

Lyudmila Ivashova,

*Doctor of Sciences in Public Administration,
Professor of Public Administration and Customs Governance Department,
University of Customs and Finance,
Dnipro, Ukraine*

Roman Bakardzhyjev,

*PhD in Technical Sciences,
Associate Professor of the Department of Technology of Structural Materials,
Tavria State Agrotechnological University*

METHODOLOGY OF SCIENTIFIC RESEARCH AND SYSTEMATIC APPROACH: MECHANISMS, LEVELS, METHODS, AND TOOLS

The substantive essence of the concept of methodology of scientific research is revealed in the article. The peculiarities of formation of methodology of scientific research in the field of public administration are shown. The main structural elements of research methodology and systematic approach in their hierarchy and relationship are proposed.

The use of scientifically based research methods is the most significant condition for increment and obtaining new knowledge, so their selection is critical to the research results. Modern scientific activity is impossible without application of methods of cognition. They are generally accepted tools. If the researcher plans to carry out scientific exploration and to summarize its outcome in the form of conclusions and proposals only based on the personally received facts, based on own understanding of the problem and a set of own "homegrown" methods, it will likely lead to errors, misstatements or not scientific results.

The methodology of scientific research and systematic approach are fundamental concepts that everyone who is engaged in or planning to engage in scientific work should learn. Understanding the peculiarities of formation of scientific research methodology and its components from the definition of the problem and purpose to the reveal of the algorithm of research activities' realization and to get the results of it based on systemic approach is a guarantee of efficiency and effectiveness of research. The strict observance of the basic principles of research: feasibility; objectivity; historicity; justification; the adequacy of the assessment results; sequence is important for the researcher. The compliance with the proposed methodology of research in any field of scientific knowledge can provide completeness of research work, which claims to be scientific.

Keywords: public administration, system of cognition, research methodology, research methods, mechanisms, tools, instruments.

Iwaszowa L., Bakardziejew R. Metodologia badań naukowych i podejścia systemowego: mechanizmy, techniki, metody, instrumenty

W artykule rozpatrzono treść istotną pojęcia metodologia badania naukowego. Określono specyfikę kształtowania się metodologii badań naukowych w sferze administracji publicznej. Określono podstawowe elementy strukturalne metodologii badań i podejścia systemowego, ich hierarchię oraz wzajemne powiązanie.

Słowa kluczowe: administracja publiczna, system poznania, metodologia badania naukowego, metody badań, mechanizmy, instrumenty, techniki

Івашова Л.М., Бакарджієв Р.О. Методологія наукових досліджень та системного підходу: механізми, важелі, методи, інструменти

У статті розглянута змістовна сутність поняття методології наукового дослідження. Окремлено особливості формування методології наукових досліджень у сфері публічного управління. Визначено основні структурні елементи методології досліджень та системного підходу їх ієрархію та взаємозв'язок.

Ключові слова: публічне управління, система пізнання, методологія наукового дослідження, методи дослідження, механізми, інструменти, важелі.

Івашова Л.М., Бакарджієв Р.О. Методологія наукових досліджень та системного підходу: механізми, рычаги, методи, інструменти

В статье рассмотрена содержательная сущность понятия методологии научного исследования. Определены особенности формирования методологии научных исследований в сфере публичного управления. Определены основные структурные элементы методологии исследований и системного подхода их иерархию и взаимосвязь.

Ключевые слова: публичное управление, система познания, методология научного исследования, методы исследования, механизмы, инструменты, рычаги.

Introduction

At the current stage of state building, a gradual replacement of the old bureaucratic system of public administration is done to the innovative system of public administration through the expansion of subjectivity of the management process: from the state and local governments to active involvement of the representatives of nongovernmental, self-governing organizations and individuals

into the management process. The formation of public administration system in Ukraine requires scientific substantiation of methodological approaches to the study of this process, understanding the sequence of its course and scientific prediction of results and consequences from the implementation or lack of reforms. An important area of scientific research is clarifying the nature and the content of the definition of “methodology” as the basis of scientific knowledge that defines the process and results of research activities in various areas of public life.

Analysis of recent research

The disclosure of the essence of methodology as the foundation of scientific knowledge of the world, on the one hand, is a scientific and cognitive activity, and, on the other hand, is one of the main and most difficult tasks because directions, processes and results of scientific and cognitive activity depend on its understanding. Therefore, from the times of the ancient Greek philosophical thought of ancient Greece (Democritus, Socrates, Aristotle, Plato) to the time of separation of individual sciences from the philosophy (Bacon, Galileo, Descartes, Newton, Leibniz, Husserl, Bertalanffy, Ashby, Parsons et al.) and to the present (Bakumenko, Hryhoryshyn, Ilyin, Kuhn, Kochanowski, Mannheim, Pismachenko, Rich, Saaty, Spitsnedal, Surmin etc.) problems of improvement of methodology of scientific research remain relevant. Many foreign scientific schools do not distinguish between scientific methodology and research methods approach in order to disclose the essence of the very concept of methodology. For instance, some authors like J. Mannheim, R. Rych [7], U.Eshbi [19] consider methodology as a system of methods of knowledge. Others, including W. Kohanovskyy, believe that the methodology is the general theory of methods of cognition [4]. In the works of O. Krushelnytska [5] methodology is seen as a multi-building, where philosophical methodology is housed on the upper floor, then - general scientific methodology, and methodology of different sciences is on the lowest floor. V.Sheyko and N.Kushnarenko [18] see the determination of the purpose, content and research methods in methodology. Contrary to them A.Rakitov [11] reduces the concept of methodology only to the system of the principles of scientific research. Y.Surmin [15] and E.Yudin [20] examine the methodology as some system that brings together the methodology of cognition, assessment and practical activity according to the main types of activities. It is common with the main approaches to the disclosure of the essence of the methodology from the system-activity positions as described in the works of A.Baskakov [2] and M.Sverdan [13]. According to them, the methodology examines interdependence, interrelation and dependence of knowledge system and activity system.

In general, national scientific tradition considers the methodology as the doctrine about a set of scientific methods of cognition or as a system of sci-

entific principles, on which the study is based and the choice of a set of cognitive tools, methods and techniques of research is made. V. Bakumenko, V. Knyazev [1] have examined general methodological approaches to researching problems of public administration [12]. The methodology of research in various areas of public administration is covered in the works of O. Borysenko [3] T. Krushelnytska [6] L. Pismachenko [10] and many other scientists. However, the dynamic development of society, of fundamental and applied science require rethinking and improving the research methodology of new problems and challenges faced by researchers.

Statement of research objectives

The purpose of the article is the elucidation of modern systemic methodological approaches used to study contemporary problems of the development of public management and administration, and the disclosure of mechanisms, methods, tools and advantages of their solution.

Results

The accumulation of knowledge about the world and society and the deepening of scientific knowledge in the disclosure of laws and regularities of functioning of real natural and social world constantly encourages scientists to analyze ways and means by which the knowledge is obtained.

The etymology of the term “methodology”, which comes from the Greek *μεθοδολογία* (*Μέθοδος* – way, method and *λογία* - word, teaching, science, knowledge) indicates that this is a difficult term, reflecting the ways or methods of cognition. Some explanatory dictionaries reveal the essence of the concept of “methodology” as “... the doctrine of the method of scientific cognition or as a set of methods used in scientific research” [14, p. 308]. Besides, this term is understood as “... the doctrine about scientific method of cognition and transformation of the world, its philosophical, theoretical basis and as a combination of research methods in different scientific fields according to the specific character of the object of cognition” [17, p. 399]. Therefore, scientists understand the term “methodology” as “... the doctrine about the rules of thinking in the process of creation of the theory of science” [4], “... the doctrine of scientific method of cognition” [7], “... the doctrine of structure, logical organization, methods and means of action” [20].

At the beginning of the development of civilization, the studies of problems of cognition generally and scientific cognition in particular belonged to philosophy. On the one hand, methodology is a certain set of philosophical methods of cognition, to which such methods belong as: the inductive method of Francis Bacon, rationalist method of Rene Descartes, dialectical method of Socrates, phenomenological method of Georg Hegel, Karl Marx, Edmund Husserl, sys-

temic method of Ludwig von Bertalanffy, William Ashby, Talcott Parsons and more. Thus, the methodology will be considered as theoretical and philosophical category, from which the vast layer of specific methods and techniques is excluded. It should be noted that even on the brink of XVI-XVII centuries, when experimental methods of cognition of nature were formed, mostly philosophers researched various issues of methodology of cognition. However, the greatest contribution during that period was made by those of them who simultaneously with philosophy were engaged in other special fields of scientific knowledge (Galileo, Descartes, Newton, Leibniz, etc.). [8]. Starting from the second half of the nineteenth century, especially at the end of it, the diversification of directions of scientific research was made, that is the splitting of philosophy into various scientific disciplines, exploring different aspects of the process of scientific cognition. Along with traditional philosophical methods, methods of mathematical logic and later methods of the probabilistic logic appear and begin to develop actively at that time. The interest to history and philosophy of science significantly increases because of the scientific revolution in natural science at that stage. A little later, such independent spheres of scientific cognition as psychology, economics and sociology of science were formed. A completely new area - the science about science appears in our days. All these scientific disciplines explore different aspects and relations of scientific knowledge by using their special techniques and conceptual apparatus.

The problems of method and methodology of scientific research attracted the attention of social thinkers, scientists and philosophers even in ancient times. However, as A.Konversky states [9], the detailed analysis of methods and means of scientific cognition has been actively carried out only in the last half century when the methodology of scientific research is closely linked with systemic approach. This is not about a simple set of methods used, but about the organized system in which the entire process of evolution preordained the place of each method in their totality [2].

In view of that, the methodology is a type of rational-reflexive consciousness, aimed at studying, improving and designing methods [1]. It is difficult to disagree with A. Rakitov that methodology is a system of principles of scientific research; a doctrine about scientific method of cognition of laws of nature by using a set of research methods applied in any science according to the specific character of the object of cognition [11]. It should be added that according to the system-activity approach the methodology examines interdependence, interrelation and dependence of systems of knowledge and systems of activity [20].

E. H. Yudin paid attention to the fact that the term “methodology” necessarily involves the use of the term “activity” and noted “... the methodology, which

is interpreted in a broad sense of the word is the doctrine of structure, logical organization, methods and means of activity. In this sense the methodology constitutes a necessary component of any activity, since the latter is the subject of awareness, education and rationalization “. [20]

The concept of methodology has two basic meanings: 1) the system of defined methods, techniques and operations that are used in a particular field of activity (science, politics, art, etc.); 2) the doctrine about this system, theory of method. On the one hand, the methodology of science examines the structure and the development of scientific knowledge, the means and methods of scientific research, ways to interpret the results, mechanisms and forms of implementation of knowledge in practice. According to these processes, it is possible to form such basic principles of the methodology of scientific research, such as the principle of correspondence of methodology to the object of transformation; the principle of openness of development or constant renewal as the research process and its means; the scientific validity of the principle. [12]

In addition, the methodology is understood as a general theory of methods of cognition. It overlaps with both the theory of cognition and appears to be broader than epistemology because it is interested not only in cognition methods, but also in methods of other forms of human activity [4, p. 171]. This view is shared, for example, by V. Kochanowski, who said: “the methodology as a general theory of the method was formed because of the need of generalization and development of those methods, tools and techniques that were discovered in philosophy, science and other forms of human activity” [4, p. 170].

The essence of the methodology according to V. Sheyko and N. Kushnarenko: “... the methodology is a conceptual presentation of objectives, content and research methods that provide achievement of the most objective, accurate, systematic information about the processes and phenomena” [18, p. 56]. If the abovementioned approach is added by a vision of the essence of methodology by V. Sheyko N. Kushnarenko, it will make its definition a more holistic and complete.

The works of E. Yudin are about diversity and a complex character of methodology as the phenomenon and the process of cognition. He recognizes that each of the variety of activities cannot exist without its methodology. In science, there is often a narrowing of significance of methodology only to the methodology of cognitive activity. The author notes that “... in modern literature the methodology is usually understood, above all, as the methodology of scientific cognition that is the doctrine of principles, forms and methods of scientific cognitive activity. The methodology of science gives the characteristics of components of scientific research - the object, the subject of analysis, research tasks

(or problems), the aggregate of research tools needed to meet the challenges of a particular type, and also forms an idea of the sequence of researcher's work in the process of solving problems" [33, p. 31]. Then the scientist notes: "... if before the methodology concepts covered, above all, a set of ideas about the philosophical foundations of scientific and cognitive activity, now it corresponds to internally differentiated, highly developed and specialized area of knowledge" [33, p. 34-35]. Finally, E. Yudin concludes: "thus, by introducing the concept of methodology, we actually distinguish two types of knowledge – knowledge about the world and knowledge about the knowledge (or, more precisely, of cognition). The first indicates what is learned, the second - how the knowledge about the world is achieved" [33, p. 31]. The difference between them is largely functional.

It should be noted that many foreign schools do not distinguish between scientific methodology and research methods [7, 19]. In most works of Ukrainian scientists [3, 10, 16] the methodology is regarded as the doctrine of scientific method of cognition, which shall be subject to a specific sequence of research beginning with setting goals and finishing with the assessment of the effectiveness of the study. Let us note that the term "method" in Greek means "the way of research or cognition," as a means of organization of practical and theoretical exploration of reality, caused by the laws of the development of the object. Y. Surmin determines the method as a set of specific rules, techniques, and standards of knowledge, assessment or action. [16] Scientists define the method of scientific cognition as a means of cognition, method of reproduction of reality in our minds, a system of principles and rules of practical and theoretical activities. Y. Surmin believes that the method can be defined differently. The method serves as activities aimed at object to obtain knowledge about it from the perspective of functionalism.

The scientific research in various fields of science is effective only if the researchers follow a certain order and rules of conduct, which are determined by the methodology of the study. As rightly pointed out by M. M. Sverdán and M. P. Sverdán, the methodology of scientific researches is a certain plan of action aimed at "... the definition of the problem, the construction of the subject of research and scientific theory, checking the validity of results". [13] Scientific schools in post-Soviet countries define two levels of research methodology: general and specific [12, 13, 15]. General methodology of cognition is based on the principles of materialist dialectics. It investigates the laws of development of scientific knowledge in general. It allows exploring all without exception events and lies at the basis of cognition of each of the branches of science. General methodology is based on the use of general scientific methods of cognition: ob-

servation and systematization, analysis and synthesis, induction and deduction, abstraction and logic, analogy and simulation and so on. It is explained by close organic link of any object of cognition with the solution of general, philosophical concepts. However, the specific methodology is aimed at research in certain fields of science. It is based on the laws of these sciences and it is manifested through the application of special empirical methods of research: economic-statistical, information-analytical, financial-budget, public-administrative, legislative and others.

Based on that methodology is synthesized concept and based on the theory of causal relations let us note that the process of cognition makes sense when performing two mandatory conditions: if there is someone to learn, and if there is something to learn that is, the subject and object of study. At the same time, we note that the object of cognition is an objectively existing substance, process or phenomenon that gives a rise to the problem and can be unlimited in its quantitative and qualitative characteristics. Therefore, the object of knowledge that has defined parameters by the researcher is defined in its limits.

The subject of scientific research can also be viewed in two ways. Firstly, it is researcher himself, and from the standpoint of methodology, he is not of interest to us. Secondly, it is someone who influences the state and development of cognition of the object (person or group of people who have some levers of influence on investigated phenomenon). After determination of the specific object and subject of research, the goal and objectives of the study are specified and the list of methods and mechanisms that allow the researcher to achieve set goal is determined. L. Pismachenko notes that theoretical approaches to interpreting the essence of the term “the methodology” as a process of cognition can be summarized by structuring this concept in the following elements: object, subject, object, goals, objectives, mechanisms and results that are expressed through other constant components of scientific knowledge. All components are closely interrelated and interdependent [10, p. 30].

We suggest the author’s vision of methodology of scientific research and systemic approach in theory and practice of cognition by developing and complementing this approach and taking into account diversity and complexity of the methodology of scientific cognition. It is displayed in the following structural and logical scheme and holds three main blocks: the staging, systemic-methodical and effective (Figure 1).

We note that the subject of the research formulates the problem and the main idea of the study, determining directions and allow formulating a working hypothesis of the study. It should be noted that formulation of the problem is a fundamental element of staging block (Figure 1), which allows the researcher

to identify the object and the subject of study. Nevertheless, often there is an inverse relationship, when the researcher, plunging into the information environment characterizing the specified subject of study, outlines a range of problems to be solved.

Filling systemic-methodical block allows building a clear algorithm of the research process according to its crucial structural elements: the purpose and objectives, principles and functions, mechanisms and levers, methods and tools for its implementation.

The last effective unit that includes innovations, inventions and scientific developments is formed considering that the main purpose of scientific research is the increment of new knowledge and ideas concerning the object and the subject of research.

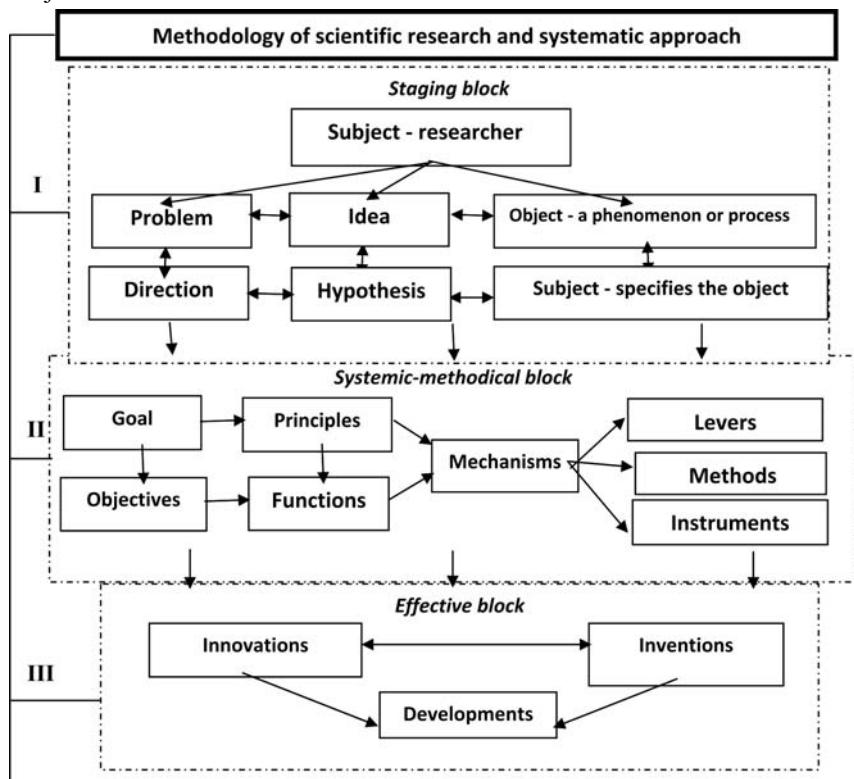


Fig. 1.6. The structural and logical scheme of methodology of scientific research and systematic approach in the theory and practice of knowledge.

This approach requires a special attention to the systemic-methodological block, from the correctness of filling of which the outcome of the study depends on. Each scientific work requires clearly defined goals, objectives, and common principles and features that in aggregate are called the research approach. Thus, the approach should be defined before the collection of factual material. For example, systematic approach, integrated (holistic) and other approaches can be used as research approaches.

The principles of dialectical logic can serve as the criteria for selecting research approach, namely:

- Objectivity of consideration (one should proceed from it itself, not from our thinking about it during the study of the object);
- Concreteness (one should take into account its features, specific conditions of existence, but principles and methods of research of the object should be used only as reference points);
- Comprehensiveness of consideration (the object should be considered in all its connections and relationships);
- Historicism (learning object, you cannot ignore its development, self-nomination, and change). The implementation of determined scientific approaches is done through the mechanisms of research, which, depending on their content allow taking into consideration both quantitative and qualitative indicators and their impact on the studied phenomena and processes. Overall, it is advisable to combine mechanisms into a single complex mechanism, the structure of which can be represented as follows (Figure 2).

As can be seen from the figure a necessary condition for the effectiveness of scientific researches is their full support in different areas ranging from organizational and management to the political support of scientific institutions.

The adequacy of implementation of the mechanism of the methodology of scientific research provides the use of a variety of instruments, methods and tools. Considering that one of the definitions of the essence of the lever is "... a means of influencing something that normally stimulates one's activities or development" [17, p.80], it is logical to interpret levers as certain "aftershocks", "shifts" or "points of growth". In our opinion, their list is the following: historical and philosophical, moral and ethical, financial and economic, material and technical, monetary, technical and technological, administrative and managerial, regulatory, motivational and behavioral, spiritual and mental, customary and demographic and others.

It is the use of those or other instruments encourages the researcher to find innovative scientifically based solutions, the direct implementation of which depends on the proper selection of methods and techniques of research. Ac-

According to the definition of V. Dubichynskiy "... method is a way of knowing the phenomena of nature and social life, or method or system of techniques used in a particular industry» [17, p. 399]. Summarizing the achievements of O.Borysenko [3], V.Racha [12], M.Sverdana [13], Y.Surmina [16], we group methods of scientific research in two classification criteria: general (philosophical) methods and special (specific) methods. In general, a system of levers, methods and tools is presented in Table 1.

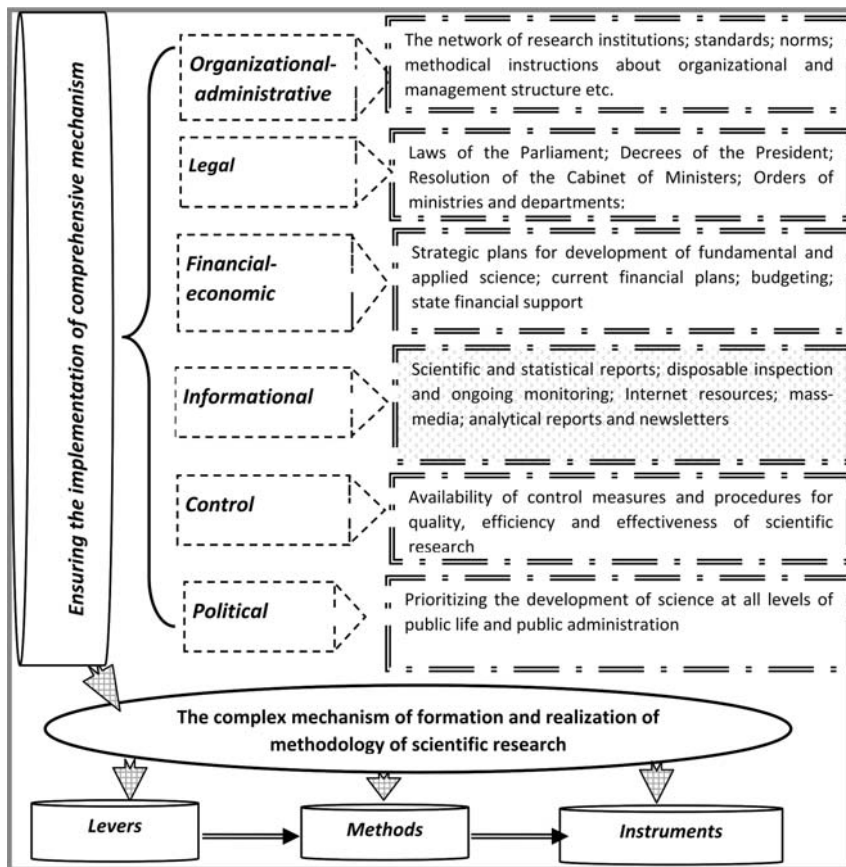


Fig. 2. The structure of the complex mechanism of formation and realization of methodology of scientific research

Table 1.

Levers, methods and tools of scientific research and systemic approach

Levers	Methods	Instruments	Sphere of application
Historical and philosophical	General scientific	Dialectical logic	<ul style="list-style-type: none"> - To study the provisions of scientific theories, scientific publications and the results of the research works on the topic of study; - For a critical analysis of the effectiveness and coherence of legislative and regulatory acts on the object and subject of study; - The justification and development of paradigmatic, epistemological, conceptual models and systems; - Separation of significant and insignificant factors that affect subject of study; - To formulate scientific assumptions and to determine hypotheses, the main directions of research work for its justification;
Moral and ethical		Logical	
Financial and economic		Formalization	
Technical and technological		Abstract logical analysis	
Material and technical		Analogy and modeling	
Monetary		Hypothetical	
Administrative and managerial	Special	Observation	- To receive primary information as a set of empirical claims
Regulatory		Economic analysis	- In the assessment of foreign trade and fixed revenues from customs' tax and payments, improving basic directions of growth
Motivational and behavioral		Mathematical statistics	- To assess the economic indicators of foreign trade in regions of Ukraine
Spiritual and mental		Creation of theory	- To summarize the research results, identify common patterns and trends
customary and demographic		Estimation and project	- To develop layouts, projects, research programs, technical tasks etc.

The use of scientifically based research methods is the most significant condition for increment and obtaining new knowledge, so their selection is critical to the research results. Modern scientific activity is impossible without application of methods of cognition. They are generally accepted tools. If the researcher plans to carry out scientific exploration and to summarize its outcome in the form of conclusions and proposals only based on the personally received facts, based on own understanding of the problem and a set of own “homegrown” methods, it will likely lead to errors, misstatements or not scientific results.

Conclusions

The methodology of scientific research and systematic approach are fundamental concepts that everyone who is engaged in or planning to engage in scientific work should learn. Understanding the peculiarities of formation of scientific research methodology and its components from the definition of the problem and purpose to the reveal of the algorithm of research activities’ realization and to get the results of it based on systematic approach is a guarantee of efficiency and effectiveness of research. The strict observance of the basic principles of research: feasibility; objectivity; historicity; justification; the adequacy of the assessment results; sequence is important for the researcher. The compliance with the proposed methodology of research in any field of scientific knowledge can provide completeness of research work, which claims to be scientific.

References

1. Bakumenko B. Metodologiya derzhavnogo upravliyya: problem stanovlennya ta podalshogo rozvytky (Methodology of Public Administration: Challenges of Creation and Further Development) / V. Bakumenko, V. Knyazev, Y. Surmin // Metodologiya naukovykh doslidzhen z derzhavnogo upravlinnya: khrestomatiya / uporyad. : S. V. Zagorodnyuk, O. L. Yevmeshkina, V. V. Leshenko ; za zag. red. d-ra polit. nauk K. O. Vaschenka. – K. : NADU, 2014. – P.7-17
2. Baskakov A. Y. Metodologiya nauchnogo issledovaniya: (Methodology of Scientific Research): ucheb. posob. / A. Y. Baskakov, N. V. Tulenkovb. — K.: MAUP, 2004. — 216 p.
3. Borysenko O.P. Zovnishnyo ekonomichna polityka derzhavy: kontseptsiya, strategiya, mehanism realizatsii: monographiya (Foreign Economic Policy of the State: Concept, Strategy, Mechanisms of Realization) / O.P.Borysenko. – Donetsk: Yugo-Vostok, 2012. – 404 p.
4. Kokhanovskiy V. P. Filosofiya i metodologiya nauki: ucheb. dlya vyschikh uchebnikh zavedeniy (Philosophy and Methodology of Science) / V. P. Kokhanovskiy. – Rostov na Donu: Feniks, 1999. - 576 p.

5. Kruschelnytska O. V. Metodologiya ta organizatsiya naukovykh doslidzhen: navchalnyi posiblyk (The Methodology and Organization of Scientific Research) / O.V. Kruschelnytska. – K.: Kondor, 2003. – 192 p.

6. Kruschelnytska T. A. Upravliyya podatkovoyu systemoyu Ukrainy v umovakh mizhnarodnoyi ekonomichnoyi integratsii: monographiya (Management of Taxation System of Ukraine in the Conditions of International Economic Integration) / T. A. Kruschelnytska. – Donetsk: Yugo-Vostok, 2012. – 412 p.

7. Mannheim J. Politologiya. Metody issledovaniya (Political Science. Research Methods): per. s angl. / predisl. A.K. Sokolova /J. Mannheim, R. Rich. - M. : Ves mir, 1997. - 544 p.

8. Metodologiya (The Methodology) // Vilna entsyklopediya. – Electronic publication. – Access mode: <https://uk.wikipedia.org/wiki/%D0%9C%D0%B5%D1%82%D0%BE%D0%B4%D0%BE%D0%BB%D0%BE%D0%B3%D1%96%D1%8F>

9. Osnovy metodologiyi i organizatsii naukovykh doslidzhen (Basics of Methodology and Scientific research): navch. posib. dlya studentiv, kursantiv, aspirantiv i adyunktiv / za red. A. E. Konverskogo. — K.: Tsentr uchbovoyi literatury, 2010. — 352 p.

10. Pismachenko L.M. Metodologichni osnovy derzhavnogo upravlinnya zovnishnyotorgivelnymy operatsiyamy (Methodological Basis of Public Administration of Foreign Trade Opeartions) / L.M.Pismachenko // Visnyk Akademiy mytnoyi sluzhby. Seriya “Derzhavne upravlinnya”. – 2009. – №1. – P. 24-33.

11. Rakitov A. I. Kurs lekziy po logike nauki (Course of Lectures on Logic of Science) / A.I. Rakitov. – M. : Vysch. Shk, 1971. – 176 p.

12. Rach V.A. Metodologiya systemnogo pidhodu ta naukovykh doslidzhen (Methodology of Systemic Approach and Scientific Research): pidruchnyk / B.A. Rach, O.V.Ignatova, A.Y. Borzenko-Miroshnichenko. – Luhansk: vyd-vo SNU im. V.Dalya, 2013. – 252 p.

13. Sverdan M.M. Osnovy naukovykh doslidzhen: (Basics of Scientific Research): navch.posib./ M.M.Sverdan, M.R.Sverdan. – Chernivtsi: Ruta, 2006. – 352 p.

14. Slovar inostrannyakh slov (Doctionary of Foreign Words). – 14-e izd., ispr. – M.: Rus. yaz., 1987. – 608 p.

15. Syrmin Y.P. Metodologiya i metody sotsiologicheskikh issledovaniy (Methodology and Methods of Sociological Research) / Y. P. Surmin, N. V. Tulenkov. – K.: MAUP, 2000. – 304 p.

16. Surmin Y. Maysternya vchenogo (Workshop of Scientist): pidruchnyk dlya naukovtsya / Y. Surmin. – K.: Navch.-metod.tsentr «Konsortsium z udoskonalennya menedzhment-osvity v Ukraini», 2006. – 302 p.

17. Suchasniy tлумachniy slovnyk ukraynskoyi movy (Contemporary Explanatory Dictionary of Ukrainian Language): 60000 sliv / za zag.red. V.V.Dubichynskogo. – X.: VD «SHKOLA», 2008. – 832 p.

18. Sheyko V.M. Organizatsiya ta metodyka naukovy-doslidnoyi diyalnosti (Organization and Methodic of Scientific activity): pedruchnyk / V. M. Sheyko, N. M. Kushnarenko. – 2-e vyd., pererob. i dop.. – K.: Znannya-Pres, 2002. – 295 p.

19. Eshby W. Ross. Vvedenie v kibernetiku (Introduction into cybernetics) / Эшби W. Росс. – М.: Изд-во иностр.лит., 1959. – 432 p.

20. Yudin E.G. Sistemniy podkhod i printsip deyatelnosti: metodologicheskiye problem sovremennoy nauki (System Approach and the Principle Activities: Methodological Problems of Modern Science). / E. G. Yudin. – М.: Nauka, 1978. – 392 p.