

## METHODOLOGICAL PROBLEMS OF DESIGNING RESEARCH IN SAFETY SCIENCES

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Review paper

**Abstract:** *Designing scientific research in the sciences of safety is essential for achieving quality results, efficient use of resources, protecting ethical principles and contributing to scientific knowledge in the field of security. The paper describes the elements of designing research in safety sciences with a focus on the research project for the preparation of the doctoral dissertation.*

*Bearing in mind that the methodology of scientific research is the basis for successful conduct of scientific research, the emphasis is on the basic problems that arise when choosing research problems, defining research subjects, selection of samples, ethical issues, validity and reliability of data and interdisciplinarity.*

*These methodological problems are just some of the challenges that can be faced in the design of scientific research in the preparation of doctoral dissertations in the sciences of safety.*

**Key words:** *methodology of scientific research, security science, research design, validity and reliability of data, ethical issues*

### 1. INTRODUCTION

Designing research in safety sciences is essential for defining research objectives, selecting the appropriate methodology, collecting relevant data, analyzing them and interpreting the results. Due to the specifics and characteristics of the safety sciences, the design of research requires and certain stages and steps, thus gaining the complexity and necessity of complying with established standards and procedures.

During many years of work and dealing with the methodology of scientific research, problems have crystallized in the design of research in the sciences of safety in the field of solving certain

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scientific problems that are often present with doctoral students and designing for the preparation of doctoral dissertations. The paper presents the basic elements of designing research with a focus on the scientific idea, and the key part that conditions other elements of scientific thought.

Also, the paper deals with the specifics of security sciences and their relationship with the most related sciences, primarily military and political sciences. This part is very important, because in research in the field of security sciences there are also "experts" from the aforementioned sciences, which makes it difficult to classify and mix certain problems in safety sciences. This is one of the issues that affects the number of scientists at certain institutions and whose views prevail in this case. But it's a special topic to consider on another forum.

The following specifically deals with the design of research in the sciences of safety and finally precisely defines the problems that are current in the field of designing research in the sciences of safety with some elements of guidelines that need to be in mind in order for design and research in the safety sciences to be scientifically verified and reflect the correctness of research and contribute to the development of safety sciences.

## **2. SECURITY SCIENCES**

In the scientific ("Official Gazette of RS", 114/2017 and 24/2020) field of social sciences and humanities, they were classified as a security auxiliary and given the status of science. Bearing in mind the status of science, it should be noted, if the same as M. Markovic: "Science is objective, critical, methodically derived knowledge [...], whose goal is to establish the objective truth about reality." (Markovic, 1994) Markovic further points out, "in order to achieve this goal, science uses certain socially accepted research procedures and appropriate criteria for evaluating whether a particular research result should be accepted as true or not", (Markovic, 1994).

In this particular case, as M. Markovic pointed out again (Markovic, 1994), "the concept of knowledge (as well as the concept of truth) implies an object to which it relates and which is learned from a certain human perspective. In this case, every science has its own subject." Also, the concept of cognition implies a certain way of knowing, that is, a subjective practice by which one comes to the awareness of the object, which is the method", (Markovic, 1994).

Given the foregoing, the subject of security is the study and analysis of all aspects of security, including political, military, economic, social and technical dimensions. The aim of security education is to understand and understand the source and, nature and consequences of threats and challenges to security, as well as to develop strategies, policies and safeguards to ensure the safety of societies, organizations and individuals. In this sense, the sciences of security belong to the applied sciences "[...] which deal directly with practical problems and contain not only explanations of immediate experiential phenomena, but instructions for control and practical mastery of them. Most expressions of their language are descriptive, concrete, single or low degree of generality, methodologically, the focus is on technical data collection and classification, (Markovic, 1994).

From the point of view of the object of safety science, it can be concluded that it covers all aspects that are relevant to security, which includes international relations, military strategy, terrorism, crime, cybersecurity, global risks, crisis management, transport safety, energy, environmental protection and other areas that may have an impact on security. Precisely because of the width of the facility, the science of safety includes it and various disciplines and areas of research. The interdisciplinary approach is key to understanding and solving complex security challenges, and security science will use knowledge in the fields of political

science, international relations, military strategy, sociology, psychology, law, technology and other relevant disciplines.

In particular, it should be emphasized that security sciences have broader scope and are studied by various aspects of security at the global, national and individual levels. The science of security covers analysis of threats and challenges that threaten security, including terrorism, crime, cybersecurity, natural disasters, economic crises and other risk factors. At the same time, security sciences encompass multidisciplinary approaches in the fields of politics, law, sociology, psychology, technology and other disciplines in order to understand the nature of security challenges and develop strategies to overcome them. In this case, it is also important to note the relations between the sciences of security, military and political science.

### **1.1. The relationship between security sciences and military sciences**

It is important to understand the relationship between military science and security sciences because both received classification at the same time. The subject of military science is primarily related to armed struggle. The sciences are a multidisciplinary field that deals with the study of military operations, strategies, tactics, technologies and organizations. The aim of military sciences is to understand and apply principles and concepts that are essential for military activities, including war planning, operations management, and military logistics. Include the study of historical conflicts, military theory, military doctrine, and the application of military technology. Their main orientation is on military operations and aspects that are directly related to armed struggle.

It should be noted that even if there are overlaps between military science and security sciences, military science is usually oriented towards the military aspects of security, while the sciences of security have a wider range of interests that include the civilian aspects of security. However, both fields can benefit from the exchange of knowledge, methodologies and experience, especially in areas such as crisis management, strategic planning, threat analysis and risk assessment.

In today's complex security environment, cooperation between military science and the sciences of security is becoming increasingly important in order to better understand and address contemporary security challenges and threats.

### **1.2. The relationship between security science and political science**

What to keep in mind when it comes to political science and security science and how to make a distinction between them, it is necessary to look at the following:

1. Political sciences are mainly concerned with the study of political institutions, political processes, political systems, political theories, and political behavior. On the other hand, security sciences focus on the study of factors that affect national and international security, such as military strategy, terrorism, conflict, information security and the like.
2. When it comes to research, political science tends to understand political phenomena, processes, and systems in order to better understand political behavior and political decision-making. In contrast, security science studies the factors that influence security, in order to identify sources of threats, assess vulnerabilities, and develop protection strategies.
3. A particular aspect in the methodology of political science and security science research is that the political sciences use a variety of methodologies, including field research, political document analysis, interviewing, and statistical analysis. The security sciences

also use these methods, but often rely on intelligence analysis, security assessments, scenarios, and models.

4. A special relationship between these sciences is interdisciplinarity, which can be characterized in the fact that both political science and security science are areas that use concepts and approaches from other disciplines. Political science often relies on sociology, economics, philosophy, and history, while the sciences of security include elements of political science, international relations, military science, information security, and other related disciplines.
5. Finally, what should be particularly emphasized is that secretaires have a strong applied dimension, with the aim of providing guidelines for risk management, ensuring national security, implementing appropriate policies and decision-making. Political science, on the other hand, is often oriented to theoretical research and understanding of political phenomena.

So, these are key elements when it comes to the relationship between security science and political science, especially in the sphere of research. Unfortunately, in practice, it often happens that in the design and preparation of doctoral dissertations, the problem of research is replaced and the problems of political phenomena are classified into security problems and vice versa.

### **3.DESIGNING RESEARCH IN THE SCIENCES OF SAFETY**

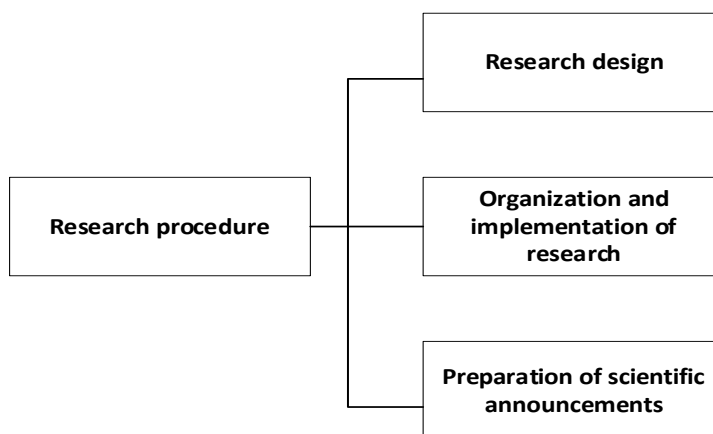
The design of research in the social sciences, which includes the science of safety, depends on the characteristics of the subject being researched. The subject of research in this area is so complex "[...] that it is not possible in scientific inquiry to include it in what is commonly called research methods", (Vujevic, 1983). The design of research involves meaningful, primarily mental activity in the development of a research project. As Milosavljevic M. points out, "it is a dynamically synchronized and coordinated system of interconnected and conditioned scientific and professional activities; mostly creative ones that are creating a research project", (Milosavljevic, 1980).

In this regard, the projection of research in the sciences of safety involves a series of steps that need to be carried out to define the problem of research, the subject of research, objectives and research, research hypotheses, method of research (methodology), collection of relevant data and analysis a Results. As a result of the design, a project is created that has its own characteristics, functions and parts.

The project is an imaginary model of [...] the acquisition of (scientific) knowledge about the subject of research, [...] it is an imaginary target, purposeful, rational and functional system and [...] a scientific and operational-organizational document" (Milosavljevic, 1980). In the end, it can be concluded that the project is an imaginary theoretical and practical model of acquiring scientific knowledge about the problem and the subject of research. It is, as The Merciful Says, "[...] expresses: first, idea – basic attitudes about the problem and subject of research; secondly – the idea of thought processes, techniques, means and procedures by which true scientific knowledge will be obtained", (Milosavljevic, 1980). It can be concluded that the design comes to the model, i.e. The whole we are [...] in their consciousness constructed and shaped on the basis of scientific and experiential knowledge, imagination, inspiration – through thinking according to the rules of logic. This model is expressed in appropriate language, signs, symbols, usually in writing and graphically in the form of a document called a research project", (Milosavljevic, 1980).

It should be noted, as Pointed out by Mihailovic D., "[...] The research project can be compared to a chess game. In it are firmly established the basic rules, what is the starting position of the figures, how they can move... [...] similar to a chess game and a research project is a kind of "mental game". There are well-known, generally accepted, firm rules by which research is conducted. The principles of methodological means and the order in their use shall be respected", (Mihailovic, 1999).

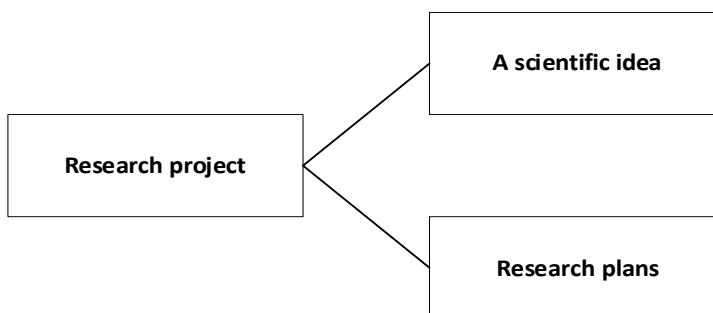
In order to understand research in the sciences of safety, it is important to present the structure of the entire research process. It is simply an established rule of research conduct methodology and is a consistent set of activities carried out during research in order to obtain objective, concrete and general and sufficiently critical and verifiable knowledge in the field in which the research is carried out. The research process is shown in Figure 1.



**Figure 1.** Research process

*Source: editing by authors*

As you can see in the picture, the first element is the design of research. It should be emphasized that successful design in a particular area of research conditions fundamental knowledge in the theory and practice of a specific field, logic, methodology and other specific areas that are important for concrete research. As a result, a fully elaborated research project is created, the structure of which is shown in Figure 2.



**Figure 2.** Structure of the research project

*Source: editing by authors*

The paper is oriented on the scientific idea that is structurally shown in Figure 3. In this context, within the framework of the scientific concept, three key questions are answered:

1. What's being investigated?

2. Why is it being investigated and
3. How is it investigated?

| SCIENTIFIC IDEA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                              |                                               |                                                                                                                                                                                                                                                                                                                                                                                              |                                   |                                  |                             |                                                                                                                                                 |                                    |                                         |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
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| <b>1. Research problem</b> <table border="1"> <tr><td>1.1. Location of the problem</td></tr> <tr><td>1.2. The essence of the problem</td></tr> <tr><td>1.3. Hypothetical positions</td></tr> <tr><td>1.4. Basic question</td></tr> <tr><td>1.5. Results of earlier research</td></tr> <tr><td>1.6. Importance of research</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.1. Location of the problem                                                                                                                                                                                                                                                                                                                                                                 | 1.2. The essence of the problem               | 1.3. Hypothetical positions                                                                                                                                                                                                                                                                                                                                                                  | 1.4. Basic question               | 1.5. Results of earlier research | 1.6. Importance of research | <b>3. Research goals (Why?)</b> <table border="1"> <tr><td>3.1. Scientific objectives</td></tr> <tr><td>3.2. Practical goals</td></tr> </table> | 3.1. Scientific objectives         | 3.2. Practical goals                    |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
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| 2.4.3. Disciplinary determination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                              |                                               |                                                                                                                                                                                                                                                                                                                                                                                              |                                   |                                  |                             |                                                                                                                                                 |                                    |                                         |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>5. Method of research (How?)</b> <table border="1"> <tr><td>5.1. Choice of methods</td></tr> <tr><td>5.2. Data sources</td></tr> <tr><td>5.3. Scope of research</td></tr> </table>                                                                                                                                                                                                        | 5.1. Choice of methods                        | 5.2. Data sources                                                                                                                                                                                                                                                                                                                                                                            | 5.3. Scope of research            |                                  |                             |                                                                                                                                                 |                                    |                                         |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
| 5.1. Choice of methods                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                              |                                               |                                                                                                                                                                                                                                                                                                                                                                                              |                                   |                                  |                             |                                                                                                                                                 |                                    |                                         |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
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| 5.3. Scope of research                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                              |                                               |                                                                                                                                                                                                                                                                                                                                                                                              |                                   |                                  |                             |                                                                                                                                                 |                                    |                                         |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>6. Scientific and social justification</b> <table border="1"> <tr><td>6.1. Scientific justification of the research</td></tr> <tr><td>6.2. Social justification of research</td></tr> </table>                                                                                                                                                                                            | 6.1. Scientific justification of the research | 6.2. Social justification of research                                                                                                                                                                                                                                                                                                                                                        |                                   |                                  |                             |                                                                                                                                                 |                                    |                                         |                                    |                                         |                                               |                                                       |                                                                                                                                                                            |                              |                           |                                   |                      |
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**Figure 3.** The scientific idea of research  
*Source: editing by authors*

On each of the above questions, as pointed out by Milosevic N." [...] the answer is given through certain parts of the scientific idea" (Milosevic, 1989). The concept of designing research in the sciences of safety is that security is a term that refers to a state of freedom from risk, danger or adverse events. It refers to the protection of individuals, groups, organizations or states from potential threats or harmful influences. Security can be physical, psychological, financial, traffic, cyber, and many other types.

In particular, it should be borne in mind that security is a multidisciplinary area that studies the phenomena and factors that affect security and develops strategies, techniques and methods of protection. It uses knowledge and methodologies from various disciplines such as political science, sociology, psychology, technology, law, economics and information technology to analyze risks, identify potential threats and develop effective ways of responding. Discusses how to identify, analyze and manage various sources of danger in order to reduce the chances of damage or loss. It also explores how people, organizations and societies can prepare for emergencies, how to deal with them when they occur, and how to minimize their consequences.

All of the above elements have a complex impact on the design of research in the sciences of safety, especially on the design of research in the context of doctoral dissertations. The essence of the paper primarily refers to the design of research in the preparation of doctoral dissertations and the treatment of topics, the choice of research problems and the mixing of problems for which it is not necessary to "engage" science.

The methodology of scientific research has been in crisis for many years. Every mention of the methodology of scientific research carries the epithet that it is in crisis. It should be borne in mind that many scientists run away from the methodology of scientific research and that the biggest problems arise precisely in the design of research.

#### **4. DESIGN AND RESEARCH PROBLEMS**

On the problems of designing research in the sciences of security, we must first start from the fact that deduction safety (aka security science) is to be used in the field of safety. security science is a multidisciplinary field that studies the causes, factors and protection measures associated with safety. It deals with research, analysis and understanding of various aspects of security in order to identify risks and threats, develop appropriate protection models and strategies, as well as effective interventions to reduce or eliminate risks. It is precisely the stated property of the sciences of security that makes it difficult to design research, especially the selection and formulation of research problems, research objects, hypotheses, ways of research, data processing and the verification of hypotheses.

In particular, it should be noted that security sciences use various methods of research, data analysis, modeling, simulation and use of technological tools to provide effective strategies and solutions for the prevention, detection, response and recovery of security threats. It also deals with ethical, legal and political issues related to security.

The basic design problems in the safety sciences can be summarized as follows:

- defining the problem of research,
- selection of the sample,
- validity and reliability of the sample,
- the verification of hypotheses,
- Ethical issues and
- interdisciplinarity.

The part concerning the design of research in the sciences of safety and which is the basis is the problem of research. As Zajecaranovic G. pointed out, "The problem is therefore a kind of question and it is the kind of questions that cannot be answered based on the available knowledge... Not all problems are scientific problems. The scientific problem is only that which contributes to the enrichment of scientific knowledge, that is, that problem which, when solved, contributes to the development of scientific knowledge" (Milosevic, 1989).

Thus, the draft of the scientific idea begins with the formulation of the research problem where the connection between the scientific-theoretical fund and the concrete research project is established. It contains a cross-section of pre-existing theories and significant research in the field of problems that are to be investigated (Mihailovic, 1999). This is one of the elements concerning design and which in the formulation of the research project bypasses and does not understand. That is why difficulties arise because the problem of research is often identified and confused with the subject of research. It should be noted that the problem of research is broader than the subject of research and surpasses other parts of the research project. Therefore, in security sciences, problems can often be complex and insufficiently precisely defined. That is why it is important to carefully formulate a research problem to ensure clarity and direction of research.

Of course, it should be further noted and ambiguities concerning hypotheses, their role in research, in particular, determining the level of scientific knowledge, indicators and

instruments. The relationship between the importance of hypotheses in the research and testing of hypotheses in statistics is often identified, thus creating general confusion in the verification of hypotheses and the results of the research. All this affects the production of reports, their quality and essentially the results of the research.

When it comes to the assembly of the appropriate sample for research, it should be noted that it is done with a limited number of participants that may be difficult to reach, such as e.g. soldiers, members of the police force or other special units. Such challenges can make it difficult to generalize survey results to the entire population.

Collecting relevant data in the sciences of security, or data science in general, is a challenging job that is conditioned by indicators and a built instrument. Limited access to information, inconsistency or unreliability of data, as well as their interpretation, can affect the validity and reliability of research results. Therefore, it is important to apply appropriate methods of data collection and analysis to ensure their accuracy and reliability.

It should be especially emphasized the method of verification of hypotheses, because simply in the statements the researchers state in the conclusions that the hypotheses are verified, and in the presentation of the results of the research there is absolutely no argumentation. It is important to note, as Basic M. points out, "[...] Hypotheses are a tool that has the function of testing a theory, [...] therefore a hypothesis must be formulated in such a way that its verification is possible, and this is feasible only in a situation where its formulation expresses a theoretical predicament in accordance with the concrete social conditions of research ... it is necessary to transform the research question into a hypothesis that will be a guide in the process of research and which will thus help us to assess the adequacy of the theoretical explanation offered" (Besic, 2019).

Another element that should not be ignored, and concerns ethical issues. Bearing in mind that scientific research in the field of security often deals with sensitive topics, such as terrorism, crime, conflict and other types of violence, it can raise a number of ethical questions regarding the protection of the rights and personal data of research participants, as well as the correct interpretation and use of the research results. It is necessary to carefully consider the ethical aspects of research and ensure compliance with ethical guidelines.

It is inconceivable in modern conditions that scientific research is of an intradisciplinary character. Thus, security sciences, in their character, are an interdisciplinary field that encompasses various disciplines such as political science, sociology, law, psychology, military sciences, etc. This multidisciplinary approach can pose a challenge in terms of integrating different theoretical frameworks, research methods and data analysis. That is why it is essential for researchers to be familiar with different disciplines and able to integrate their approaches into research.

However, the above methodological problems are just some of the challenges that can be faced in designing scientific research in the sciences of safety. It is important to approach research with careful planning, the use of appropriate methods and continuous critical thinking to overcome these problems and provide valid and relevant research knowledge.

## **5. CONCLUSION**

The methodology of scientific research is the basis for the successful conduct of scientific research. It provides the structure and guidance that researchers use to achieve research objectives in a systematic way. The subject and object of research methodology of security science refers to the study and understanding of the approaches, techniques, procedures and methods used in the analysis and research of the security field.

Designing research in the sciences of safety is a complex procedure that creates the necessary conditions for conducting research and obtaining relevant scientific knowledge and solving a specific scientific problem. The paper found that the sciences of security are interdisciplinary and that there is a direct link with military and political sciences. The methodology of security science is based on a multidisciplinary approach, combining elements from different disciplines such as political science, sociology, psychology, law, informatics, statistics and other relevant fields.

It has been established that the research project, especially the part related to the scientific idea, is a key element for providing answers to questions concerning obtaining relevant scientific results and the preparation of doctoral dissertations. It can be noted that the research project essentially provides application to the scientific method and data analysis in order to gain a deeper insight into the nature of security and provide guidance for making relevant decisions in the field of security.

It was noted that in the sphere of designing research in the sciences of security there are certain methodological problems that are manifested most often in the form of: vague or avoidance of defining problem of research, problems of choice and selection of samples, validity and reliability and sample, omission or formal statement of verification of hypotheses, problems Ethical issues of data collection and interdisciplinarity and research.

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