that year in order to provide wider borders and system character to integration

between system analysis's methodology and economic problem field the scientific and methodical seminar was organized. It connected specialists from all universities of Moscow and was called "System analysis and modeling in social and economic problems' decision". Besides All-Russian scientific and practical conference called "System analysis in economics" was established. In the first time it took place on November, 24-25, 2010. George Kleiner published the main thesis of a new system economic theory called "System economics". These ideas were pleasantly accepted by teaching corpus of our university and by all scientists and lecturers of the national high school. The new approach allowed to summarize economical knowledge accumulated to that period, as well as find the economic problems with system character, which demand immediate decisions.

For instance, the basic classification of economic systems, which divides them in environments, objects, processes and projects, led to necessity of increasing present nomenclature of products' types. Now it includes services, jobs and goods, and reforms should be added here. These are the typical results of project systems. The same thing is provided with offer to reform the structure of law-making body of the state. According to it Federal Assembly should be increased by to chambers – house of branches and house of organizations. This structure provides representation of economical agents on meso- and micro-levels in law-making bodies. It allows to provide system balance and organizational unity of national economy. And following to the principles of system economics (subject of conservation, optimization, stability, competition, cooperation, substitution of import, etc.) was accepted by many specialists as a general of overcoming crisis in economical subjects and national economy as a whole.

What is more important, system economics allowed to create theoretical base for many stable economical ideas. For example, the solid theoretical base was created for Charles Handy's classification of organizational cultures [7]. These types are known as autocratic (culture of Zeus), administrative (culture of Apollo), project (culture of Athene) and personnel (culture of Dion). In the same way it was proved that there are limits of manager's activities classification created by Adizes. This classification

includes P (producing), A (administration), E (entrepreneurship) and I (integration) [1]. Particularly it is necessary to point out theoretical base of a concept, which is very popular in economical society. It's a concept of balanced system of indicators created by David Caplan and Robert Norton [3]. According to it, each one of its four elements is associated with certain type of system: the "Finance" element is associated with object system, business-processes are associated with process system, the element named "Studying and growth" is associated with project system, and the consumers are associated with environment.

Unfortunately, we can't validate that the main ideas of systems economics are easily accepted and learned by the students. Firstly, it is caused by their original unreadiness to understanding such highly integrated scientific material. Secondly, there is no really valuable students book provided with system economics, and usually there is no time for finding necessary information in monographies and scientific articles. And in thirds (it is the main thing), there are no formalized methods for supporting system analysis's process in the context of new system economics.

The problem is that, as a rule, social and economical system includes the features of all four types of systems: object, project, process and environment. Electing certain elements from the whole system is untrivial creative task for cognitive abilities of a student. And if it is also demanded to model the system on different hierarchal levels, connect these hierarchies between each other, and balance the quantity of types of systems on each level, the task becomes quite unacceptable. Only talented people can find its decision without instrumental and methodological support. So, we may conclude, that there should be a hard work on instrumental and methodological apparatus of system analysis in the context of new system economics. In the same time, we should understand, that this work cannot be done by a particular person and even by a whole department. Creating methodology and instruments of new system analysis should involve analytical society as a whole. It seems, that pointed circumstance is one of the bases of movement for establishing association of system economics.

The weak place of system economics in its present state is a definition of system.

From easy position of Yanosh Kornai system is expected as a part of space-time, which is relatively particular in space and stable in time; it has external unity and internal differences [6]. Here we take in account that independence, stability, unity and difference are identified from the point of social explorer. He is a normal participant of business activities and his ability to identify system characteristics depends on his ability to receive and analyze the information. It's not difficult to expect that there may be a mistake in the results of identifying a system in space-time. In this case, that's not wright to use system methodology for exploring elected formation which is not a system. I can expect that in formulated definition fixed external system character should be forced by validating internal system character of elected element in space-time.

There are also other problems which don't still allow wider using of system economics for solving practical tasks of system analysis. Nowadays its practical using is associated first of all with art, nor with habitual engineering.

Finally, we have to conclude the following thesis. In modern system two theories are present and live in peace. These are classical and system theories. The base of classical theory is paradigm, which's main ideas were created by Ludwig von Bertalanfy in 1930s [3]. According to his ideas a system is identified through the internal connections between the elements. The base of system economics is a system paradigm, which's ideas were formulated by George Kleiner in the beginning of current millennium [5]. According to his ideas a system is identified through external acceptance. I think, as usual, the truth is in the mid. It follows, that there should be an active work for organic integrating formulated approaches of system theory and synthesis a new one, which's name is still in project.

## REFERENCES

1. *Adizes I.* Ideal manager: why it impossible to become and what does follow from this [Ideal'niy rukovoditel': pochemu im nel'zya stst' i chto iz etogo sleduet]. Moscow, 2007, 263 p. (in Russian)
2. *Drogobyckij I.N.* System analyses in economics [Sistemnyj analiz v ehkonomie]. Moscow, 2017, 607 p. (in Russian)
3. *Kaplan R., Norton D.* Organization oriented on strategy: how do organizations using balanced system of indicators become successful in new business environment [Organizatsiya orientirovannaya na strategiyu: kak v novoy biznes-srede preuspevyut organizatsii ispolzuyushie sbalansirovannuyu sistemu pokazateley]. Moscow, 2004, 423 p. (in Russian)
4. *Kleiner G.B.* Economics. Modeling. Mathematics: elected articles [Economika. Modelirovaniye. Matematika: izbranniye trudy]. Moscow, 2016, 856 p. (in Russian)
5. *Kleiner G.B., Rybachuk M.A.* System balance in economy [Sistemnaya sbalansirovannost' ekonomiki]. Moscow, 2017, 320 p. (in Russian)
6. *Kornai Y.* System paradigm [Sistemnaya paradigma]. Voprosy ekonomiki – Questions of economics, 2002, no. 5, pp. 4-23 (in Russian)
7. *Handu C.* Gods of management: the changing work of organization. Oxford Universiti Press, 1996. – 254 p. (in English)