

Interdisciplinary Synthesis in Economic Research in the Context of Digitalization

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ABSTRACT

The article is devoted to the issues of the interdisciplinary nature of modern scientific practices and the strengthening role of interdisciplinary synthesis in research in the context of the society’s digitalization. The authors analyzed the content and specificity of inter-scientific approaches in research activities: intradisciplinary, interdisciplinary, transdisciplinary, multidisciplinary. Interdisciplinary synthesis was considered as an integration of concepts, ideas and methods of various disciplines in order to solve the tasks of applied research and enrich scientific knowledge. It was based on the analysis of domestic and foreign scientific views. The authors identified the prerequisites and reasons for the actualization the interdisciplinary research in the context of economic transformation. The authors revealed the key advantages and possibilities of using interdisciplinary synthesis in scientific economic research in the context of digitalization. The interdisciplinary connections of economic theory with the social, natural, humanitarian and mathematical sciences were identified in the article. The authors proposed the interdisciplinary matrix of economic research.

Keywords: *interdisciplinary synthesis, interdisciplinarity, intradisciplinary approach, economic research, economic disciplines, digitalization*

1. INTRODUCTION

The modern development of society is characterized by a number of some new issues and problems caused by the development of the digital economy. The simultaneous layering of such social processes as large-scale globalization expansion, the information revolution, the transition to innovative development, the environmental crisis and the exacerbation of the shortage of economic resources have radically changed the conditions for the functioning of society, thereby putting forward new requirements for the process and the results of scientific research. The use of various methodological tools for the scientific knowledge of social phenomena leads to ambiguous theoretical conclusions that reflect different aspects of a complex social organism. Today, there is an urgent necessity for interdisciplinary studies of the specific genesis of the multipolarity of modern society, which would illuminate the essence of various institutions and the transformational links between them, characterized by information, complementarity, and the strengthening of the relationship between the parts in the context of digitalization.

In a digital society, interdisciplinary synthesis, integration, and interpenetration of sciences are becoming widespread. It should be noted, firstly, that interdisciplinary synthesis is an international phenomenon; secondly, its causes, essence and forms of manifestation are not sufficiently clarified; thirdly, in the course of research a number of urgent debatable problems arose related to these approaches in

general and their individual types in particular (intradisciplinary, interdisciplinary, multidisciplinary, transdisciplinary).

1.1. Related Work

The methodological developments with which scientific schools operating in the field of economic sciences entered the 21st century need updating and supplementing with the achievements of related scientific schools - sociological, philosophical, political, and some others. General interdisciplinary foreign practices are related to how the scientific community from various research areas “does things together”, creates identity [1], develops a unique working style and way of doing business [2], and also develops a typology and indicators of interdisciplinarity [3]. Exploring the concept of interdisciplinarity in economic research, scientists consider some aspects and problems of economic practice, for example, in the context of ensuring socio-economic growth [4, 5]. According to G. J. Stigler, until about the last third of the 19th century, the development of economic science was decisively influenced by socio-economic development, and after that it was under the decisive influence of internal changes in science itself [6, p. 463]. Owing to these factors, the consideration of the relationship between the concepts of economic sciences from a purely theoretical plane has shifted more and more to the practical plane.

1.2. Research goal

The increasing complexity of the applied tasks of transforming the economy necessitates a deeper understanding of the problem of interdisciplinary connections between economic theory and other sciences. In the methodological aspect, this problem includes a fairly large number of questions: the typology of formation, factors for highlighting new disciplines, interdisciplinary connections, especially the combination of educational and scientific disciplines. In recent years, a significant amount of both intradisciplinary and interdisciplinary “synthesis” studies has been observed in socio-economic literature. These approaches have direct access to the formation of an interdisciplinary synthesis of basic schools and areas of the latest stage in the development of economic theory and relate not only to political economy or economic theory, but also to the other humanities. The hypothesis of this work is the use of interdisciplinary synthesis as the organization of scientific knowledge in order to improve the quality and effectiveness of economic research in the context of digitalization.

2. MATERIALS AND METHODS

The research materials were the fundamental principles of the theory of economics, philosophy and pedagogy. As a

research method, a comparative analysis was used to identify the characteristic features of the intradisciplinary, interdisciplinary, transdisciplinary and multidisciplinary approaches to scientific knowledge. To identify the inter-scientific relations of economic theory with other sciences, as well as to develop an interdisciplinary matrix of economic research, a system-functional approach, critical synthesis methods and comparative analysis, as well as a graphical method for presenting the results were used.

3. RESULTS

Studying the characteristic features of such approaches to scientific research as intradisciplinary, interdisciplinary, transdisciplinary, multidisciplinary, it is determined that interdisciplinary synthesis in economic research is an integration of concepts, ideas and methods of various disciplines in order to solve the tasks of applied research and enrich scientific knowledge. Inter-scientific relations of economic reality research are grouped in the form of a table showing the relationship of economic theory with individual social, mathematical, humanitarian and natural sciences. The possibilities for conducting interdisciplinary analysis in economic studies in the context of their relationship with other sciences are presented in **Table 1**.

Table 1 Interdisciplinary relations of economic theory with groups of sciences

Group of sciences	Sciences	Interdisciplinary communication
Math sciences	Math	The use of mathematical knowledge and methods in the study of economic processes and phenomena
	IT	The use of information and communication technologies and multimedia resources in the processing of economic information
Social Sciences	Sociology	Analysis of the interaction and behavior of sociological groups in the economy
	Psychology	The study of the motives of human behavior in the process of economic activity
	Jurisprudence	Consolidation of key economic terms, phenomena and processes in regulatory legal acts.
	Political science	The study of governance and public choice in the economic space
	History	Historical consideration of the genesis and development of economic phenomena and processes
Natural Sciences	Geography	Analysis of natural resources and the geography of productive forces as components of national wealth, which must be effectively managed
Humanitarian sciences	Languages	A study of the etiology of the origin of the conceptual categorical apparatus of economic science

A source. Designed by Authors

Based on the basic conceptual provisions of interdisciplinary synthesis, the authors proposed an interdisciplinary matrix of economic research. Interdisciplinary synthesis in economic science allows you

to reproduce the transfer of knowledge from various sub-sectors and disciplines within the general system of scientific coordinates. All of the above sufficiently characterizes the methodological relationships of the

modern matrix of the system of scientific research in economics (Fig. 1).

Subjective determinants					Object determinants
Determinates of organizational, political and socioeconomic relations	Political economy	International economics	Macroeconomics	Microeconomics	Marketing
	Public Welfare and the Public Sector	International trade	Macroeconomic equilibrium	Microeconomic equilibrium	Consumer behavior
	Public finance	International finance	Public finance	Enterprise Finance	Financial marketing
	Economic Theory of Law	International Economic Law	Economic law		Standardization, product certification and brand management
	Economic development in the context of globalization	Global economy	Macroeconomic Theory of an Open Economy	Economics and organization of innovation	Marketing Distribution Policy Strategic marketing
				Enterprise Potential and Development	
	Public choice	Global economy and international conflicts	Political business cycles	Economic analysis of political markets	Public Relations Political marketing
	Transformational Economy	Transformation Systems and International Politics	Macroeconomic analysis of transformation processes	Transients and enterprise crisis management	Marketing product and pricing policy Product
Economic policy	International economic policy and management of foreign economic activity	Macroeconomic Policy and Public Administration	Microeconomic policy of the company and strategic management	Innovation Policy Marketing management	
Political Economy Institutions and Development					
Positive methodology (history of economic studies, economic history, statistics, accounting, etc.)					

Normative methodology (economic and mathematical methods, economic analysis, etc.)

Figure 1 Interdisciplinary matrix of economic research

The proposed matrix reflects in matrix form the structure of the components of economic science. The processes of the formation of scientific theories, concepts and models are not so much in a narrow circle of specialists as in a fairly wide audience, including those interested, united by common interests by specialists. The spread of digitalization and related integrated information technologies creates opportunities for improving the quality and effectiveness of scientific research, as well as developing their practical potential.

4. DISCUSSION

Interdisciplinary research is any scientific research or a series of studies carried out by scientists from two or more different scientific specializations. The study is based on a conceptual model that combines theoretical foundations from different disciplines, uses a methodology that is not limited to any one area of knowledge. However, in order to turn to interdisciplinary research, scientists need to conduct an intradisciplinary research involving a critical analysis of an object within one and / or several relevant disciplines. It should be noted that at present there is no single view on the interpretation of the concept of interdisciplinarity. Its

polysemy reflects the complexity of its functional and substantial manifestations. Interdisciplinarity is seen as a form of organization of scientific knowledge based on certain relationships between scientific disciplines, technologies and methods, providing a solution to complex problems. This concept is characterized by the properties of integrability and requires a synthesis of the results obtained in the framework of various scientific disciplines.

In the process of research, an interdisciplinary approach is implemented through two main formats. The first format considers interdisciplinarity as an informal uniting link between various sciences, while not violating their uniqueness, but forming a kind of add-on in methodological and instrumental dimensions. The idea of interdisciplinarity does not mean abandonment of a disciplinary approach, but is accompanied by the establishment of techniques and approaches to interdisciplinary research, forming interdisciplinary thinking.

The second format defines interdisciplinarity as a real tool for combining sciences, and is manifested in the formation of integrated interdisciplinary research objects. In this regard, the interdisciplinary practice of scientific research provides for the use of the potential of existing concepts, theories, doctrines created by the efforts of scientists of other sciences. In this case, practice can be described as a set of actions or statements that are aimed at achieving a specific goal [7].

In a broad sense, interdisciplinarity involves the mutual integration of organizational concepts, methodological procedures, epistemology, terminology, data and the organization of research and training. However, in a narrower sense, two models of interdisciplinarity in economic science are also considered:

1. Multidisciplinary (or multidisciplinary), based on the need to exchange knowledge with "related" disciplines, aimed at achieving a better understanding of the economic system, but in which each discipline has a clearly delineated area.
2. Transdisciplinary, which advocates the need to "go beyond" the current disciplines, forming a unified social science [8, p. 352].

Thus, multidisciplinary research means that the object is considered from the point of view of two or more disciplines, however, the new knowledge obtained is not integrated, and a situational connection is determined in the context of these sciences. Transdisciplinary research is necessary to develop new knowledge to solve complex problems, taking into account various points of view on it and on the basis of related abstract and specific knowledge [9, p. 2]. The result of such a study can be a transition to a new quality of knowledge, the emergence of a new scientific direction or scientific discipline.

Modern scholars point out that "interdisciplinary knowledge is better than knowledge obtained from one discipline" [10]. Interdisciplinarity today is the main supplier of new knowledge and in the context of digitalization it acquires special significance when the object of scientific research becomes more and more systemic and multidimensional, depending on a significant number of factors. Today there is a complication of

economic, social and managerial institutional structures and systems, their interweaving.

To master the mechanism of functioning and development of these systems becomes impossible within the framework of the methodology of one science. Such an understanding of the research problems leads to the search for information from different fields and areas, the use of methods from other disciplines and sciences, which necessitates the use of interdisciplinary tools. In addition, dynamism and the mobility of social processes and phenomena in the digital economy have become an important reason for the spread of interdisciplinary synthesis.

The structure of the multidisciplinary research methodology implies the maximum benefit from the multidisciplinary research. Modules can be mono- or interdisciplinary and can be based on quantitative, qualitative, or mixed methods [11, p. 1215].

One of the first to most comprehensively considered the interdisciplinary synthesis of M. Marney & N. Smith in 1972, focusing on the sociological, philosophical and political aspects of the category [12]. The classical stage in the development of science was characterized by accelerated differentiation of knowledge, the allocation of individual scientific disciplines. For the non-classical stage, an intradisciplinary synthesis of scientific knowledge was more typical, and for the post-non-classical stage, an interdisciplinary synthesis of knowledge is highlighted. The interdisciplinary synthesis of economic research is implemented in two directions: as integration that does not go beyond the boundaries of social and human sciences, and as integration carried out throughout the space of scientific knowledge without any disciplinary restrictions.

Interdisciplinary synthesis - a combination of theories, methods and methodologies of various disciplines in order to obtain new knowledge within the same discipline or at the junctions of different disciplines [13, p. twenty]. Modern economic science uses a fairly wide methodological toolkit to study the constituent elements of its subject, and some disciplines have so deepened their own methodology that they can claim the status of an independent branch of scientific knowledge in the near future. Economic methodology is an important area of research that studies the fundamental, high level of economic knowledge, the principles of its conclusions and evidence of a variety of economic provisions and theories.

The synergetic methodology, which has been developed in recent decades, substantiates the significant differences between static and dynamic mechanics, the behavior of closed and open systems, equilibrium and nonequilibrium systems, the interaction of chaotic and ordered forms of development, therefore, in our opinion, it must be used in theoretical studies of economics. Today there is no branch of science in which the concepts of "complexity", "non-linearity", "bifurcation point", "fluctuations", "dissipative structures", "coherence", "stochasticity", "randomness", etc., are used by synergetics. [14, p. 8]. The synergistic approach is a methodological tool that applies to any systems that operate on the principles of self-organization. It is known that "the most interesting ideas in the history of philosophy and science arose precisely during the collision

and mutual criticism of different conceptual frameworks, various intellectual paradigms” [15, p. 578].

The focus of modern scientific research is shifted to creating the conditions of human life. In the context of digitalization, the traditional boundaries between disciplines are blurred to a greater extent and much faster. The global reach of information networks is against narrow specialization. However, the specifics and dangers lie not in the information and computer technologies themselves as a continuation of general technological changes, but in the methods and content of their application [16, p. 255]. In this context, digitalization should not be considered as a goal, but as a tool or method of obtaining additional advantages in the process of scientific research, including on the basis of interdisciplinary synthesis. In this regard, we will determine the following main advantages in using interdisciplinary synthesis in scientific research in the context of digitalization:

- the availability of diverse interdisciplinary scientific information;
- speed and optimization of information retrieval;
- verification of information received;
- effective management of multidisciplinary knowledge through digital platforms;
- the possibility of using new methods of scientific research from other sciences through interdisciplinary cooperation;
- dissemination and intensification of scientific cooperation of scientists from different countries and of different scientific directions using information and communication technologies.

Thus, digitalization becomes a prerequisite for dissemination and a driver for the development of an interdisciplinary approach in scientific research. It can be assumed that the need for special knowledge will disappear, as researchers will be able to navigate networks that contain knowledge about the world, without effort to extract the necessary information. At the same time, digital technologies can facilitate the participation in a multidisciplinary project of a number of specialists.

Interdisciplinary modeling is becoming more accessible, although new methods are emerging for integrating discipline-specific modules into the overall program. The “navigation” nature of the digital search and processing of information objectively facilitates the process of cognition and analysis of data, and, therefore, is a prerequisite for improving the quality and effectiveness of research.

In modern conditions, economic research and economic discipline are becoming more and more interdisciplinary. The ambiguity of the phenomena and processes that become the object of scientific research causes the problem of the impossibility for economists to explain real economic processes from the standpoint of only traditional economic theory. To explain modern economic processes, it is necessary to study their diversity, using a method that allows us to represent reality as an ordered set of components in a certain way, highlight their common features, determine the degree of their interaction, interdependence and complementarity in the real dimension.

Thus, an interdisciplinary approach combining the knowledge of other disciplines with the economic basis of analysis to form a more inclusive means of studying issues will contribute to a more productive discourse. Interdisciplinarity contributes to the generation and posing of new questions, which can then stimulate the development of new approaches and methods to solve new problems [17]. Disciplinary practice can be useful in studying economic issues of interest not only to economists, but also to specialists in other areas of human life. Issues related to unemployment, environmental pollution, education, healthcare have psychological, sociological, moral and political aspects, the study of which only from an economic perspective is insufficient.

In the field of recent economic studies, considerable interest is made by the attempts to synthesize the concepts of new classics and new Keynesians. For new classics, which include R. Lukas, T. Sargent, N. Wallace, F. Kydland, E. Prescott, R. Varro, Ch. Plosser and many other scientists are characterized by a penchant for theories of money and the real business cycle. New Keynesians - J. Stiglitz, O. Blanchard, N.Y. Mankiw, Y. Akerlof, M. Ragkin and others - represent the concepts of real and nominal rigidity of macroeconomic indicators (prices in commodity markets, wages), asymmetry of information, etc.

Unlike the new classics with their postulate that the economy has a tendency to maintain long-term equilibrium and the level of full employment of resources, the new Keynesians allow the possibility of significant fluctuations in total output and employment, despite the rational behavior and expectations of economic entities at the micro level. The basis for combining new classics and new Keynesians is their commitment to the hypothesis of rational expectations, the consideration of the behavior of economic entities as rational, the purpose of which is to optimize their objective function. Let us pay attention to the attempts of new Keynesians by including the problems of asymmetric information in macroeconomic research to actively use psychological and sociological phenomena in them. As George A. Akerlof, A. Michael Spence, Joseph E. Stiglitz [18] emphasize, sociological and psychological approaches rely on factors outside the economic standard set. This leads to the emergence of the so-called behavioral macroeconomics. In this case, there is a transition from intradisciplinary to interdisciplinary synthesis. For economic science, such a transition is caused by a problem space that is common with other sciences, which causes both mutual discussions and mutual enrichment. Therefore, a high-quality interdisciplinary research must necessarily include the so-called mapping of international relations. One of the new methodological areas of the social sciences is the adoption of their components (economics, philosophy, sociology, history) as an organically whole, where the object of research is the same - society. V. Leontiev, analyzing the relationship between economics, anthropology, linguistics or geography, noted that each of these disciplines developed “its own analytical apparatus and achieved corresponding successes in explaining the observed phenomena”. Each of these sciences develops separately from each other and recommends a pluralistic

approach, the essence of which is “not the simultaneous application of significantly different types of analysis, but the willingness to move from one type of interpretation to another [19, p. 28]. A complete and reliable analysis of the modern economic system today is impossible only from the point of view of not only one school of economic theory, an interdisciplinary approach is needed here, which would cover law, politics, economic culture, traditions etc.

Interdisciplinary studies conducted within the framework of synergetics have revealed "... the effects of phase transitions and the formation of dissipative structures" [20, p. 183], thereby confirming the need for such an analysis. Despite the complexity of the tasks, it is important to study the processes of structuring economic science as a component of the system of social sciences, in particular, to determine the regulatory principles for the formation of the disciplinary matrix of economic science, on the basis of which the paradigm of economic education is formed. In general, by the disciplinary matrix we mean a subordinate system of disciplines that determine the normative structure of scientific knowledge and research. The choice of the subject component of the study determines the formation of an independent branch of science and the corresponding search for specialized methods and tools for studying the processes and phenomena underlying it.

At the same time, the generalization and justification of specialized methods, within the framework of the methodology of science, make it possible to use them in other areas of scientific knowledge, thus forming integration interactions between them. Such an approach, in our opinion, allows us to determine not only scientific relationships and separate them from ideological doctrines when structuring the system of economic disciplines, but also to formulate criteria for intradisciplinary subordination. Economic science is an offshoot of system logic, a certain way of thinking in terms of categories and models that will be adequate to current economic practice. Economic education, in turn, acts as a way of forming such thinking. This gives grounds, when forming an interdisciplinary matrix of economic studies, to draw on the above principles of subordination of disciplines of economic science and use identical criteria and determinants. The key methodological principle of economic research should be the unity of the economic essence of concepts and categories in the process of using them by various economic sciences and, at the same time, the recognition of the multi-stage nature of certain categories, phenomena and processes.

5. CONCLUSION

Focusing on economic conceptual approaches (an interdisciplinary approach) helps isolate economic theory from other branches of science. Therefore, the foundation of economic research methodology should be an intradisciplinary synthesis, which in digitalization will ensure the scientific coverage of various facets of reality based on the determination of the essential relationships between them, as well as create conditions for improving the quality of scientific research and developing the

potential for practical application of its results. The completed information technology system is aimed at the effective organization and monitoring of scientific research, the regulation of all stages of their life cycle and electronic document management, the analysis and evaluation of research results, as well as the formation of an integrated space of interdisciplinary knowledge. Digitalization makes it possible to measure indicators of the volume and quality of scientific results and, accordingly, objectively evaluate, compare and monitor the results of scientific research of an interdisciplinary nature. The process of developing scientific knowledge, as well as of society as a whole, today is becoming not only a means of cognitive activity, but also an integral part of economic culture, socio-economic development, which are mutually agreed with the behavior of economic entities and the adoption of state decisions. It seems possible and necessary to measure the relative level of individual interdisciplinary studies, support intellectually complex processes of theoretical, empirical knowledge, and also assess the potential for testing the results obtained.

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