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The history of the paradigm in the system of scientific knowledge

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Abstract

Current study is focused on the concept of the paradigm, its characteristics and stages of development. In the system of scientific knowledge, the concept of the paradigm is very important because it shows how specific traditions of the scientific research emerge from various models. This concept includes all the achievements accumulated during a certain period of time. Therefore, the concept of the paradigm represents various methods and solutions for problem situations developed by the scientific community at a certain stage of development. The changing of the initial conditions of the paradigm causes a paradigm shift, which includes the following periods: pre-paradigm, "normal science", extraordinary science, and scientific revolution ones.

Keywords: Paradigm, paradigm shift, disciplinary matrix, research program;

1. Introduction

The main aim of the contemporary science is to order accumulated knowledge. That is why various variants of the presentation of scientific knowledge and information appear. All of these are mainly expressed in scientific paradigms.

2. Discussion

Nowadays the concept of "scientific paradigm" is in demand in various science fields, and it has different meanings. For example, in *the methodology*, a paradigm is a set of values, methods and technical skills adopted in the scientific community within the framework of an established tradition in a certain period of time. This concept is used in scientific works, schools, textbooks, etc. [2].

In *linguistics*, the paradigm is 1) any class of linguistic units opposed to each other and at the same time united by the presence of a common feature or causing the same associations; 2) a set of linguistic units connected by paradigmatic relations [4]. From the point of view of *the philosophical knowledge*, the paradigm is defined as a certain set of concepts, which include theories, research methods and standards [7]. In *rhetoric*, the paradigm acts as an example taken from history or mythology and given for the purpose of comparison [5]. In *the political science*,

the paradigm means a set of cognitive principles and techniques of displaying the political reality [9].

The theory was considered the main structural component of the functioning and development of science (with such categories as methods, the methodology and concepts) until the middle of 20th century. However, in general terms, the concept of the paradigm is wider and often precedes it.

The term “paradigm” emerged in the system of scientific knowledge in the second half of the 20th century after the publication of the book “The Structure of Scientific Revolutions” (1962) by the American philosopher T. Kuhn. It is worth to say, that this concept originated in science in the 19th century. It was created by the positivist G. Bergman to characterize the normativity of the methodology [1].

Since the late 1960s, the term “paradigm” was mainly used in philosophy of science and sociology to denote the basic system of ideas, concepts and attitudes, the initial conceptual scheme, the model of problem statement and their solution, research methods that dominate for a certain time in the scientific community [5].

The scientific paradigm is all scientific achievements, which for some time give a model of problem statement and their solutions. According to T. Kuhn, it is “the source of methods, problem situations and standards of solutions”, which is accepted by scientists at this stage of development [5].

As mentioned above, the concept of the paradigm acquires all sorts of meanings in various kinds of science. However, in its well-established definition, the paradigm is an accepted model or sample. In his work “The Structure of Scientific Revolutions” T. Kuhn notes that the concepts of “model” and “sample”, suggesting conformity with an object, do not fully cover the definition of the scientific paradigm. This concept can be considered as a conceptual module of science because it is a set of theories based on ontological and epistemological idealizations which is prevalent in a particular scientific community [5].

K. Popper, I. Lakatos, M. Masterman and others criticized T. Kuhn's definition of the concept of the paradigm because of its ambiguity (there were up to 60 different meanings of its understanding). Under the influence of criticism, T. Kuhn revised and concretized this definition. The scientist has identified it as a “disciplinary matrix” [8].

The disciplinary matrix takes into account the belonging of scientists to a particular discipline and includes ordered elements of a different nature: 1) symbolic generalizations constituting a formal apparatus and the language peculiar to a specific scientific discipline; 2) metaphysical components that characterize fundamental and methodological principles of the worldview; 3) values that set dominant ideals and norms of the construction and justification of scientific knowledge [1].

T.N. Khomutova in her article “Scientific Paradigms in Linguistics” notes that a lot of scientists and researchers did not accept the terminological combination “disciplinary matrix”. That is why it was not practically used, while the term “paradigm” became an eponym [3].

Fundamental initial conditions may change in the paradigm. This phenomenon is *a paradigm shift*, which is divided into the following periods:

1. *pre-paradigm* (this period is inherent in any science at the stage of its origin and formation) [6];
2. *“normal science”* (when all research works are based on the dominant theory. The term “normal science” means “the research firmly based on one or several past scientific achievements that have been recognized by a certain scientific community as a basis for its further practical activity”) [5];

3. *extraordinary science* (alternative theories appear because of deviations from the accepted norm) [6];

4. *scientific revolution* (there are conflicts of various value systems caused by heterogeneous scientific pictures of the world. During this period, a new paradigm appears and the known phenomenon is researched from a different point of view) [5].

Afterwards, the British philosopher I. Lakatos researched the paradigm within the framework of the concept of the research programs. He identified the scientific paradigm with the research program. *The research program* consists of "a hard core", "negative heuristics", "positive heuristics". The "hard core" is an indisputable and unchanging set of hypotheses that form the essence of research programs. The "protective belt" ("negative heuristic") was introduced in order to protect the nucleus from any counterarguments. The protective belt contains supportive auxiliary hypotheses. "Positive heuristics" serves as a strategy for identifying and selecting priority problems and tasks that scientists must solve [6].

3. Conclusion

Thus, the scientific paradigm is a theoretical concept, methodological principles and values that remain constant for "normal science" and changing as a result of scientific revolutions. In the framework of scientific knowledge, the analysis and the study of scientific paradigms are necessary in order to understand the various methods and techniques in solving specific research problems.

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