

RISK MANAGEMENT IN RESEARCH-DEVELOPMENT (R & D) PROJECTS CARRIED OUT BY ROMANIAN ORGANIZATIONS

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Abstract

The article aims to analyze the main features of the risk management process in R & D projects in Romanian organizations. In the article, the risk management process in the projects carried out by the Romanian organizations is surprised at all stages: risk identification, risk analysis and project risk response. Organizational risk management influences the way in which risk identification and analysis are integrated into the management of R & D projects. The level of residual risk during the project implementation period depends on how project managers address the identification of risks in the initial stages of their preparation. In most projects, resources are not allocated to team members with exclusive risk management responsibilities, but they are usually assumed by the project manager.

Keywords: projects, research, risk, management

1. Introduction

R & D projects are carried out by Romanian organizations in order to create new knowledge, methods, techniques, procedures, processes or products and to improve the existing ones. In terms of Romanian research legislation, R & D covers three fundamental areas: fundamental research, applicative research and experimental development.

Fundamental research projects are carried out most frequently by the research institutes of the Romanian Academy and universities. Projects with objectives in the field of applied research and experimental development are usually carried out by specialized project teams from the national research and development institutes in partnership with universities and private firms. Through national research programs, the Romanian state encourages public-private partnership projects to facilitate the transfer of research results to the economy.

The research and development projects carried out by the Romanian organizations maintain all the characteristics that the specialized literature refers to the concept of the project (clearly defined objectives, a well defined development period, a sum of resources allocated and uniqueness). Nevertheless, in the R & D projects, the characteristic feature of uniqueness is manifested most significantly in comparison to other types of projects, since novelty and thus the uniqueness of project deliverables is the sine qua non condition of their funding under national research programs.

Having the same characteristics as other types of R & D projects, R & D projects carry the risks generally applicable to any other type of project. Besides, the research - development projects present a series of specific risks both in the field of research - development and in each type of research - development project.

That is why the general framework of the risk management process needs to be adapted to the specificity of the research-development field. This is the premise behind the analysis conducted in this article on risk management in research and development projects carried out by Romanian organizations.

2. Literature review

The risk of projects is a notion defined many times in the literature. Project Management Institute considers that project risk is „an uncertain event or condition that, if it occurs, has a positive or negative effect on the project’s objective. The project’s risk includes both threats to the project’s objectives and opportunities to improve those objectives”. From our point of view, the PMI definition has a major deficiency because it explains risk through uncertainty which does not correspond to the types of decisions that may be adopted by the decision-makers according to the degree of knowledge of the environment by them. In addition, in the economic theory, the first distinction between risk and uncertainty belongs to Frank Knight, who, since 1921, has associated the risk to situations that can be quantified and the uncertainty to non-quantifiable situations. The great merit of the PMI definition is the positive perception of the risk being treated not only as a potential threat to the project objectives but also as a potential opportunity, which puts the Project Management Institute’s approach closer to the notion of risk in the economy.

Risk management includes, in most literature approaches, three key steps: risk identification, their analysis, and project risk response. Risk management is considered to be an iterative process throughout the life cycle of the project.

In the view of many specialists, the risk of R & D projects is a consequence of their specific nature. Winston (2006) [7] considered that a research project is a risk in itself. He supports the conception of Cochrane and Turner (1993) [2], which considered research projects to have less well-defined objectives and methods in the project initiation phase, which is a particular challenge in terms of project management. Very often, new research directions may emerge during the course of projects, leading to changes in the initial objectives and methods.

Research projects are most often conducted by researchers or technological development engineers with or without knowledge or experience in project management and in the application of specific methodologies, including project risk management (Winston, 2006 [7]). In specialty literature, the opinion was expressed that managers of research projects tend to focus the risk management process on technical risks at the expense of risks that can have a significant impact on the success of the project (Lee, Chung and Kim, 2007 [4]).

Several studies and researches conducted in various countries have confirmed the trends identified by the above-mentioned specialists. The study by the Australian National Audit Office in 2005

revealed that only half of Australia's research projects had implemented a formal risk management process. However, the Canadian National Research Council considers that a formalized risk management process leads to a more accurate quantification of the funds allocated to research projects and their more efficient use. From the point of view of coordinating research programs, a formalized process of risk management at the project level results very often in a more efficient use of the funds allocated for the implementation of the activities. Identifying risks in project start-ups can minimize spending to implement risk response strategies / measures.

Another outlined direction for risk management in research projects is the identification of the main project-specific risk categories. Winston considered in 2006 that a research project involves four categories of risks: internal, project, technical and external. Lee, Chung and Kim (2007) [4] found that research projects involve risks of a legal, moral, political, technological, social and market-related risk. It is noteworthy that the three specialists mentioned above make a clear distinction between the legal risks involved in carrying out a research project and the moral hazard that such a project involves. From their point of view, the manager of a research project must identify and analyze not only legal but also moral risks. Examples of the past of scientific research work worldwide confirm this concern. Researchers who participated in the research projects that resulted in the first atomic bomb, for example, faced countless moral problems during the course of the projects but also after their completion, and among them were recruited the greatest opponents of the assimilation of this technology in both the military and economy fields.

The Australian National Audit Office (2003) [10] considers that a research project involves eight key categories of risk: operational, commercial, financial, health and safety, personnel, project management, natural disasters, and risks to achieving project outcomes. Other professional research organizations focus the risks specific to research projects in four categories: financial, ethical, feasibility and reputational.

Moore and Shangraw (2011) provided a technological perspective on the risk of research projects considering that the main risk affecting research projects is the level of technological complexity. The use of new or partially-researched techniques or technologies previously investigated in a research project may lead, according to Moore and Shangraw, to an escalation in the cost of implementing it.

Baccarini and Melville (2011) [1] have developed a typology of the main categories of risks involved in carrying out research projects. Their study, focused on the university environment, led to the identification of the following project-specific risk categories:

- commercial and financial risks;
- risks of integrity and achievement of the proposed objectives;
- process and methodology;
- risks related to the project team;
- risks arising from the relationship with project stakeholders;
- ethical risks;
- research infrastructure risks.

It is noted that Baccarini and Melville distinguish between integrity risks and ethical risks. In the category of integrity risks, Baccarini and Melville can include: falsification of research results, use

of plagiarized materials, formulation of conclusions without a factual or experimental basis, formulation of project proposals with objectives and results that can not be achieved in the current state of knowledge. Ethical risks are those that originated in the Nuremberg trials after the Second World War. Of these, the most important are:

- physical and / or psychological harm to the subjects of research;
- lack of respect for local culture and traditions;
- undeclared conflicts of interest;
- non-compliance with confidentiality;
- non-compliance with protocols and / or procedures.

Rodage, Lei and Ganjeizadeh (2014) consider that the risk of research projects originates in the fact that the research activity starts from the necessity of testing / verifying / confirming hypotheses. That is why the risk of research failure is present in any research project. These specialists consider that the risk response and, implicitly, the risk response effectiveness study as a whole of a formal risk management process of R & D projects is particularly important.

3. Research methodology

Starting from the results achieved in other previous studies and from the main theoretical and methodological approaches regarding risk management in the research and development projects for the research carried out, the following objectives were proposed: identifying the main risks faced by research projects carried out by Romanian organizations, identifying the main techniques and methods used in the risk management process, and analyzing the main approaches at project or organization level in terms of project risk response. The research methodology for carrying out the study on risk management in the research and development projects carried out by the Romanian organizations comprises the following stages:

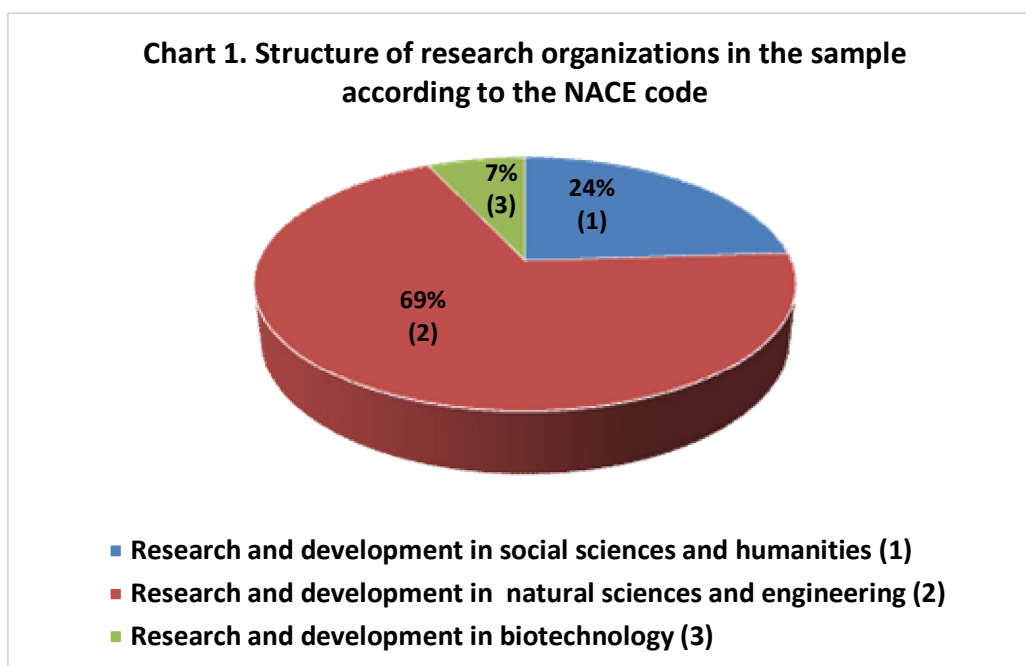
1. Study of the main results published in the specialty literature on risk management in research projects.
2. Selection of research projects which staff, project managers and project team members are interviewed on the main aspects of the risk management process. Initially, there were selected 30 projects underway and / or completed in the last two years, representing a representative sample, at least for projects carried out by public sector organizations. In order to select the projects and contact the project managers, the lists of results published in competitions within national R & D programs were used.
3. Making a questionnaire on risk management in R & D projects. The questionnaire had four sections: data about the respondent (gender, age, level of studies, scientific degree, specialization); data about organization (organization type, number of staff, annual revenue from R & D activity); identifying risks; risk analysis and risk response / reaction.
4. Submitting questionnaires and processing data following the responses of managers and project team members.

- Analyzing the results obtained and formulating the conclusions of the research regarding the risk management in the research and development projects carried out by the Romanian organizations.

4. Research results

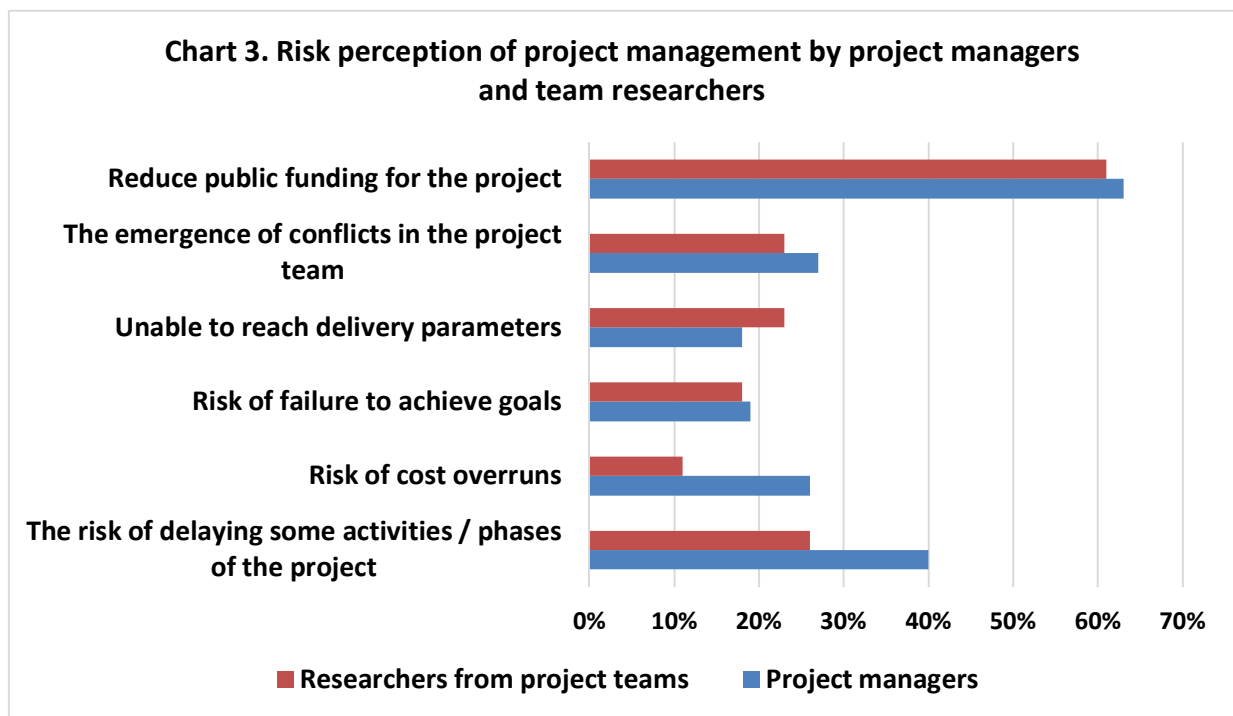
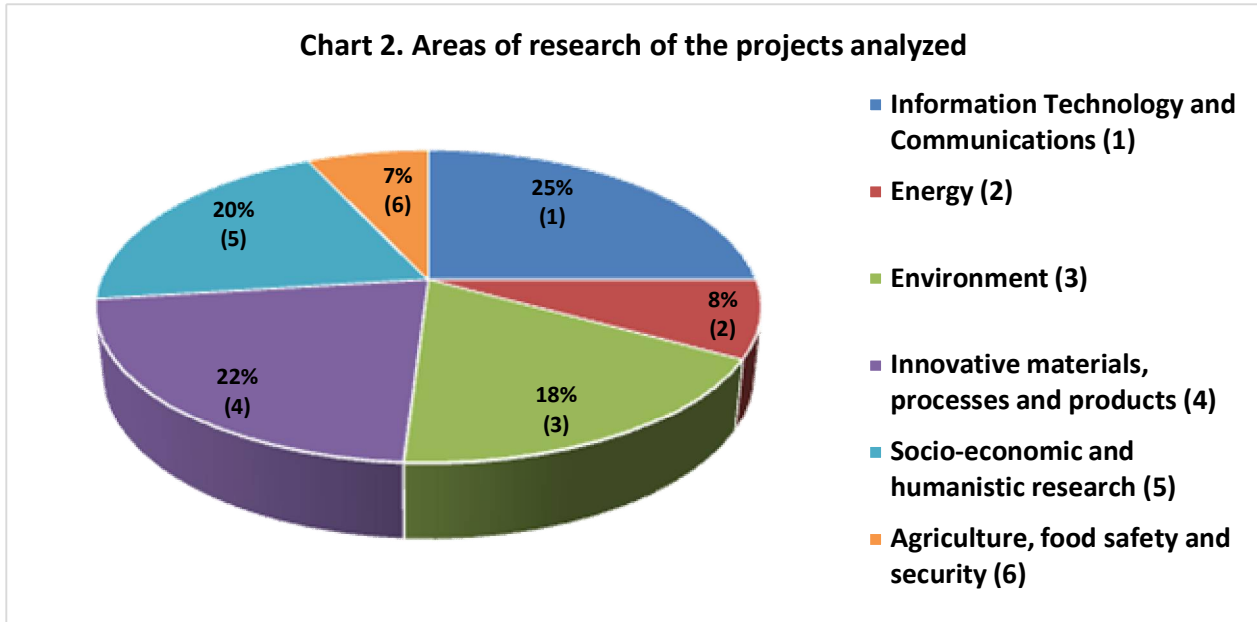
As a result of the obtained data processing, the research results mainly focused on the analysis of the perception of project managers and researchers working in the project teams on the risks they face in carrying out the research projects, the main methods and techniques used by the project teams for risks identification and analysis, and the share of different generic response measures to project risk.

The structure of the sample (according to Chart 1) comprises mostly research and development organizations in the field of natural sciences and engineering, followed by research and development organizations in social sciences and humanities. Research and development organizations in biotechnology are less represented. The situation is explicable given that most research organizations in Romania are specialized in natural sciences and engineering.



The research areas of the analyzed projects are presented in chart 2. The best represented in the sample are projects in the field of „Information and Communication Technology”, followed by those in the fields of „Innovative Materials and Processes” and „Socio-Economic and Humanistic Research”.

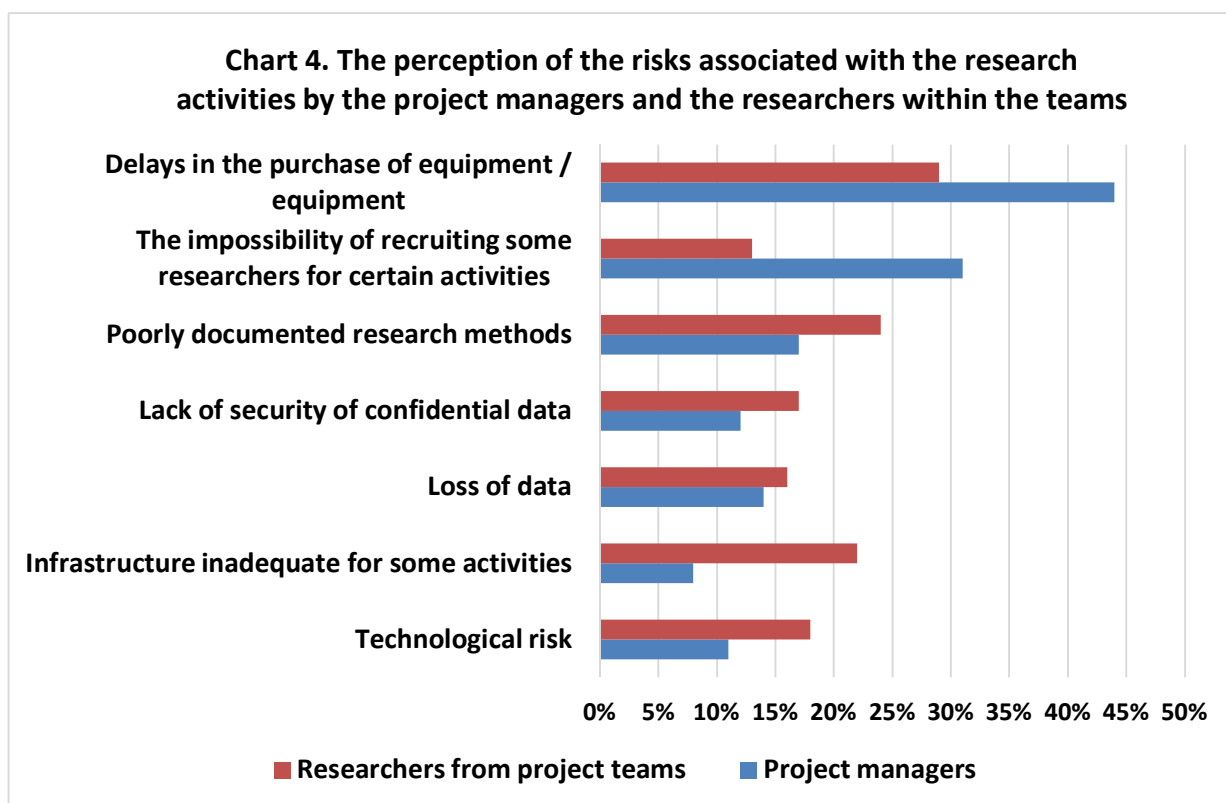
The main types of risks identified by the project managers and the team researchers are presented in Chart 3. There are a number of differences in risk perceptions between Project managers and Researchers within project teams, although both categories perceive the diminution of public funding as a key risk.



The first difference of perception is with regard to the risks associated with the project management itself. Project managers feel that the risk of cost overruns is more important than the perception of researchers in R & D teams. The same difference in perception, but less pronounced, occurs in the perception of the risk of delay.

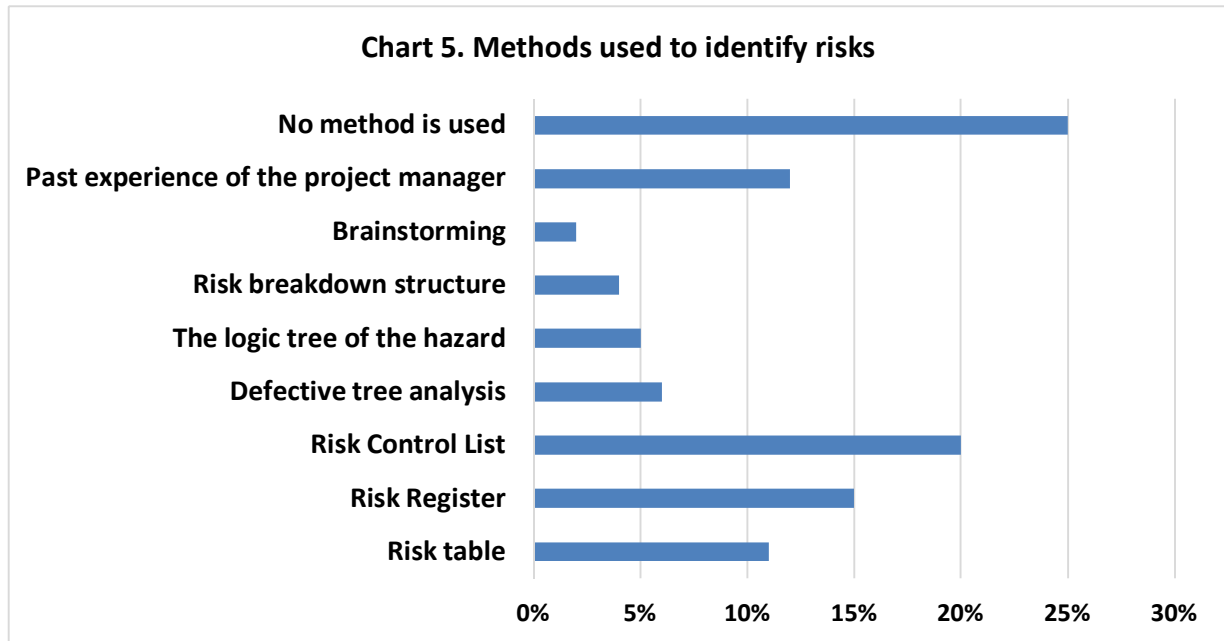
The perception of the risks of research activities in the projects (according to Chart 4) shows that the research staff perceives more clearly the risks involved in the execution of the project activities compared to the managers of the research-development projects surveyed. This situation is easily observable within the following categories of risks:

- the technological risk, namely the possibility that, at the end of the research project, the technology used and the resulting deliverables will be morally used due to the emergence of more efficient technologies / deliverables on the market in other projects;
- Inadequate infrastructure for research activities which may lead to the impossibility of confirming / verifying / obtaining results in research-development projects;
- the impossibility of reaching the parameters of deliverables in the research-development projects;
- Delays in the purchase of equipment / equipment.

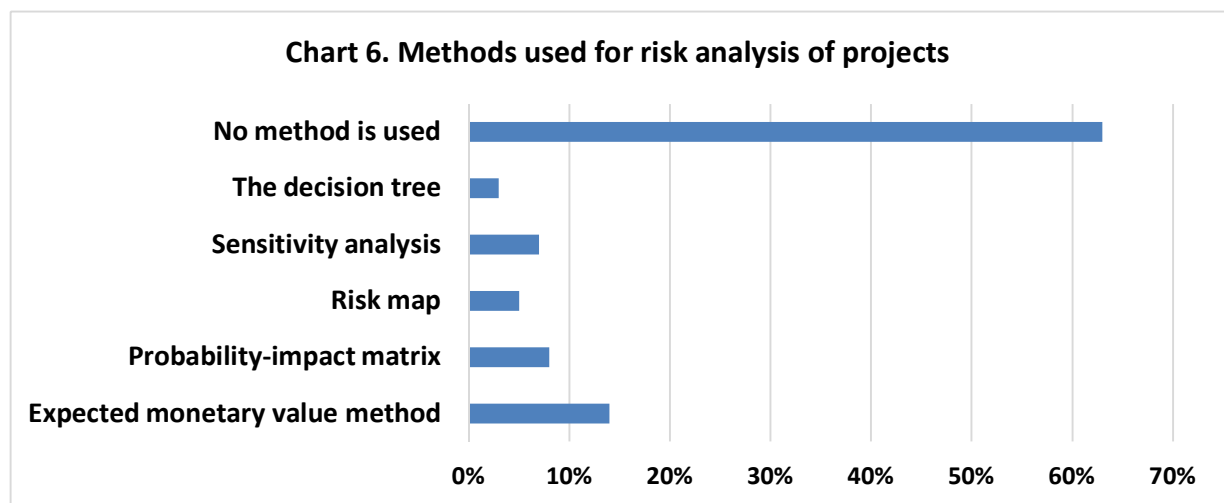


Although they perceive and identify project risks, nearly a quarter of project managers and researchers interviewed do not know or use specific risk identification methods according to Chart 5. The most commonly used risk identification methods are the control lists, the risk table and the risk register. Their use within projects is a reflection of their use at the organization level, which is mandatory according to the Romanian legislation regarding internal / managerial control. Compulsory practice at the organization level is transferred and used at project level.

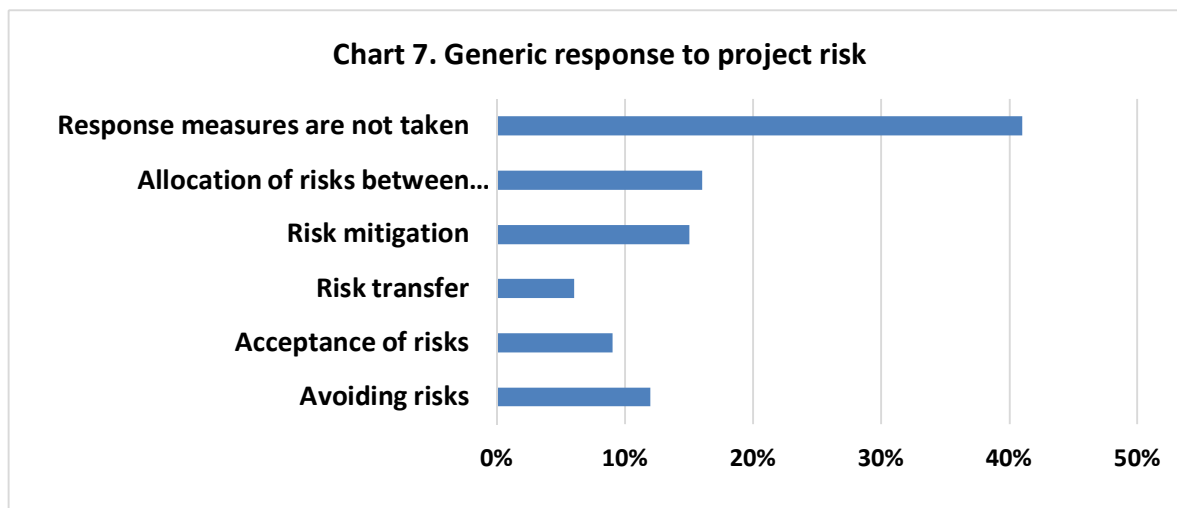
According to respondents surveyed, an alternative to using specific risk identification methods is to use the intuitive experience of project managers. The experience of the project manager is used in the process of identifying risks taking into account that the majority of research project managers reach this position relatively late in their career.



Graph 6 shows that the vast majority of respondents stated that no project risk analysis method is used in the projects in which they operate. Since the stage of risk analysis is poorly represented in the process of risk management, it follows that risk hierarchy is performed empirically.



According to Chart 7, over 40% of project staff believe that no project risk response measures are being adopted. The best represented generic methods of responding to project risk in all surveyed human resources are the allocation of risks between contractual partners involved in R & D projects and risk mitigation.



5. Conclusions

The research carried out within this article aimed at highlighting the main features of risk management in the research and development projects in Romania. The analysis of the results led to the following defining features of the management of research projects:

- there is a formal risk management process but not all phases of the risk management process are equally well represented (risk identification is much better compared to the analysis and response phases);
- there are a number of differences in risk perception between project managers and researchers within project teams;
- the methodological arsenal used in the risk management process is extremely poorly represented and reflects the existence or non-existence of a risk management process at the organization level.

Carrying out a research project involves identifying risks from its early stages so that implementation and / or exploitation periods are less exposed to the materialization of risks. The onset of a formal risk management process from the stages of preparation of project proposals to participation in competitions will minimize exposure to risk throughout the life cycle of a project.

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Rezumat

Articolul are ca obiectiv analiza principalelor caracteristici ale procesului de management al riscului în proiectele de cercetare-dezvoltare din organizațiile românești. În cadrul articolului procesul de management al riscului în proiectele realizate de organizațiile din România este surprins în toate etapele sale: identificarea riscurilor, analiza riscurilor și răspunsul la riscul proiectelor. Managementul riscului la nivel de organizație influențează modul în care sunt integrate identificarea și analiza riscurilor în managementul proiectelor de cercetare-dezvoltare. Nivelul riscului rezidual în perioada de implementare a proiectelor depinde de modul în care managerii de proiect abordează identificarea riscurilor în etapele inițiale de pregătire a acestora. În majoritatea proiectelor nu sunt alocate resurse pentru membrii echipei care să aibă responsabilități exclusive în privința managementului riscului ci, de obicei, acestea sunt asumate de managerul de proiect.

Cuvinte-cheie: proiecte, cercetare, risc, management

Аннотация

Целью статьи является анализ основных особенностей процесса управления рисками научно-исследовательских проектов в румынских организациях. В данной работе процесс менеджмента рисков, в осуществляемых проектах румынскими организациями, рассмотрен по этапам: выявление рисков, анализ рисков и реагирование на проектные риски. Менеджмент риска на уровне организации влияет на способ интегрирования идентификации и анализа рисков в управлении научно-исследовательскими проектами. Уровень остаточного риска на период внедрения проектов зависит от того, как менеджеры проекта решают проблему выявления рисков на начальных этапах их подготовки. В большинстве проектов ресурсы не распределяются между членами команды с исключительными обязанностями по управлению рисками, последние берет на себя руководитель проекта.

Ключевые слова: проекты, исследования, риск, менеджмент (управление)

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