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Triangulation as the method used in the study of local security

Abstract

Research on the science of safety can be carried out various scientific methods, allowing to obtain the results of both a quantitative as well as qualitative. As part of the research you can use a wide range of methods, techniques and research tools. The publication aims to popularize the method of triangulation in research on local security. The author describes the characteristics and advantages triangulation method over other methods in studies of local security.

Keywords: *safety, local level, research, research methods, triangulation*

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Introduction

Research in the field of safety science can be carried out with various scientific methods that allow to obtain the results of, both, quantitative and qualitative nature. As part of the research, wide range of methods, techniques and research tools can be used, and their detailed selection should be made deliberately and should be planned with taking into account such variables as the subject, the purpose and scope of the work, or the specificity and the size of the research sample. Currently, in safety sciences, the use of qualitative methods that allows more accurate specificity of phenomena observation, as well as taking into account the impact of immeasurable variables or variable difficult to measure for level of safety, becomes an important trend.

On the basis of the safety sciences, safety means: "The objective state being the function of the threat level and defense capabilities, perceived subjectively by individuals or groups" (Korzeniowski 2012, p. 76). Concern for the safety of a man and the ubiquitous sense of varied risks occurring in social reality, from years have been forcing to take the measures concerning understanding of their essence and seeking ways and methods of reducing, even in part, the impact of these negative tendencies on the functioning of people, societies and countries. Such an objective in this area forces conducting the research on the sources of the threats formation, methods of their detection, monitoring, mitigation and eliminating the consequences of their occurrence.

Shaping the safety of people and social groups is conditioned primarily by obtaining reliable information about the current status of the analyzed reality, the condition of safety or existing threats, while creating a safety system, the correct policy of safety information should also be taken into account – "it is a set of laws, rules of practical experiences governing the way of management, protection and distribution of information resources within the organization" (Kister 2009, p.17).

Only on the basis of the obtained, the most reliable information there is a possibility to pursue any remedial and prevention actions. This methodological accountability of action from diagnosis to prevention is a condition *sine qua non* of any logical actions. It becomes increasingly important in these areas of human activity in which the subject are persons, their life, health, possessions, and safety. In safety sciences, the basis for success in performance is to make correct analysis of the actual condition but not only in states of danger or crisis. It is in a state of "peace", daily, safe situation, that actions are taken for the maintenance, improvement and development of the state of human

and environmental safety. These correct and logical actions are enabled by the methodology of security research as a specific procedure in order to achieve the intended objective.

The research process in safety sciences

In the process of progressive social development, its increasingly complex relationships and conditionings existing in the process of globalization, the interaction scope of various elements in the man – technology – environment system, expands. It causes that, in everyday social reality, there are many elements more or less related to the generally conceived safety.

This increasing social complexity of life and conditions of human functioning, including a growing number of factors affecting the safety of persons and social groups, does not help to understand what security is, how to shape it, and to what extent a sense of safety affects our functioning. Safety becomes such an important sphere of our functioning that sometimes it is considered to be the dominant value. It is the need for safety that determines a man's actions in the already existing traditional areas. It is impossible to present conditionings of all areas, but it can be indicated how actions in the field of economics aim at creating conditions for the safe functioning of the economy and the creation of economic (financial) security of families and individuals.

Similarly, in sociology, the analysis of the functioning of society, various social groups, their merging or disintegration, seeks to identify what unites, what serves the safety, and the elimination of what leads to war, destruction and annihilation. Research in the safety sciences is interdisciplinary; describing, explaining, evaluating and predicting events (facts), processes and occurrences in the field of safety, but also the design of structures and taking action to ensure the safety, all this requires the use of knowledge from different fields and scientific areas. In the process of properly planned and organized research, the choice of method or research methods are equally important.

Only through the proper choice of methods and the use of their respective tools and techniques it is possible to examine a specific event or several events (facts) arranged in a logical sequence of these events (process) or to investigate a particular occurrence, that is, its description, explanation (understanding) and alternatively, predicting the direction of change, but also proposing specific repair solutions.

The origin of the triangulation term

Etymologically, the word triangulation comes from the Latin word *triangulum*, which means the triangle, from *triangulus* – triangular, where *tri* means three, and *angulus* stands for angle (Denzin 2006, p. 78). Lexically, triangulation is: "a method for measuring larger areas, used in geodesy, consisting in dividing the measured area on the adjacent triangles" (Apanowicz 2005, p. 45), and "the method of determining the coordinates of points on a system of triangles formed by these points" (Cieślarczyk 2006, p. 117), but also "positioning points in the field by the use of the triangle geometry" (Flick 2011, p. 56).

The concept of triangulation derives from surveying and geodesy. Triangulation, as a kind of geodetic measurements performed in order to determine the location of selected points in the area, uses this attribute of a triangle which claims that the knowledge of one side and two angles is enough to construct the entire figure, and while site survey of the angles is much easier than the distance. Triangulation is used to accurately measure the area of the country during the construction of topographic maps (Isaacs 2009, p. 61).

Sources say that the triangulation was invented in 1615 by Snell van Royen Willebrord, Snellius (1580-1626), Dutch mathematician, astronomer, physicist and geodesist, a professor at the University of Leiden. He developed the principle of triangulation measurements and on their basis he designated the length of equator (Karpiński 2006, p. 93). Analysis of the literature shows that triangulation was used by the ancient Egyptians and Greeks. They used a simple observational instruments that have been improved and gave birth to today's geological tool known as theodolite. Rules for the use of triangulation were already described in the 1st century. A.D. by Greek geometer and inventor – Heron of Alexandria (Kopaliński 1989, p. 24).

Currently, triangulation is used, among others in: engineering and navigation as technology of accurately determining the position of a ship or an aircraft. The latest technology is used in triangulation, i.e.: in satellite connections (GPS). In the source literature, after Denzin, there is triangulation of: data, researchers, theory, methods. Data triangulation is related to source of information. Under this type there are several subtypes of data triangulation. It is recommended to examine the occurrence at different moments in time, taking into account different locations and the participation of different subjects. It allows to combine or mix various data (Sztumski 2005, p. 252).

Researchers' triangulation is another type of triangulation which was proposed by Denzin. In this method, it is important that the individual researchers do not conduct research by dividing work or task between each other. The importance of that triangulation in conduction of research by several researchers is parallel. This means that given occurrence is examined by, i.e.: observations or interviews in order to reveal what each of the investigators acknowledged at the forefront during the study and to minimize unconscious preferences of researchers. Then, the data obtained by the researchers is compared (Marshall 2004, p. 404). Triangulation of theory refers to a situation in which examined phenomenon is theoretically inconsistent. The essence of this approach to the research is an analysis of the theory of the given occurrence and selecting the most appropriate, or, if it is impossible, to develop one's own theory. The advantage of this method is the opportunity to learn, in the process of research, various theories of the examined occurrence, even the most distant (Kostera 2003, p. 98).

Another type of triangulation is triangulation of methods. It is the most prevalent among researchers. It consists in choosing and combining the best, most useful research methods to the given research problem in order to maximize the results of the research. Combining different research methods allows to eliminate their weaknesses and to expose strengths. It allows to compose newer research projects. It is important to combine research methods in a critical way, without naivety and ill-considered decision. There are two possibilities as part of this triangulation. Triangulation within one method and between methods.

Data triangulation as a research method in the study of local safety

The research process based on the analysis of the local safety system and the impact of external and internal factors on it should be implemented by means of triangulation, for a variety of methods, techniques and tools can be used. Here, useful methods can include a method of researching documentation, observation, interview method or the method of survey. Proper conduct of the research process with use of this approach enables, among others, to present more accurate and profound image of studied reality, explanation of the sources and conditions of certain phenomena, as well as the reliance on deeper relations between the researcher and the examined subject.

Triangulation is a methodological procedure relying on the credibility of data collected by different researchers or with different techniques. "Triangulation is therefore the method of rational objectification of an observed reality by the researcher"

(Konecki 2000, pp. 77). An example of an area in which the triangulation works particularly well is exploring various aspects of the implementation and application of safety systems. Safety systems are usually characterized by a high level of complexity, which is a derivative of uniqueness, in which the system is implemented.

Therefore, it can be said that triangulation is used in order to illustrate the case, occurrence, action in the best way. In this case, the emphasis is put on the quality of learning the holistic character. Case study is used for educational purposes. An in-depth analysis allows to analyze the mistakes, behaviors worthy of following, and implementing processes. The difficulty of research issues also deepens the very importance for the functioning of complex systems, among others, different groups, e.g.: tourists and residents of the local community.

Use of triangulation provides the opportunity to take advantage of the many techniques of data collection and analysis. Among the basic techniques are: analysis of materials and documents, observations, interviews, experiments and other qualitative techniques. In the analysis of the local safety system there should be used as many data sources as possible in order to use all the positive aspects of the techniques most effectively, while minimizing their negative sides. In planned studies concerning local safety, triangulation methods, research techniques, and triangulation of data should be used.

In the given literature there are several methods of triangulation. Among often mentioned (Stake 2009, p. 112) there are triangulations of:

a) **Sources of information** (several sources of information are used simultaneously),
b) **persons analyzing the data** (several people independently analyze source data, then check whether formulated interpretations are similar),
c) **research perspectives** on the same source data (the same set of data is tried to be assessed from the position of various areas of science),
d) **research methods** (the same case is examined simultaneously by several research instruments; if a triangulation exists, each instrument should provide the same, or very similar results).

In an attempt to identify the methods, techniques and tools used in the research of safety problems, in its interdisciplinary character, various disciplines and fields of knowledge using specific research methods, characteristic for their areas, should be noted and within them appropriate techniques and research tools. In the research analysis should be used methods, both qualitative, allowing to explain the essence of social

processes, and quantitative, specifying numerical parameters characterizing studied phenomenon or the object of study.

In studies of local safety, the following techniques and methods can be used:

- **Description** – allows to describe in detail the functioning system of local safety, taking into account different elements of the system.
- **Survey** – carrying it out in the local community helps to obtain information about the assessment of: a sense of safety, threats and functioning of the safety system.
- **Interviews** – carried out with public service employees in order to obtain information on the cooperation level of local government and institutions responsible for the safety level and other entities dealing with the problems of local safety.
- **Analysis** – i.e. of the documents, being in force in the municipality, which relate to the functioning of the municipality safety system. (resolutions, regulations, procedures, reports, analysis).
- **Comparison** – used to compare opinions and assessment of the various groups composing the local safety system.
- **Casual method** – allows to indicate dependencies whether a certain effect (action, procedure) remains in the causal relation to the events of the primary event (the specificity of the place, the threat).
- **Deduction** – allows to lead to conclusions on the functioning of the local safety system on the basis of pre-established set of circumstances.

The use of all of the above mentioned methods and research techniques with the use of triangulation of methods and data, will enable an accurate understanding of analyzed occurrence. In this case, different research techniques are used to illustrate selected occurrence or action in the best manner. The emphasis in this case is placed on the quality of learning the holistic character.

Conlusions

Safety sciences use the methodological achievements of social sciences. On one hand, a wide range of methods and techniques allows accurate research, on the other, it creates difficulties in the selection of the most appropriate of them. Due to the fact that the research subjects of the safety sciences are, among others, contemporary security systems in the military and non-military aspect, and their functioning at different organizational levels, it is required that empirical data for analysis and interpretation come

from the widest possible range of the observation of interest subject. Research in this discipline should contribute to formation of the theoretical foundations and development of systems of national and international safety and operating systems functioning in the area of safety. The answer for the need of reliable, accurate research results is the method of triangulation.

In science, there is no consensus on what triangulation is. Analysis of source literature leads to the conclusion that, despite the differences in the definition of triangulation, there exists a common denominator. It is, namely a combination of methods and research techniques. This operation is the essence of triangulation. There is also no consensus on the minimum number of methods necessary to perform research in accordance with the method of triangulation.

The analysis of literature allowed to formulate statements that triangulation as a research method used in the safety sciences asserts higher quality of conducted research and reduces measurement error. It consist in gathering, elaboration, analyzing and interpretation of data using three or more methods and research techniques, and then comparing and merging the results. The analysis of what has been presented above allows to conclude that in the safety sciences triangulation, as a research method, can provide valuable and noteworthy of researchers attention manner of scientific knowledge, however, application of this method requires specific intuition from researchers. The triangulation is not only about the combination of methods and research techniques. Their compilation is also important. The combined elements should create, despite its diversity, one monolithic, coherent in itself, subordinated to the objective pursued, synergistic research method.

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