

Review Paper

Innovative Risk Management: Identification, Assessment and Management of Risks in the Context of Innovative Project Management

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ABSTRACT

The article aims to solve the critical problem of risk management in the context of innovative projects, which affects the competitiveness and sustainability of organizations in the modern business environment. The purpose of the article is to highlight and develop an innovative approach to risk management in innovative projects to improve their success. The article examines the theoretical foundations of risk management in the context of innovative projects, including concepts, principles, and methods of risk management. The article identifies and analyzes the key risks that arise in the process of implementing innovative projects, including technological, financial, market and organizational risks. The article proposes the development of risk assessment methods and tools in the context of innovative projects, which may include the use of analytical methods, models, and approaches to assess the probability of risk occurrence and their potential impact on projects. The article offers effective methods of risk management in innovative projects: the development of proactive measures to prevent risks, the determination of control points, the implementation of backup plans, and the development of a risk monitoring and control system. The article provides practical recommendations and examples of implementing innovative risk management in the real field of innovative project management. The authors examine various aspects of risk management and offer practical recommendations for managing them effectively. The results of the study will contribute to the improvement of risk management practices in organizations engaged in innovative activities and contribute to ensuring sustainable development and competitiveness.

HIGHLIGHTS

- The article underscores the critical importance of an innovative approach to risk management in the context of innovative projects, emphasizing the need for clear definitions, assessment, and effective strategies to mitigate risks that may otherwise lead to instability and project failure.

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- ① The study contributes to project management by presenting a comprehensive framework for innovative risk management, addressing the unique challenges and uncertainties associated with innovation. The framework includes the identification of specific risks, assessment of their impact, and the development of proactive strategies, promoting a systematic and integrated approach to enhance the success of innovative projects.

Keywords: Risks, management, innovation, project management

In conditions of rapid technological development and growing competition, innovative projects are becoming important success factors for organizations in various industries. However, innovations are accompanied by certain risks that can negatively affect the effectiveness and implementation of these projects. However, in the context of innovation project management, the lack of clear definition, assessment, and effective risk management can lead to instability, losses, and failures in the implementation of innovation projects. Therefore, the main problem considered in this article is the need to develop an innovative approach to risk management in the context of innovative projects. It involves the identification of key risks that arise in the process of implementation of innovative projects, their assessment considering the impact on the success of projects, and the development of effective strategies for managing these risks. Innovative projects are usually accompanied by many uncertainties, unpredictable factors, and technological challenges. In conditions of rapid technological development and globalization, risks are becoming more complex and unpredictable, which requires the development of new methods and approaches to their management. The results of the study are aimed at expanding the understanding of the process of risk management in innovative projects and contributing to the improvement of risk management practices in organizations engaged in innovative activities.

The article aims to highlight and develop an innovative approach to risk management in innovative projects to improve their success and reduce the negative impact of risks.

To achieve the goal of the study, the following tasks were performed:

- ♦ Definition of the main theoretical aspects of innovative risk management.
- ♦ Analysis of risks associated with innovative projects.

- ♦ Development of risk assessment methods and tools:
- ♦ Development of risk management methods.

LITERATURE REVIEW

The article “Sustainable supply chain management performance in post COVID-19 era in an emerging economy: a big data perspective” explores the crucial role of big data analytics capabilities in enhancing the performance of green supply chains, particularly in the post COVID-19 era. Drawing upon the dynamic capabilities theory, the study investigates the impact of big data analytics capabilities (management, talent, and technology) on green supply chain performance. A quantitative and cross-sectional research approach was adopted, utilizing a survey questionnaire to collect data from 374 executives selected through random sampling. The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The study’s findings demonstrate that big data analytics capabilities significantly contribute to improving sustainable supply chain performance. Specifically, these capabilities have a positive influence on supply chain risk management and foster innovative green product development, leading to enhanced innovation and learning performance. Furthermore, the study reveals that innovation and green learning performance have a significant and positive relationship with sustainable supply chain performance. Consequently, organizations can bolster their sustainable supply chain performance in the post-COVID-19 situation by prioritizing investments in big data analytics capabilities and effectively managing supply chain risks while promoting innovation. The originality of this paper lies in its focus on the factors that drive sustainability within the supply chain, particularly by integrating big data analytics. Furthermore, it provides insights into the boundary conditions that enable the achievement of sustainable supply chain management. This research contributes to the

growing body of knowledge on green supply chains and underscores the importance of leveraging big data analytics capabilities for operational excellence in a post-pandemic world (Nisar *et al.* 2022).

The article “Management accounting tools for failure prevention and risk management in the context of Indian Innovative Start-ups: A Contingency Theory Approach» investigates the failures faced by Indian innovative start-ups (ISs) and proposes interventions using management accounting tools (MATs) to mitigate the risks leading to their failure. The study highlights the relevance of contingency theory (CT) in applying MATs for failure prevention and risk management. The research adopts a multi-method approach consisting of two sequential studies. The first study involves surveys conducted through semi-structured interviews with 51 specialists and analysis of media reports. The second study employs the Delphi method. The findings of the research identify and categorize the reasons behind the failures of Indian ISs into eight broad underlying risk factors. Appropriate MATs applicable to ISs are identified and examined in relation to these risk factors. The applicability of CT is demonstrated by utilizing MATs for failure prevention and risk management in ISs. While this study focuses on the Indian context, it acknowledges the need for empirical validation of the applicability of MATs for different types of failures across the lifecycle stages of ISs. Practically, the conceptual framework developed in this study can assist founders and owners of ISs in addressing the risks that contribute to their firms’ failure. Policymakers can utilize these insights to formulate appropriate policies that promote the survival and success of ISs. Additionally, researchers can further explore the application of CT in the context of failure prevention and risk management in ISs. This paper contributes to the field by presenting a conceptual framework that links failure-causing risk factors specific to ISs with relevant MATs, thereby establishing the applicability of CT. It provides valuable insights into mitigating risks and enhancing the sustainability of ISs, highlighting the significance of management accounting tools in this context (Krishnan *et al.* 2022).

The article “Creative errors and Heroic Failures: Capturing Their Innovative Potential” and “Risky Ventures: Financial Inclusion, Risk Management

and the Uncertain Rise of Index-Based Insurance” addresses the challenge of the “innovation dilemma” faced by many business organizations, where fear of failure and a reluctance to take risks hinder innovative efforts. The study emphasizes the importance of innovative management and risk-friendliness while highlighting the detrimental impact of the fear of making mistakes and the way failure is handled. Drawing on theoretical and empirical work, the paper first explores the concept of “error” and introduces the concept of “creative errors,” highlighting their significance in fostering innovation. The study then presents illustrative findings from a case study conducted in the automotive sector. The research suggests that a cultural aversion to errors exacerbates innovation incompetence within organizations, leading to a reluctance to engage in creative behavior. The paper emphasizes the need for tolerance for legitimate errors, acknowledging that complete absolution of mistakes is not necessary, but rather, errors should only occur under exceptional circumstances. Furthermore, the study highlights the importance of fairness in addressing errors, emphasizing the value of creating a climate of trust and confidence rather than striving for artificial harmony. The practical implementation challenges of such an incentive system are also considered. While the findings are based on a single case study, the paper acknowledges the need for further empirical research on “creative errors” due to the crucial importance of the “innovation dilemma.” Practically, the study proposes an initiative called the “Creative Error of the Month” to facilitate cultural change within organizations, fostering a climate of trust and confidence where innovative efforts are treated fairly, even if they do not always succeed. This initiative has the potential to encourage innovative commitment and overcome the barriers posed by the fear of failure. This research contributes to the understanding of the innovation dilemma and offers insights into the value of embracing creative errors. It calls for a shift in organizational culture and provides practical implications for fostering an environment conducive to innovation and risk-taking (Kriegesmann, Kley and Schwering, 2005; Taylor, 2016).

The articles “Development of Project Risk Management framework based on Industry

4.0 technologies”, “Public risk management: development and financing”, “Enterprise risk management and sustainability of banks performance” aim to identify and manage the risks associated with construction projects by utilizing a project risk management (PRM) framework based on Industry 4.0 technologies, specifically leveraging Internet of Things (IoT) technology. The research begins with a comprehensive literature survey to identify the various risks involved in construction projects. Subsequently, a PRM framework is developed to enhance the effectiveness and efficiency of risk management, incorporating Industry 4.0 technologies. The study demonstrates the application of Industry 4.0 throughout different stages of PRM. The literature survey identifies 21 risks commonly associated with construction projects. Furthermore, the developed PRM framework highlights the critical risk of sudden equipment breakdown and equipment uncertainty, particularly to heavy equipment used in construction projects. The framework is exemplified through the utilization of IoT technology within the context of Industry 4.0. While the research limitations pertain to the potential addition of further risks due to project complexity and unique project features, the practical implications of the developed PRM framework are noteworthy. By leveraging Industry 4.0 technologies, the framework contributes to increasing the success rate of construction projects while enhancing the overall efficiency and effectiveness of PRM. This paper offers originality and value by presenting a framework that effectively addresses PRM in construction projects. Demonstrating the framework’s application, mainly through IoT technology, provides a logical and practical approach to managing risks associated with heavy equipment in construction projects. The research findings provide valuable insights for practitioners involved in construction project management, offering a comprehensive and technologically advanced approach to mitigate risks and improve project outcomes (Rane, Potdar and Rane, 2021; Qiao, 2007; Oyewo, 2022).

The articles “How good are banks at managing business risk?” and “Risk management: The reinvention of internal control and the changing role of internal audit” address the growing interest in risk management and the need for guidance in

this emerging area, as identified by the Financial and Management Accounting Committee of the International Federation of Accountants (IFAC). It focuses on the role played by Pricewaterhouse Coopers (PwC) through their Global Risk Management Solutions in providing information and assistance in managing business risks. The study highlights the importance of adopting an integrated approach to risk management and emphasizes that implementing risk architecture is not merely a reactive response to risk but rather a paradigm shift that requires enterprises to embrace change. The research delves into the motivation behind the increasing interest in risk management and explores the potential for improvement in this field. It discusses the need for comprehensive guidance to navigate the complexities of risk management effectively. The article proposes that an integrated approach to risk management is vital, emphasizing the importance of considering risks holistically across the organization. The study underscores that the implementation of risk architecture signifies a significant shift in how enterprises perceive and address risk. It goes beyond a reactive approach and calls for a fundamental change in organizational mindset and practices. This paradigm shift involves enterprises embracing a proactive and integrated approach to risk management. By shedding light on the evolving landscape of risk management, this article offers insights into the importance of integrating risk considerations into organizational strategies. It emphasizes the need for enterprises to proactively adapt to changing risk landscapes and embrace a comprehensive risk management framework. Overall, the research contributes to the understanding of risk management practices and highlights the significance of adopting an integrated risk architecture. It provides a valuable perspective for organizations seeking to enhance their risk management capabilities and effectively navigate the complexities of today’s business environment (Cooper, 2000; Spira and Page, 2003).

Managing supply risk has become increasingly important in the interconnected global economy. The foundation of effective risk management lies in identifying the relevant risks. Therefore, this paper aims to introduce supply risk management and focuses on identifying these risks. The study proposes a holistic framework that distinguishes

between risk dimensions and risk factors in manufacturing upstream supply networks. Using a mixed methods research approach, the study combines a structured literature review, analysis of company-specific documents, and semi-structured expert interviews to collect data. Deductive content analysis is then conducted to derive the holistic framework of supply risks specific to the manufacturing industry. The conceptual supply risk framework is externally validated by consulting additional experts from various manufacturing companies. The research findings contribute to the definition and categorization of supply risks. The study identifies six supply risk dimensions: quality, delivery, collaboration, economics, ambiance, and compliance. These dimensions encompass a total of 27 risk factors. The framework serves as a comprehensive foundation for managing supply risk. The originality and value of this study lie in providing a holistic framework of relevant supply risks specific to the manufacturing industry. This overview offers a novel perspective on risk within manufacturing supply networks and can guide future research on risk assessment and mitigation strategies. Despite the significance and popularity of this research area, no comprehensive overview of manufacturing supply networks has been available in the literature. This framework enables the development of management approaches to address risks arising upstream of the supply network (Wiedenmann and Größler, 2021).

The article “Beyond COVID-19 supply chain heroism, no dust settling yet – lessons learned at Rolls Royce about advancing risk management thinking» highlights the need for advancements in risk management literature to address the unique challenges posed by the COVID-19 pandemic. While existing research has provided valuable theoretical contributions on the pandemic’s impact on risks, this study argues that at least four further advancements are required. Drawing on the insights of a co-author from Rolls Royce (RR), the paper presents real-world examples of risks encountered and risk management approaches adopted in manufacturing and supply chain operations during the early stages and the first year of the pandemic. The findings emphasize that the COVID-19 pandemic presents a distinct risk scenario that extends beyond the scope of existing risk management literature.

The pandemic’s impact is multi-faceted, global in nature, and affects the entire supply chain and various industries. Furthermore, the effects of the pandemic persist over an extended timeline with multiple time horizons. The study highlights the remarkable instances of supply chain resilience and adaptation witnessed during the pandemic’s initial year while acknowledging the ongoing challenges that lie ahead. The originality and value of this co-created paper lie in enriching the perspective on COVID-19 research in manufacturing and supply chain operations. The empirical insights provided offer opportunities for further research, advocate for interdisciplinary approaches and emphasize the significance of considering multiple time horizons in risk management (van Hoek and Loseby, 2021).

Global crises have become frequent occurrences that pose significant challenges to public-private partnerships (PPPs). This paper aims to present an analysis of the research agenda concerning PPPs in times of crisis through the integration of bibliometric and network analyses. The study examines the PPP literature related to global crises between 2008 and 2022, employing a three-stage approach. First, relevant articles were selected and screened for inclusion in the analysis. Second, a semantic network was developed to explore the thematic connections among the chosen papers by assessing the co-occurrence of keywords. Finally, network metrics were calculated to gain insights from the analysis. The findings reveal six key research areas within the PPP-crisis agenda, namely public interest, relational governance, risk management, user-pay PPPs, crisis management, and financial performance. Over the past five years, the PPP-crisis literature has expanded significantly, primarily driven by case study approaches focusing on national or regional contexts. Conversely, non-crisis periods have provided opportunities to enhance user-pay PPPs and relational governance. The COVID-19 pandemic and its aftermath share similarities with the priorities identified during the 2008 financial crisis, while also highlighting the importance of risk management and addressing the structural factors underlying global crises. This study demonstrates that during periods of global crisis, public interest and financial performance gain prominence at the expense of addressing structural challenges and social legitimacy erosion faced by

PPPs. This emphasis on urgent financial issues necessitates equipping the public and private sectors with tools to navigate future challenges in the realm of PPPs (Castelblanco, Guevara and De Marco, 2023; Casady and Baxter, 2020; de Castro Silva e Neto, Oliveira Cruz and Miranda Sarmiento, 2019).

The article “The role of Risk Management in buyer-supplier relationships with a preferred customer status for total quality management” aims to present a comprehensive risk management framework tailored for buyer-supplier relationships, where the buyer holds the status of a preferred customer with the supplier. Empirical evidence is provided through a case study conducted in a large multinational organization operating in the Fast Moving Consumer Goods (FMCG) industry. The study offers real-life perspectives on the main risks, mitigation strategies, and challenges while implementing the risk management framework. The findings highlight that buyer-supplier relationships are exposed to various risks, including traditional supply risks, risks associated with specific initiatives or relationships, and risks unique to relationships with a preferred customer status. The mitigation strategies identified prioritize customer attractiveness and supplier satisfaction, as they serve as essential drivers in protecting and nurturing the buyer-supplier relationship. The framework recognizes that being a preferred customer with access to preferential resource allocation can enhance a firm’s competitive advantage. This research makes significant contributions to both academic literature and strategic purchasing practitioners. It enhances the existing understanding of supply risk management in buyer-supplier relationships with a preferred customer status. Moreover, it provides strategic purchasing practitioners with a comprehensive perspective on the risks that may impact relationships with preferred customer status, along with potential mitigation approaches. The insights gained from this study can inform strategic decision-making and foster more effective management of buyer-supplier relationships in similar contexts (Pellegrino, Costantino and Tauro, 2020).

The article “Innovation management framework for achieving sustainability through managing risks of innovative solutions during the design process” focuses on the development of an innovation

management framework that effectively addresses the risks associated with incorporating innovative solutions during the design process, with the ultimate goal of achieving sustainability. The research methodology comprises a literature review, case studies, a survey questionnaire, and the creation of an innovation management framework. The literature review emphasizes the vital role of innovation in attaining sustainability objectives. However, integrating innovative solutions in the design process often introduces risks. Throughout the research, 30 specific risks related to innovation were identified and categorized into four groups: product, process, person, and press. The analysis of case studies revealed that architectural design firms (ADFs) that employed innovation management approaches successfully managed the risks associated with innovative solutions. In contrast, those without such approaches struggled to meet sustainability objectives. The survey questionnaire results indicated that ADFs in Egypt not only recognized the importance of innovative solutions for sustainable projects but also highlighted a gap between theory and practice. “Project delivery” emerged as the most significant type of innovation for ADFs, followed by “building technologies” and “organizational culture.” Furthermore, a discrepancy was found between ADFs’ perceptions and the strategies employed to achieve successful innovations. The highest risks of innovation identified were the “unanticipated cost of innovation,” “manufacturing technologies and development issues,” and “failure to meet technical criteria.” This study contributes to the field by presenting an innovation management framework that effectively addresses the risks associated with incorporating innovative solutions during the design process. The findings highlight the importance of adopting innovation management approaches to achieve sustainability objectives in architectural design projects. The research provides valuable insights for practitioners and encourages the practical implementation of innovation management strategies to navigate risks and maximize the potential of innovative solutions in sustainable design (Othman and Hussein, 2023; Kilubi and Rogers, 2018; Alpkhan *et al.* 2010).

The article “Risk analysis for innovative activities in production systems using product opportunity

gap concept” presents a stepwise method for the identification and analysis of innovative activities within production systems. The objective is to provide a structured framework that proposes risk paradigms and corresponding factors associated with innovative activities, while evaluating their impact on innovation decisions and investments. The approach used in this study is an analytical method that assesses the influence of innovative activities on innovation decisions and investments using the concept of the product opportunity gap (POG). The framework is applied to innovative activities in the Asian industrial sector, with the risks of these activities calculated through a weighted risk analysis method. In this method, risk weights and intensities are determined based on the average opinions of experts gathered through interviews. The findings of this implementation offer valuable insights for investors, innovators, and policymakers seeking to make informed strategies and decisions in various domains related to innovation management, risk management, and innovation policy. The results indicate that product innovation is the most prevalent category of innovation observed in Asian manufacturing industries. Furthermore, product innovation, marketing innovation, and organizational innovation have the most significant influence on technology, economic, and social changes, respectively. While this study provides useful information for various stakeholders, it is essential to note some limitations. The analysis of the risk of innovative activities was conducted after their occurrence, leading to diverse and sometimes contradictory assessments due to differing expert perspectives. Overall, this research contributes to the understanding of innovative activities in production systems by offering a structured approach to identify and analyze risks associated with these activities. The findings contribute to the decision-making processes of stakeholders involved in innovation and provide insights for enhancing innovation management, risk management, and innovation policy in diverse industrial contexts (Arabshahi and Fazlollahtabar, 2019; Kryshchanovych *et al.* 2021).

In today’s highly competitive business landscape, adaptive innovation plays a crucial role. However, concerns regarding potential risks associated with such innovative activities are raised, particularly

during economic downturns, which can impact firms and even countries. This research addresses these concerns by integrating two important strands of literature: risk management and innovation management. A conceptual framework, termed Risk Behaviour, Environmental Conditions, and Adoptive Innovation (REAI), is developed to examine the efficacy of risk management in adaptive innovation activities within an organization, taking a historical perspective. Applying the REAI framework, the research investigates the risk management effectiveness of adoptive innovation activities in a single organization. The findings reveal that adopters exhibit a higher tolerance for managing uncertainty and a greater appetite for risk-taking, aligning with their competitors. However, two critical factors influence the performance of such risk behavior: the level of environmental turbulence and the role of senior management. This study is the first to explore the relationship between risk and adoptive innovative behavior, providing valuable insights for managers on how to effectively manage risk and uncertainty during different circumstances within their innovative practices (Jin and Navare, 2010).

“The effect of perceived risk on information search for innovative products and services: the moderating role of innate consumer innovativeness” aims to investigate the effects of two dimensions of perceived risk, namely functional and emotional risk, on two types of consumer information search: ongoing search and pre-purchase search, specifically in the context of innovative products and services. Additionally, the research examines the moderating role of innate consumer innovativeness. The study adopts a quantitative design, employing a multiple linear regression model and a residual centering method. Data were collected through surveys on tablet PC adoption within an online community and a laboratory experiment on online bike-renting services. The findings reveal distinct impacts of functional and emotional risks on ongoing and pre-purchase searches in the context of innovative products and services. Functional risk negatively affects ongoing search, while emotional risk positively influences ongoing search (Levytska *et al.* 2022). However, the effect of functional risk on pre-purchase search is not significant, while emotional risk has a positive effect on pre-

purchase search. Furthermore, innate consumer innovativeness moderates these relationships. For ongoing search, consumer innovativeness mitigates the negative impact of functional risk and enhances the positive impact of emotional risk. Regarding pre-purchase search, consumer innovativeness weakens the positive influence of emotional risk on search behavior. This research addresses the unique characteristics of innovative products and services, which often contain unfamiliar elements for consumers. The study emphasizes the importance of assessing perceived risks and information searches in advance, as companies often release innovative offerings prior to their official launch, shaping market expectations. As innovative products and services continue to proliferate, understanding the impact of perceived risk on information search becomes essential for marketers. This study makes significant contributions to the literature by examining the effects of functional and emotional risks on ongoing and pre-purchase search, considering the moderating role of innate consumer innovativeness. It contributes to perceived risk, information search, and innovation management (Zhang and Hou, 2017).

The article “Investigating the relationship between supply chain innovation, risk management capabilities and competitive advantage in global supply chains” aims to propose and validate a theoretical model that explores the impact of supply chain (SC) innovation on risk management capabilities, specifically robustness and resilience in global SC operations. Additionally, the study investigates how these risk management capabilities can enhance competitive advantage. The research employs a theoretical model derived from existing studies and conducts a large-scale questionnaire survey among South Korean manufacturers and logistics intermediaries engaged in global SC operations. The collected data are analyzed using confirmatory factor analysis and structural equation modeling to validate the proposed model. The findings demonstrate that innovative SCs have a significant positive influence on all dimensions of risk management capability, which subsequently leads to enhanced competitive advantage. This study provides empirical evidence for the crucial role of SC innovation and risk management capability in supporting competitive

advantage. This research contributes to the SC management discipline by offering empirical insights into the strategic importance of retaining SC innovation and risk management capabilities. It not only confirms existing theories but also expands our understanding of the relationship between innovation and competitive advantage. The findings provide a solid foundation for managerial decision-making regarding investments in technology innovation and process innovation within the supply chain context. This study is unique as it is the first to empirically validate the connections among SC innovation, risk management capabilities, and competitive advantage. It fills a gap in the literature and contributes valuable insights to academia and industry (Kwak, Seo and Mason, 2018).

The articles provide an overview of the current state of enterprise risk management (ERM) in Europe, focusing on the similarities and differences in ERM adoption and utilization across European countries. The analysis examines various aspects, including the level of risk management development in different countries, the institutional context, and cultural factors influencing the advancement of risk management. By adopting a comparative approach, this analysis identifies five clusters of countries, shedding light on the varying degrees of ERM development in Europe. The findings highlight the need for increased efforts to align and harmonize ERM practices across the region. The analysis also uncovers the drivers that can facilitate the effective implementation of ERM and the dissemination of best practices. Furthermore, it emphasizes the importance of early detection of factors that may hinder or impede the success of ERM initiatives. By understanding these drivers and challenges, organizations can enhance the implementation of ERM, promote the adoption of best practices, and mitigate resistance to change. This chapter contributes to the understanding of ERM in Europe by providing insights into the current state of ERM development and practices. It emphasizes the need for coordination and coherence in ERM thinking and implementation. The findings can guide organizations in aligning their risk management strategies and fostering effective ERM practices (Carter *et al.* 1995; Maffei and Spanò, 2021; Oliva *et al.* 2021).

METHODS

The analysis of scientific sources, publications and academic studies related to innovative risk management allows you to get an overview of modern theories, approaches, and practices of risk management in innovative projects and to identify the main aspects that require further research. Empirical research is used in the article. Application of methods of data collection and analysis, such as questionnaires, observations, interviews, or case studies, allow to collection primary data about real innovation projects, their risks, and methods of managing them. An in-depth study of specific innovative projects and their risks allows to understand the context, conditions, and features of risk management, obtain more detailed information about specific cases and highlight practical challenges and best practices of risk management in innovative projects. Mathematical modeling and data analysis, the use of statistical methods and other analytical tools to assess risks and the influence of various factors on the success of innovative projects, includes the calculation of probabilities, the creation of simulation models, and the conduct of sensitivity analyses, which allows for the quantitative assessment of risks and the effectiveness of various risk management strategies. Combinations of these research methods made it possible to reveal the topic of the article through the theoretical understanding of concepts, analysis of real cases, data collection and analysis, as well as the use of mathematical models for risk assessment and the impact of management strategies on the success of innovative projects.

RESULTS

Many organizations do not have a clear understanding of the risks associated with innovation and do not take them into account properly in the project management process. This can lead to failures and financial losses. The article proposes to identify and assess key risks, which will allow to increase the awareness and preparedness of organizations to manage them. Risk management in innovative projects requires the development and implementation of effective strategies to reduce the negative impact of risks and ensure the successful implementation of projects. The article aims to highlight such strategies and methods of

risk management, which create practical value for organizations.

Based on the results of the analysis of literary sources, an algorithm for the analysis of risks associated with innovative projects is proposed:

Step 1: Defining the context and scope of the risk analysis:

- ♦ determination of the research area of the innovative project,
- ♦ setting the goal and objects of risk analysis,
- ♦ determination of the boundaries of the innovative project and its key elements.

Step 2: Identification of risks:

- ♦ compiling a list of potential risks that may affect the innovative project,
- ♦ identification of sources of risks, such as technological difficulties, financial constraints, changes in market conditions, etc.,
- ♦ consideration of pop-up projects, similar to the innovative project, to identify possible risk scenarios.

Step 3: Risk assessment:

- ♦ assessment of the probability of occurrence of each risk and its potential impact on the innovative project,
- ♦ the use of quantitative and/or qualitative methods for risk assessment, such as data analysis, expert assessments, scenario analysis, etc.,
- ♦ prioritization of risks, considering their importance and impact on the innovative project.

Step 4: Development of risk management strategies:

- ♦ consideration of different risk management strategies, such as avoiding, reducing, transferring, or accepting risk,
- ♦ determination of specific measures and methods for each risk to reduce its impact or probability of occurrence,
- ♦ development of action plans for the implementation of risk management strategies and identification of persons responsible for their implementation.

Step 5: Monitoring and risk control:

- ♦ establishment of a risk monitoring system that will allow for the detecting changes in the risk environment and responding to them in a timely manner,
- ♦ periodic assessment of the effectiveness of implemented risk management strategies and making the necessary adjustments,
- ♦ ensuring communication and cooperation between all stakeholders to ensure effective risk management throughout the project (Pomaza-Ponomarenko *et al.* 2020).

The algorithm provides general guidance for risk analysis in innovative projects. It is worth remembering that specific methods and approaches may vary depending on the context and specifics of each project (Kotenko *et al.* 2020).

Based on the analysis results, enterprise risk management indicators may vary depending on the specific context and characteristics of the organization. However, the following are general indicators that can be used to measure and evaluate the effectiveness of risk management:

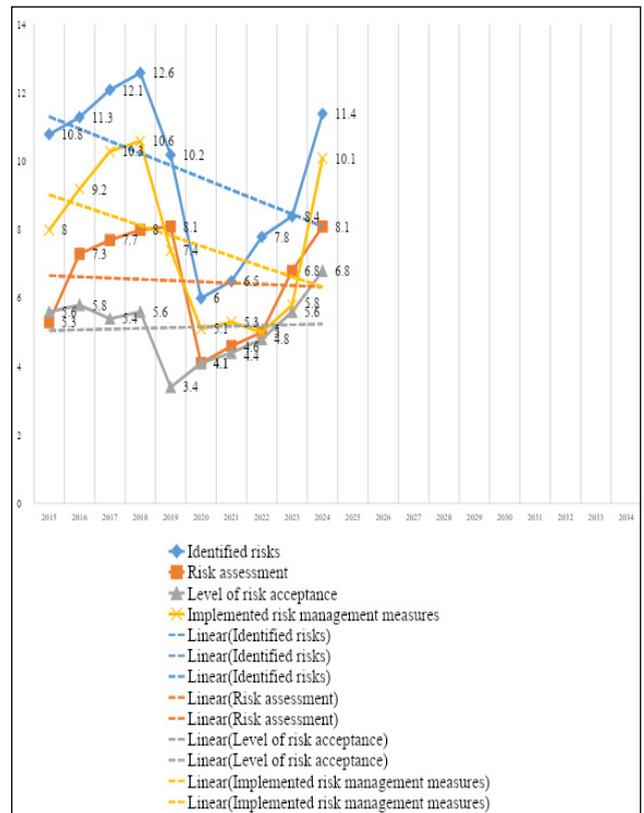
- 1. Identified risks:** Number of identified risks that have been identified and described as part of risk management. This indicator reflects the organization’s understanding of potential threats and opportunities.
- 2. Risk assessment:** A level of risk assessment that includes an assessment of the likelihood of risks occurring and their potential impact on the organization. This indicator allows you to set priorities for risk management and decision-making.
- 3. Level of risk acceptance:** Record and assess the level of risk acceptance for each identified risk. This indicator indicates how the organization feels about risks and whether they are ready to accept them.
- 4. Implemented risk management measures:** Quantity and quality of implemented risk management measures and strategies. This indicator reflects the effectiveness of the applied risk management methods and processes.

On the basis of the analysis of statistical data of five domestic enterprises, a forecast of trends of changes in indicators of risk management of innovation projects was developed – Fig. 1.

The trend line determines that by 2035 the risk management of innovation projects will restore pre-quarantine performance indicators of:

- ♦ Identified risks.
- ♦ Risk assessment.
- ♦ Level of risk acceptance.
- ♦ Implemented risk management measures.

Two scenarios, namely positive and optimal, were constructed to depict the trend line. The positive scenario assumes a situation where there are no negative external factors impacting the industry. On the other hand, the optimal scenario considers the presence of negative external factors or barriers that may hinder the industry’s development.



Source: Developed by the author based on the analysis of statistical data (State Statistics Service of Ukraine) and the calculation of the trend line.

Fig. 1: Trends of changes in indicators of risk management of innovation projects

Consequently, a matrix was created to project the resulting factors of influence on project management during crisis conditions. This matrix, referred to as Table 1, presents a comprehensive overview of the anticipated effects due to the identified factors.

Table 1: Matrix of the projection from the project risk management

Indicators	Optimal scenario	A negative scenario	A positive scenario	Parameter
Identified risks	9,0	17,4	7,4	7,4-17,4
Risk assessment	7,8	15,6	6,6	6,6-15,6
Level of risk acceptance	6,8	11,6	5,7	6,8-11,6
Implemented risk management measures	6,8	11,0	4,8	4,8-11,0

The developed matrix for evaluating indicators enables the assessment of each indicator's effectiveness and its inclusion in the established parameters. This process aids in determining both the positive and optimal scenarios for the industry's development during crisis conditions.

DISCUSSION

Discussion points that can be considered in the article include the following aspects:

- ♦ *Definition of innovation risks:* Discussion of specific risks that arise in the context of innovation projects. These can be technological risks, market uncertainty, financial constraints, legal factors, etc. It is essential to discuss what risks are unique to innovative projects compared to conventional projects.
- ♦ *Risk assessment methods:* Discussion of different methods and approaches to risk assessment in innovative projects. These can be qualitative or quantitative methods, expert assessments, analytical models, simulation models, etc. The discussion may relate to the advantages and limitations of different risk assessment methods.
- ♦ *Risk management strategies:* Discussion of different strategies and methods of risk management in innovative projects. These can be strategies for risk reduction, risk sharing, risk prevention, or risk acceptance. The discussion can focus on the effectiveness of different strategies and their relevance to the context of innovation projects.
- ♦ *The role of risk management in driving innovation:* A discussion of how effective risk management can contribute to driving innovation and organizational development. This may include supporting creativity and innovative thinking, creating contingency plans, and being able to take reasonable risks and manage them effectively.

- ♦ *The role of organizational culture in risk management:* Discussion of the influence of organizational culture on risk management in innovative projects. Consideration of possible barriers or enabling conditions that may exist in organizational culture and their impact on risk management (Lelyk *et al.* 2022).

The discussion points can contribute to broadening the understanding of innovative risk management and contribute to further discussions and research in this area.

CONCLUSION

In conclusion, this article emphasizes the significance of innovative risk management in the context of project management. The study focuses on the identification, assessment, and management of risks, specifically within innovative projects. The research highlights the dynamic nature of innovative projects and the unique risks they pose. It underscores the importance of adopting a proactive approach to risk management, as traditional risk management practices may not adequately address the complexities and uncertainties associated with innovation. The article presents a comprehensive framework for innovative risk management, which encompasses the identification of risks specific to innovative projects, the assessment of their potential impact, and the development of effective risk mitigation strategies. The framework promotes a systematic and integrated approach to managing risks, facilitating better decision-making, and enhancing the success of innovative projects. Furthermore, the study acknowledges the importance of collaboration and knowledge sharing among project stakeholders to effectively manage innovative risks. It emphasizes the need for open communication, cross-functional collaboration, and the involvement of diverse perspectives in the risk management process. Overall, this article contributes to the field of project management

by shedding light on the unique challenges and opportunities associated with innovative projects. It provides valuable insights and practical guidance for project managers and organizations seeking to effectively identify, assess, and manage risks in the context of innovation. By adopting the proposed innovative risk management framework, organizations can enhance their ability to navigate uncertainties, capitalize on opportunities, and achieve successful outcomes in innovative projects.

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