

**REPUBLIC OF AZERBAIJAN**

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**ABSTRACT**

of the dissertation for degree a Doctor of Philosophy

**SCIENCE AND ITS PHILOSOPHICAL MODELS**

Specialty: **7201.01-Philosophy of knowledge**

Field of science: **Philosophy**

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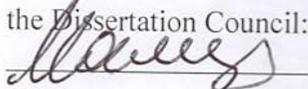
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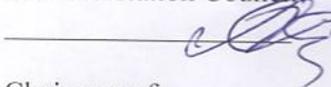
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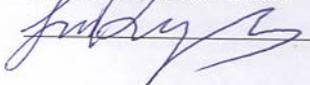
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## GENERAL CHARACTERISTIC OF DISSERTATION

**Actuality of the subject.** One of the most characteristic features of our century is that science, which is an integral element and attribute of world culture, has an intensive and ecstatic influence on all spheres of social life, including material-economic, spiritual, political and social spheres. It is known that such a trend is characteristic of the 20th century, but in terms of the spiritual development of human being and society, there are new trends in the science of the 21st century, which are conditioned by a number of objective processes taking place within science and in human thinking compared to the previous century. It is known that the processes of differentiation and integration have played a key and decisive role in science in the last two centuries. However, in our days there is a noticeable change: if in the 20th century the differentiation of sciences surpassed their integration, in the 21st century science manifests itself more clearly in its integration capacity. Therefore, scientific knowledge, scientific information and science as a whole have become one of the main reasons for the existence and development of modern society along with “natural conditions” (geographical environment) and technology (production method).

The importance of science for human life and society was stated in the declaration “On the use of science and scientific knowledge” adopted in 1999 at the UNESCO World Conference on Science in Budapest, capital of Hungary, with the following words: “We all live on the same planet and are part of the biosphere. All scientists and nationalities of the world demonstrate their determination to use responsibly the knowledge acquired in all areas of science. Science should always serve the needs of people and never focus on their harm”.<sup>1</sup> The declaration clarifies that one of the most important tasks facing modern man is to achieve the harmonious development of all spheres of science, to overcome the centuries-old barrier between

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<sup>1</sup> Декларация о науке и использовании научного знания // [www.Inesco.org.science.declarationz.pdf](http://www.Inesco.org.science.declarationz.pdf)

concrete life and the system of abstract scientific values and to achieve intensive and extensive development of science.

Modern science contains about 15 thousand specific areas of knowledge that study the colorful spheres and shades of the vast field of knowledge in nature, society and human spirit. The modern state of science and its importance for the life of society require dynamic development of this universal phenomenon. Among these requirements, the question of what science is, what features it differs from other areas of the modern cultural system, the structure of science, its frame, its role in the life of society, its philosophical images and theoretical models occupy one of the central places in the judgments of philosophers of the XXI century. Today, both simple labourers and great statesmen are involved in many vital problems, including energy supply of people, development of new means of transport and communication, finding methods of treatment of diseases considered incurable to this day, etc. and they have high hopes for the power of science in resolving issues. Therefore, the question of what science is today has become a subject not only of philosophy, but also of scientific studies – science about science.<sup>1</sup> The study of science within the framework of science can not be exhausted only by the analysis of its genesis, status, scientific criteria, forms of scientific knowledge, dynamics of development of science. In the context of western philosophy, the analysis of philosophical branches of science is also important to this range of problems. Unfortunately, this issue remains one of the less researched issues of science and therefore, its expulsion into the scope of research should be one of the principal tasks of every researcher interested in the study of science.

**Degree of subject processing.** The thesis presented under the heading “Science and its philosophical models” to the attention of the readers is one of the most important topics of the worldview, which is little studied in science, but which is of great importance in terms of

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<sup>1</sup> Фигофский О.Л. Наука управлять Наукой // Экология и жизнь. - 2006, - №12, - 48-62 с.

studying the development prospects of science. In general, the subject of philosophical models of science, which acts as an integral part of science, has certain aspects studied at various levels both in the world philosophical system, within the framework of the modern Commonwealth of Independent States (CIS), and in our republic. Taking into account the reality of these aspects, the author formulated his research in two directions: the criteria of science in one of these directions, and the theoretical-philosophical models of science development in the context of modern western philosophy in the other one.

The first studies on science in philosophy began to be conducted from the first half of the 20th century, and as an independent science, scientific studies was formed in the 60s of the last century. In the Soviet Union, a lot of articles, monographs and dissertations were written in the area of scientific studies. Such studies have gained special significance in the 70-80s of the last century, and in these years the scope of research on these or other problems of science has expanded considerably. During this period, the structure, genesis, outlines, social functions of science, methodological problems of its interaction with technique and production became a special object of cognition.

Studies on science have been continued in the following decades, have revealed a number of research works on science and its criteria in 1990-2010.<sup>1</sup>

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<sup>1</sup> Гиргинов Г. Наука и творчество / - Москва: Прогресс, - 1979, -365 с; /Методологические проблемы совершенствования взаимодействия наука и производства. / Новосибирск: Наука, - 1985, - 335 с; Лазарев Ф.В., Трифонова М.К. Структура познания и научная революция / - Москва: Высшая школа, - 1980, - 127 с.; Петров Ю.А., Никифоров А.Л., Логика и методология научного познания / - Москва: МГУ, - 1982, - 349 с; Ильин В.В., Калинин А.Т. Природа науки (гносеологический анализ). / - Москва: Наука, - 1985, - 318 с; Кедров Б.М. Классификация наук / - Москва: Мысль, - 1985, -350 с.

<sup>1</sup> Вах: Философия науки: история и методология. / - Москва: Логос, - 1998, - 336 с; Горохов В.Г., Розов М.А. Философия науки и техники / - Москва: Наука, - 1996, -404 с; Кравец А.С. Идеалы и идолы науки / - Воронеж:- Наука, - 1998,

The monograph of the famous Russian philosopher V.V.Ilin “Philosophy of science” is one of the interesting studies in the study of science taken as a system, as well as philosophy of science.<sup>1</sup> Distinguished by its uniqueness and scope, this monograph reflects the genesis, status, criteria of science, forms of scientific knowledge, dynamics of development of science and other issues of methodological importance. Along with all the positive aspects, in our opinion, this monograph lacks the highest quality necessary for our research: the problem of theoretical models of science is not reflected in this significant research work.

In our opinion, the monograph of a well-known Russian philosopher A.I.Rakitov “Philosophical problems of science” published in 1986, can also be included in the list of original studies devoted to the analysis of science in a philosophical context.<sup>2</sup> The originality of the above-mentioned monograph is, above all, that there are a number of problems that have been studied relatively little in philosophy and have not been addressed in science, including the structure of the genesis of the philosophical problems of science, the systematic approach to scientific research, the system of scientific research, the genesis of scientific knowledge, adequacy and other issues were included in the research cycle. Our critical opinion about the monograph of prof. V.V.Ilin “Philosophy of science” can also be concerned to prof. A.I.Rakitov's work, which, despite all his

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-218 с; Кравец А.С. Наука как феномен культуры / - Воронеж: Наука, - 1998, - 402 с; Канке В.А. Основные философские направления и концепции науки. Итоги XX столетия / - Москва: Логос, - 2000, - 496 с; Князева Е.Н., Курдюмов С.П. Основы синергетики / - СПб: Алетейя, - 2002, - 414 с; Xəlilov S. Elmşünaslığa giriş / - Bakı: Azərbaycan Universiteti, - 2010, - 440 s.; Xəlilov C. Elm haqqında elm / - Bakı: Azərbaycan Universiteti, - 2011, - 752 s. ; Məmmədov Ə.B. Elmi idrak və onun inkişaf dialektikası / - Bakı: Səda, - 1998, - 108 s.; Məmmədov Ə., İsmayılov V.İ. Müasir təbiətşünaslığa konseptual yanaşma / - Bakı: Elm, - 2001, - 757 s. ; Məmmədov Ə., İsmayılov V. Məmmədov F. Rəşadət və qeyri-rəşadət / - Bakı: Elm, - 2010, - 880 s.

<sup>1</sup> Ильин В.В. Философия науки / - Москва: МГУ, - 2003, - 562 с.

<sup>2</sup> Ракитов А.И. Философские проблемы науки / - Москва: Наука, - 1986, -270 с

intellectual and epistemological qualities, did not include the philosophical models developed by prominent methodologists of western philosophy in the aforementioned monograph.

We would like to express our critical attitude to another monograph study that has been a cornerstone for the writing and implementation of the dissertation: this work was written with the participation of several authors and is a monograph “history and philosophy of science”, published in 2006 in the publishing house “Pitern” of Moscow.<sup>1</sup> Written on the basis of the latest materials of epistemology, this monograph includes philosophical problems of socio-humane sciences along with general regularities of science development, genesis and history and other methodological problems.

Science and its philosophical problems have been one of the most pressing issues in the philosophical life of our republic since the end of the last century, and a number of local philosophers joined the solution of these problems and conducted serious corresponding member of Azerbaijan National Academy of Sciences, prof. S.Khalilov, prof. J.T.Ahmadli, prof. A.B.Mammadov, prof. A.F.Abasov, prof. A.J.Abasov, prof. F.M.Gurbanov, prof. T. Allahyarova, prof. Z. , prof. H.Guliyev, prof. V. I. Ismayilov and others can be shown among these researchers.<sup>2</sup> The first serious researches in the field of scientific study in our republic is connected with the name of prof. S.Khalilov, corresponding member of MEA. His articles devoted to this area made a great contribution to the

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<sup>1</sup>Əhmədli C. Elmlərin inteqrasiyası və biliyin sintezi // Fəlsəfə. Elmi-nəzəri jurnal, - 2009, - N2, - 21-33 s.; Məmmədov Ə.B. Dialektik idrak və ümumelmi tədqiqat metodları / - Bakı: Azər nəşr, - 1997, - 298 s.; Аббасов А.Ф. Сложность. Время. Синергетика: общетеоретический анализ проблем сложности и развития сложных систем / - Баку: Элм, - 1991, -124 с; Абасов А.С. Проблема истории, теории и методологии познания./ - Баку: Энинесил, - 2001, - 284 с; Qurbanov F. Elmə sinergetik baxış / - Bakı: Elm, -2005, - 364 s.; Allahyarova T.V. Sinergetika – I. Sinergetik ontologiya / - Bakı: Elm, - 2005, - 374 s.; Məmmədov Ə., İsmayilov V. Müasir fizikaya fəlsəfi baxış / - Bakı: Elm, - 2001, - 408 s.

development of philosophy not only in Azerbaijan, but also in the whole USSR. The merit of Professor S.Khalilov's articles on scientific study is that their attempts to study the development of science in the context of formal indicators were criticized and the need to put the real driving forces of science to the fore was justified. S.Khalilov's attitude to the problem of scientific study, along with his numerous articles, has also been embodied in two fundamental monographs, "Introduction to scientific study" (Baku-2010) and "Science about science" (Baku-2011), published in recent years. In his work "Introduction to scientific study", having analyzed the concept of science in general-theoretical terms, on the one hand, the author put forward a number of theoretical considerations related to its optimal modeling, on the other hand, on the basis of summarizing the results of research conducted in the leading countries, expressed rational considerations, valuable forecasts about the ways of science development. Prof. S.Khalilov's monograph "Science about science", which was published in 2011, is a weighty research work, both in its volume, content, and in its scientific aspect.

Prof. A.B.Mammadov also had his own services in the research and development of scientific problems. In a number of works published by the author in different years, including the monographs and numerous articles titled "Dialectical cognition and general research methods" (Baku, 1997), "Scientific cognition and its development dialectics" (Baku, 1998), "Conceptual approach to modern natural science" (Baku-2001), "Rationality and non-rationality: philosophical-methodological analysis" (Baku-2010), "Philosophical foundations of natural scientific knowledge" (Baku, 2014) it was brought clarity to a number of issues of scientific study.

The last research work written in the field of scientific study in our republic is V.R.Zulfugarov's dissertation on "Philosophical analysis of the social function of science", which he defended in 2012 for the degree of doctor of philosophy in philosophy.<sup>1</sup>

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<sup>1</sup> Bax: Zülfüqarov V.R. "Elmin sosial funksiyasının fəlsəfi təhlili" dissertasiyasının avtoreferatı / - Bakı, -2012.

The outstanding western philosophers of the 20th century also contributed to the development of science. From this point of view, we can specifically mention the evolutionary epistemology of Popper's falsification, T.Kunin's paradigms, I.Lakatos's research programs, P. Feyerabend's epistemological concept, S. Tolmin's evolutionary epistemology, that are considered in the dissertation..<sup>1</sup>

**Goals and objectives of the study.** The main objective of the dissertation is to look at the modern problems of science on the basis of philosophical-methodological analysis and to study the philosophical images of science in the context of modern western philosophy and theoretical models of its development. The goal set forth in the work is carried out through the realization of the following tasks:

- analysis of science as a intellectual element of culture;
- philosophical review of the options on the historical age of science, one of the important issues of science;
- analysis of the essence, features and social functions of science on the basis of system-structural approach method;
- studying the interaction of scientific revolutions and historical types of rationality and dynamics of development;
- logic of the structure and development of scientific knowledge dialectics-analysis in the gnoseological aspect;
- research of the statistical model of the structure of science in the logic and gnoseological aspect;
- analysing foreign (K.Popper) and internal functionality (I.Lakatos) models of science ;
- analysing external (P.Feyerabend) and interior (A.Kuyre) logic of genetic models formation of science in the gnoseological aspect;

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<sup>1</sup> Вах: Поппер К. Логика и рост научного знания / - Москва: Прогресс, - 1983, - 605 с. Кун Т. Структура научных революций. / - Москва: АСТ, - 2001, - 288 с. ; Лакатос И. Методология научных исследовательских программ // Вопросы философии, - 1995, - №4, - с. 135-154; Фейерабенд П. Избранные труды по методологии науки / - Москва: Прогресс, - 1986, - 544 с.; Тульмин С. Человеческое понимание / - Москва: Наука, - 1984, - 536 с.

- systematic analysis of foreign (T.Kun) and interior (S.Tolmin) development models of science.

**Object and subject of the study.** The object of the study is the regularities of interaction between science and society and the dynamics of development of scientific study. The essence of science, the structure of scientific knowledge, the connection of historical types of rationality with the concept of science, as well as internal and external conditions of the functioning, formation and development of science express the subject of the research conducted in the dissertation.

**The scientific novelty of the study** comes first of all from its subject, goals and objectives. The following theoretical provisions, conclusions and theoretical generalizations are presented as the scientific novelty of the study:

- science has been studied as a intellectual element of culture, and in this process it has been analyzed the important aspects of scientific culture that distinguish it from other spheres – art, philosophy, religion, mythology.

- as one of the important but less studied issues of scientific study, the problem of the historical age of science has been studied perfectly and existing options in scientific literature in this field have been evaluated in a philosophical context.

- the essence of science is studied from different angles and its working definition has been clarified based on a broad analysis of the definitions given to it in the scientific literature.

- the dynamics of development of science has been studied on historical types of rationality (classical, non-classical and post non-classical) and in this context functional relations of scientific revolutions and rationality types have been analyzed.

- two types of science function in dissertation are distinguished and its external function in the example of western philosophy (K.Popper) and internal functionality (I.Lakatus) models have been studied.

- here are two models that genetically express the formation of

Science: the external genetic model of science (P.Feyerabend) and internal genetic model (A.Koyre) that are brought to a philosophical study.

- in the dissertation work, the models of development of science were analyzed and divided into two different types, such as the model of external development of science (T.Kun) and the model of internal development of science (C.Tulmin).

**Methodological principles of the study.** The results of the researches of Russian, Western, Azerbaijani scientists and classical philosophers were used as methodological basis in writing the dissertation and the overall course of the research was regulated by system-structural approach, analysis and synthesis, abstraction and generalization, rising from abstraction to concrete, dialectical methods.

**Theoretical-practical significance of the study.** The research in the dissertation has an important scientific-theoretical and practical significance for philosophy and modern scientific thought. The main provisions and results of the dissertation can be used in the research of ontology of science, gnoseology, epistemology, natural science, history of philosophy and social philosophy, methodological, logical-gnoseological results of the development of modern science. The materials of the dissertation may also be suitable for lectures and seminar sessions on science, philosophical ontology, cognitive theory, epistemology, natural science and synergetics.

**Aprobation of the study.** The dissertation work was carried out and discussed at the department of philosophy of BSU. Important aspects of the dissertation topic are reflected in the articles and theses published by the author in the scientific press, speeches at national and international conferences.

### **Main content of dissertation**

The dissertation consists of introduction, three chapters covering nine semi-chapters, conclusion and a list of used literature.

In the introduction part, the relevance of the topic is substantiated, the goals and objectives of the study are defined, the

degree of problem development, methodological and theoretical bases, scientific novelties, theoretical and practical significance are clarified.

The first chapter of the dissertation called “**Science in the context of socio-cultural studies**” consists of three semi-chapters.

In the first half of the chapter, which is called “Science is the intellectual element of culture”, the reader is told that even though science has an ancient history as a phenomenon, it has been possible to study it only as the intellectual element of culture, to explore its fundamental essence, main characteristics, development mechanism, functioning and general regularity of development... in connection with the formation of a new field of science called scientific study in the years of 20s. A new stage began in order to transfer the existing knowledge from generation to generation with the emergence of science in the history of mankind, and science, which acts as a unique element of culture in this process, has acquired a number of features that combine it with other structural areas of culture and perform common functions in front of culture. As noted in the study, as a form of public consciousness, there are specific features that distinguish science from other areas of culture: in the process of understanding the world, science, which uses not only images, but also logical forms of thinking, differs from art in its rationality, from philosophy by the fact that its results can be checked, from religion not in practice, but by basing on intellect, and in the sense that it relies on reality, from mythology not as a whole of the world, but also in the form of laws of separate fragments.

Then, the dissertation reveals the characteristic of the scientific worldview, which views science as the only salvation force of mankind and thereby overestimates the role of Science in the life of society, and the antiscientific worldview that reflects this latter and the pros and cons of both worlds are explained here.

In the second half of the first chapter of the dissertation, called “Historical age of science: a philosophical look at the available options” the question of when and where science originated is answered. Here are five such options in the study, and a philosophical

picture for each of them is created.

**The first option:** in this case, we are talking about an ancient Egyptian civilization with a rich history. In the fourth millennium BC, the ancient Egyptian civilization mastered mathematics, medicine, geography, chemistry, astronomy, agrotechnics, etc.

**The second option:** many scientists, referring to the phenomenon of antique science, think that the first images of theoretical science, including Euclidean geometry, were formed in ancient Greece in the V century.

**The third option:** according to this option, the emergence of science dates back to the period of flowering of Medieval European culture (XII-XIV centuries).

**The fourth option:** according to the Dissertation, about the historical age of science, the fourth option was relatively traditional, due to the emergence of the temple of knowledge in Europe (XVI-XVII centuries), which is called science.

**The fifth option:** according to this option, science was formed in the middle of the XIX century under the conditions that it was possible to combine higher education with research activities on the basis of the universal research program. In this regard, the German naturalists V.Humboldt and J.Libix should be counted as creators of science.

From the analysis and collusion of the proposed options for the emergence of science in dissertation, it is concluded that science, as a specific type of activity of individual scientists, was originated in Greece in the V century, and as a perfect social-spiritual subsidiary it was formed in the XVII century in European countries

The third half of the first chapter is called “**The essence, features and social functions of science**”. In this half-chapter, it is noted that science is a historically determined form of human activity, aimed at understanding the world and its practical transformation. The work states that science, one of the most advanced forms of social progress, can be approached in three contexts: science is a system of empirical and theoretical, productive and reproductive knowledge, as

well as a field of moral production and a practical form of human activity.

In the scientific-methodological literature, science is given different definitions, and the number of such definitions currently exceeds 150.<sup>1</sup> Analysis of all these definitions shows that knowledge, activity, social institution, academic system and scientific and technical revolution are understood in the traditional lexicon under the expression of “science”.

Science, one of the main forms of human cognition, performs a number of social and cognitive functions as an important component of existing knowledge about objective reality. In accordance with the modern state of science, the following functions are analyzed in the dissertation: the function of the cultural outlook of science, the function of explanation, the function of description, the function of systematization, the function of forecasting, the function of science arising directly from the transformation of science into productive force, a function that science has acquired in connection with its transformation into a great social force.

The second chapter of the dissertation, called “**The phenomenon of scientific rationality and knowledge**”, consists of two semesters.

In the first half of the chapter called “Scientific revolutions and dynamics of development of rationality”, it is suggested that revolutions occur not only in political life, but also in science. Being applied to science, this concept expresses all elements of science, including the radical change of facts, laws, theories, methods, scientific landscape of the world. How and why do scientific revolutions occur? The concrete and laconic answer to this question in the dissertation research by American physicist and philosopher T.Kun on "The Structure of Scientific Revolutions" suggests that the

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1. Вак: Popper K.R. Conjectures and Refutations. / London - 1972, - p. 225; Никифоров А.Л. Теория научного познания Карла Поппера // Научные теории: структуры и развитие / - Москва: Наука, - 1978, - 358 с.

development of science can be divided into two periods: the “normal science” and the “cycle of scientific revolution.”

By accurately and unequivocally recording the radical changes in the scientific landscape of the world, the dissertant, who chose and distinguished several fundamental revolutions in the history of science, in particular in natural science, calls them the Aristotle, Newton and Einstein revolutions, respectively, and gives an in-depth and meaningful analysis of the characteristic features of each.

All three constituent elements of rationality are examined separately and their scientific-philosophical characteristic is explained in the dissertation.

The second half of the second chapter of the dissertation is called “Structure and development dialectics of scientific knowledge”. It is noted in the dissertation that knowledge reflecting the important relations and regularities of nature and society events is a theoretical system and is distinguished by its specific logical structure, theoretical nature and social nature.

The dissertation notes that currently the empirical and theoretical levels of scientific knowledge differ depending on the structure and the nature of development, and the proper determination of the proportion of these forms is one of the most urgent issues of the scientific cognitive process. Here, the characteristics and differences of empirical and theoretical knowledge become the object of discussion in the philosophical-logical and methodological aspects, and such conclusions are extracted from the studies that if the empirical level of knowledge describes experiments and their results, then at the theoretical level it contains the concepts and laws, ideas and principles of rational cognition, and theory at the highest level.

The author, who studied in detail the relationship of empirical and theoretical knowledge with the sense and rational forms of cognition, by engaging the distinguished aspects of empirical and theoretical knowledge (object of cognition, applied means of cognition, etc.) in the study, he finally directs the direction of the study towards the issue of empirical and theoretical knowledge. In the

dissertation, it is noted that both levels of knowledge (empirical and theoretical knowledge) have a complex structure and are divided into specific sub-levels depending on the specifics of the applied cognitive methods and the type of knowledge gained. From this point of view, at the empirical level of knowledge, two sub-levels are distinguished: the first is the sub-level made up of observation materials, the second is the sub-level made up of empirical facts derived from the generalization of observation materials.

The theoretical level of knowledge is also made up of certain sub-levels: theoretical models and laws that form the basis of the theory explaining the relatively limited field of reality are included into the first sub-level, the theory developed is included into the second sub-level.

Both the empirical and theoretical levels of knowledge differ according to the research methods used in them.

The third chapter of the dissertation is called **“Theoretical models of the functioning and dynamic development of the structure of science”**.

In the introduction of the chapter, such an idea takes place that one of the important features characterizing the dynamics of development of modern science is the formation of the philosophy of science, which forms a separate section of philosophical knowledge, and is associated with its increasingly strong place in the spiritual life of society and the system of ideological relations. In this regard, one of the important tasks of modern science is the identification of philosophical models of the structure and dynamic development of science. At present, this methodological issue is approached in two contexts - synchronic and diachronic. Synchronic analysis of science in the most general plan reflects the description of its structure and function, and diachronic analysis reflects its system, genesis and development dialectics.

In the course of the research carried out in the dissertation, the following philosophical models of science are identified: 1. philosophical models of the structure of science; 2. external and

internal philosophical models of the functionalization of science; 3. external and internal philosophical models of the formation (genesis) of science; 4. external and internal philosophical models of the development of science.

The first half of the third chapter of the dissertation is called the **“Statistical model of the structure of science”**. Here, the statistical model of the structure of science is based on the neopositivist program about the logic and methodology of science. In the neopositivist program, the methodology is understood as the analysis of the logical structure of the scientific language, and the axiomatic method, which is considered the ideal of organizing scientific knowledge, is understood as the main means of constructing the theory.

Since the neopositivist concept of science is based on the principles of reductionism, physicalism and demarcation, these principles are explained in detail in the dissertation.

The dissertation also addresses the problem of demarcation of science and philosophy, that is, the problem of the delineation of their boundaries and in this regard it is shown that since the initial requirement is impossible to validate all philosophical ideas and considerations, it is supposed that all of them should be excluded from science as something meaningless. In this context, science should only use meta-denoting terms and judgments, rather than universal-looking ideas and principles of philosophy. K. Popper tried to soften the harsh demand that was put before him by proposing that the principle of verification does not belong to philosophical judgments and empirical sciences, and thus accepted that philosophical considerations bear meaning. According to a number of prominent philosophers who have independent thinking in the field of philosophy of science, including I. Lakatos, P. Feyerabend, O. Koyre and others, since the philosophical reflexes carried out on science by nature have a significant impact on its development, it is important and expedient to re-analyze the development of science and philosophy.

The second half of the chapter is called **“Models of the functioning of science”**. In this sub-section it is stated that two models

of functioning of science in philosophy have been created. The first of these models is the model of externalization proposed by the prominent German philosopher and mathematician Karl Popper, and the other is the internal model of science proposed by the English methodologist, Imre Lakatos.

In the model of external functionalization of Science, which is associated with K.Popper's name, the process of dynamic development of science is viewed as the substitution of falsified theories. Popper solves the problem of demarcation of science from philosophy in a new context and offers the principle of falsification to distinguish their boundaries instead of the verification criterion.<sup>1</sup> According to this principle, the criterion for gaining the status of the theory can only be its falsification or refutation. K.Popper offers two ways of checking the authenticity of arbitrary judgment by giving a serious consideration to the acuity of the methods of affirmation and refutation in cognition: a) searching for facts that can confirm the authenticity of the judgment (thesis); b) searching for facts that can refute the authenticity of the judgment. The principle of falsification is based on the search for facts that can refute the given judgment. In this case, the given judgment is taken as a thesis, and the opposite judgment is taken as an antithesis. This means that the essence of the principle of falsification is first to replace the thesis with an antithesis, and then to look for real facts that can confirm the antithesis. If in this case it is proved that the antithesis is false, then the thesis is true, and, on the contrary, if the antithesis is true, then the thesis is false. It seems that the principle of falsification is built on the asymmetry between the confirmation of the given judgment and its refutation. Therefore, in Popper's view, falsification or refutation of the theory should be considered a more efficient method for confirming its authenticity and science.

Then it is noted in the dissertation that in addition to the model

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<sup>1</sup> See: Popper K.R. Conjectures and Refutations. London 1972, p. 225; Nikiforov A.L. Karl Popper's Theory of Scientific Knowledge // Scientific Theories: Structures and Development. / - Moscow: Nauka, - 1978, - 358 c.

of external functions of science, there is also a model of internal functions. The internal functionalization model, which aims to improve the logic of science and theory, finds its expression in the concept of the methodology of the British methodologist Imre Lakatos "Research programs on the development of science". Regardless of their ideological orientation, the religion they believe in, and the priorities they share, the problem of increasing knowledge is a pressing problem that deeply concerns and troubles all scholars, methodologists, and thinkers. In order to re-organize the problem of increasing knowledge in the initial period of scientific activity, Lakatos tried to create an original version of probability and refutation logic and for this purpose he chose mathematics of XVII-XVIII centuries as the subject of research. Later, he came to the idea of competition of scientific research programs and justification of this idea. In this regard, he wrote: "My method of approach requires the determination of a new criterion between" adult "science organized from research programs and" non-adult "science organized from outdated examples of trial and error".<sup>1</sup> To substantiate the concept of Lakatos about the internal functionalization of science, the main emphasis was placed on the history of science. According to Lakatos, scientific program should be considered as the main unit of scientific knowledge development. According to his concept, the development of science is nothing more than the substitution of research programs. The following words of Lakatos can also confirm our opinion: "I look at the continuity of science "from popper glasses". Therefore, where Kun sees the paradigm, I also see rational "research programs"". In the literal sense of Lakatos, the "research program" meant the continuous development of the basis, the main ideas and principles, and the consistent layout of the theories with a broad general understanding. According to this understanding, the output theory follows the next series of theories, and each new theory participating in this series is developed and

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<sup>1</sup> Лакатос И. Методология научных исследовательских программ // Вопросы философии, - 1995, - № 4, - с. 135-154..

improved on the basis of hypothesis derived from the previous theory. Continuity in the development of the program is maintained by special normative rules.

Noting the issue of the methodology of research programs in dissertation, the dissertant points out that it is made up of a hard core, fundamental assumptions, the "positive heuristics" that determines the strategy of the ways in which the research can be conducted, "negative heuristics" that determines the ways in which the research can not be conducted and protects the theory from refuting facts.

According to Lakatos, in the development of the research program, it is necessary to distinguish two stages – progressive and regressive steps. The progressive role in the development of the program, as a rule, belongs to positive heuristics. The emergence of a new research program that competes ideologically with its predecessors, can successfully explain the new empirical achievements of science, a high degree of heuristics potential means the rejection of the old research program. The most radical function of scientific revolutions is the elimination of the old research program, which exhausted the internal resources of its development, by means of a new, more advanced research program.

From the studies carried out by Lakatos on the research program, the dissertant finds that the concept of Lakatos on internal function of science as a whole has a logical-normative nature. The scientific-research program, which is the core of the concept of Lakatos, which presents the history of science as the formation, development and competitiveness of various theories, limits the number and diversity of ways of development of scientific knowledge.

In the third half of the third chapter of the dissertation, called "**Genetic models of science**", it is studied the models of its formation. Here are two models of the genetic models, namely the formations of science are studied in the direction - a) the external genetic model of science; b) the internal genetic model of science. The external genetic model of the formation of science finds its striking expression in the methodological concept of the American philosopher P. Feysrabend.

Feyerabend accepted the essence of the first of the positions described above, but persistently denied the second. Sharply criticizing the position of positivism in the study of the problem of the ratio of theory and experience, Feyerabend noted that since the positivist language of observation is based on metaphysical ontology, from the point of view of positivists, a unified ontology should exist. Feyerabend, who called positivist theory a naive theory in his own interpretation, later noted that since the language of observation is defined by theory, this language, which clarifies what we observe, undergoes a corresponding change in relation to the change in theory.

Feyerabend summarized his thesis in the following principle. If the theory is fundamentally confirmed and universally accepted, it means that theories that contradict existing ideas can be discovered and developed. According to Feyerabend, such theories should be considered as an alternative to existing ideas. The principle of pluralism is not only the opening of new alternatives in science, but also the preservation of old theories, so every old theory that has been refuted contributes to the positive content of the new theory that has been confirmed in science. It is the competition of theories that creates real opportunities for the development of the spiritual ability of man and stimulates the strengthening of theories in this struggle. Then, in the dissertation, the ideas of Feyerabend and its relation to the history of science are clarified and shown that, according to Feyerabend, the history of science acts as an integral part of it, since the history of ideas is based on “criticism of the past”, as well as being an integral part of scientific knowledge.

From the research conducted by Feyerabend on the concept of methodological anarchism in dissertation, the dissertant concludes that in the analysis of new theories he studied not only the inner nature of the formation of scientific knowledge, but also its external nature and appreciated the role of external factors in this context.

In the history of methodology, the study of the internal genesis of science is related to the name of the American philosopher A.Koyre (1882-1964). Koyre recognizes that neopositivists present the irrational

sphere as an element of the rational interpretation of scientific thought. His research examines the extraordinary factors in the internal structure of the genesis of science, including the general spiritual climate of the time, philosophy, religion and so on. His research examines the extraordinary factors in the internal structure of the genesis of science, including the general spiritual climate of the time, philosophy, religion and so on.

From his theoretical and philosophical research on the phenomenon of science, Coyre concluded that the philosophical reflection and the technique of the experimental base of science not only influenced its development, but also embodied it in its internal structure. Therefore, when conducting an analysis of the conceptual schemes of experimental naturalism, Coyre constantly resorted to the previous periods, for example, parallel with Aristotle and medieval physics and Galilee Physics, looking for traces of the influence of Plato and Archimedes in the scientific theories of the new era.

As a result of his research, Koyre revealed that unlike the Descartes view, the Newtonian view of the universe was not made up of two components such as space and motion, but of three components such as matter, motion and space.

Koyre notes that, since Newton viewed gravity as a "mathematical force" rather than as a "physical force, unlike his followers, this force does not have the ability to influence not only the substance, but also the God himself.

The final result of the search for Koyre's theoretical heritage in the dissertation is that A.Koyre analyzed not only the evolution and development of scientific theory, but also its internal formation, internal genesis.

The fourth half of the third chapter of the dissertation is called the "**Development models of science**". Addressing such a problem in the dissertation is not accidental, as the working-out of general models of its development in connection with irreversible processes in science is of great importance both in terms of methodology and in terms of heuristics. Following this need, the dissertation analyzes the models of

development of science in two groups: a) a philosophical model of external development of science or a revolutionary model of science; b) a philosophical model of internal development of science or an evolutionary model of science. The model of the external development of science (revolutions model of science) is based on the concept of the paradigms found in the monograph of the American philosopher and physicist T. Kun titled "Structure of Scientific Revolutions".

In this work, T.Kun's main idea developed by the day is that science is not a system of knowledge, but, above all, the activity of scientific societies. In this approach to the problem, all claims of science to normality and logic-methodological sovereignty lose their force. Speaking of the notion of "paradigm" in its concept, T.Kun offers a theoretical model of the historical-scientific process. According to this model, the paradigm is the main unit of measurement of the development of science in a particular case, and in a general case the conceptual scheme, which the scientific community perceives as the basis for its practical activity in a certain time frame.

The paradigm of Kun meant the ideas, methods adopted by the scientific community, all-accepted examples of the solution of concrete problems for a certain period of development of science. The paradigm concept also includes scientific traditions, moral values and technical means adopted by the scientific community. Paradigm-a factor that unites members of the scientific community, and the scientific community is a group of people who accept a concrete paradigm.

It is noted in the dissertation that T.Kun considers scientific knowledge in dynamic development. He calls the development of scientific knowledge within a concrete paradigm, as a "normal science", the stage in which one paradigm is replaced by another paradigm, as a "scientific revolution", and the problems that the scientist wants to solve within the framework of each paradigm as a "puzzling". According to T.Kun, the new paradigm is not the result of any process but the result of sudden "irradiation". From this point of view, T.Kun represents the manifestation of a new paradigm in the

form of lightning that illuminates the midnight world.

The analysis of the stages of development of science in connection with the concept of paradigms is also noted in dissertation.

In the period of revolutionary development of science and its structure, cognitive principles, categories, methods and forms of organization undergo changes.

The dissertation states that scientific revolutions are a logical consequence of the accumulation of abnormalities that may not only modulate the theory but also replace it with the new theory. Usually in these cases it is necessary to choose between two or more theories. Kun calls this phase of science development a crisis or an extraordinary situation.

In his dissertation, the author summarizes the results of his research on the paradigm of Kun, along with the pros and cons of this concept, explaining some of its weaknesses and non-critical aspects.

The dissertation notes that, despite all of its merits, the concept of Kun's paradigms is merely a philosophical model of external development in science, and it cannot describe its internal development. The theoretical model of the internal development of science is related to the name of American philosopher S.Tulmin. Taking the position of evolutionary epistemology in his scientific research, S.Tulmin seeks to clarify the mechanism of evolution based on the theory of evolution, recognizing human perceptions as a separate emblem of nature.<sup>1</sup> In this case, he understands the historical development of any intellectual subject as a process of population, although not biological in nature. Therefore, we come across a new manifestation of the general theory of evolution in the concept of Tulmin, which differs from Darwin's natural selection theory.

Tulmin's evolutionary epistemology is based on the idea of the same process of cognition as biological evolution, which is based on such an idea that the human cognition apparatus is nothing more than the name developed in the process of biological evolution. For this

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<sup>1</sup> Тулмин С. Человеческое понимание / - Москва: Наука, - 1984, - 23 с.

reason, the process of cognition, as if, can only be understood on the basis of modern theory of biological evolution.

S.Tulmin did not accept the dual character of the meaning of man, writing: "Man understands and at the same time understands that he has such a talent". It is well-known that the central element of human notion is understanding. It is known that understanding forms the central element of human meaning. Therefore, the main task faced by Tulmin was to give an adequate explanation of the content of understanding and explain the reason for the increase in the process of their mastering.

The dissertation's final conclusion on this training, which provides a comprehensive analysis of the concept of epistemology of evolution in science in the dissertation, is that the evaluation of science in the methodological concept of Tulmin is based on a dual approach: science, on the one hand, is presented as the totality of intellectual sciences and on the other as a social institution.

The "conclusion" also sums up the study, a number of recommendations on the future prospects of the problem are said here.

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