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**Oksana Velko** 

senior lecturer,

Belarusian State University,

Minsk, Belarus

## **THE POSSIBILITIES AND IMPORTANCE OF SOCIOLOGICAL MATHEMATICAL METHODS IN SOCIOLOGICAL RESEARCH AND EDUCATION OF SOCIOLOGISTS**

***Annotation.** This article describes the possibilities and significance of sociological and mathematical methods in sociological research and education of sociologists. Specific examples of the use of sociological and mathematical methods in sociology, education and science are given.*

***Key words:** sociological and mathematical methods, sociological research.*

Modern mathematical methods occupy an important place in social life, culture, science and sociological research. Mathematics has become the most important discipline for sociologists due to the ideological breadth of its concepts. It helps to understand the essence of the processes and phenomena occurring in the world around us; develops a research approach to the work of a sociologist based on consistency, and completeness of judgments; evaluates the plausibility of information based on quantitative parameters and ratios.

Due to the fact that modern sociological knowledge has become even more complex and elusive in terms of its integrity and unity, which is reflected in its methodology, among mathematically oriented sociologists a need arose for the integration of mathematics and sociology [1, p. 50]. Modern sociology is often based on data research, and therefore statistics play an important role in sociological research. Sociology and statistics are those sciences that play a significant role in meeting the needs of society and managing relevant information. Both of these sciences throughout the entire period of their formation and development do not exist autonomously, but in interaction, both in the field of theory and in the field of empirical research [2, p. 54]. To master statistics, to competently describe and analyze the phenomena that it studies, a sociologist must possess modern sociological and mathematical methods.

Many social studies are associated with a wider and more specialized use of mathematics. Thus, the works of Kovalevsky, devoted to the problems of demography, laid the foundation for the modern theory of sampling. Chuprov invented the coefficient of pairwise connection between nominal features, which is actively used in modern sociology. Domestic sociologists also studied the influence of social factors on the types of economic models. Perekrest proposed an original method of multidimensional scaling and built a deterministic model of the behavior of design engineers. Tolstova substantiated the foundations of mathematical formalization in empirical sociology in various classes of research practices. Guts makes extensive use of mathematical methods in sociological research, in particular, mathematical modeling, data processing methods, computer modeling.

The connection between sociology and mathematics in recent years has become increasingly close and multifaceted. In connection with the development needs of both the theory of sociology and its experimental and applied directions, there is growing interest in the use of mathematical methods to describe and analyze the phenomena that it studies, there is a desire to express the discovered laws in mathematical form [3, p. 22]. In social research, such mathematical and statistical tools are widely used as the method of analytical groupings; method of averages; index method of analysis; data analysis methods; proximity matrices between objects; methods of accounting for data that meet multivalued criteria; a way to test the robustness of a table structure based on random modeling, etc. Recently, the method of sociological and mathematical modeling has become more and more in demand in sociological research.

Recently, sociological research has been actively using models of social groups and social institutions, attempts are being made to model the behavior of both individuals and interpersonal interactions. Models of sociogenesis, group productivity and inclusion in a small discussion group are based on mathematical research. Mathematical models are also used in the socio-economic sphere in the form of systems of linear algebraic equations. For example, in the study of the input-output balance of production.

The author studies the satisfaction of BSU students with their education using the method of sociological and mathematical modeling. This method was chosen due to the fact that in relation to the study of satisfaction with the quality of higher education, only an indirect measurement is applicable. The relevance of modeling the satisfaction of BSU students with the quality of education is determined by the fact that the education received interests and worries parents, students, university graduates, employers and university leaders [4, p. 64]. The author made the assumption that the construction of a sociological and mathematical model of satisfaction with the quality of higher education is influenced by: satisfaction with the educational process; social satisfaction (characterized by satisfaction with the student's relationship with other students, satisfaction with the student's relationship with teachers and satisfaction with extracurricular activities); satisfaction with the activities of the university to create a favorable educational environment (services, infrastructure, material component, which the university has).

Recently, graph theory has been widely used in sociological research. Undirected graphs can be used to depict symmetric (two-way) relationships between objects, such as collaborative relationships between people. Directed graphs are useful for depicting asymmetric (i.e., one-way) relationships. For example, love, envy, care, submission.

The author is the developer of a typical program for the specialty 1-23 01 05 Sociology in the discipline "Fundamentals of Higher Mathematics". The program of the discipline contains several important sections that cover the main areas of application of mathematical methods in sociology. These are such sections as "Elements of set theory and their application to social objects", "Elements of linear algebra and their use in the socio-economic sphere", "Fundamentals of mathematical analysis and their application in the socio-economic sphere", "Elements of the probability theory in sociological research", "Fundamentals of mathematical modeling in sociology" [5, p. 6].

Thus, the use of sociological and mathematical methods by sociologists in the analysis of modern society and social reality contributes to a more successful formation of professional competence, the ability to use intersubject connections [6, p. 45].

The possibility of using mathematics in sociological research arises when a sociologist abstracts from some specific features of the object under study and considers a certain formalization of a phenomenon or process [7, p. 124]. Note that sociology solves the following tasks: it analyzes data, explains the results of surveys or other sociological studies presented in the form of arrays of numerical data, using cluster analysis, component analysis, factor analysis, regression analysis; explains social phenomena; describes social phenomena by building at the same time, models of phenomena, including mathematical ones; predicts social phenomena using methods of mathematical modeling.

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