






ENHANCING OPERATIONAL RISK MANAGEMENT IN THE SCIENTIFIC RESEARCH ORGANIZATION

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Abstract:

This study evaluates whether the implementation of Integrated Management Systems (IMS) with the COSO Enterprise Risk Management (ERM) model fosters a sustainable business context within the scientific research organization¹. Aligned with the PDCA (Plan-Do-Check-Act) cycle, the research aims to enhance organizational responses to demands, operational risks, and strategic planning. The primary research, based on which a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was conducted, was carried out between March 31, 2023, and February 8, 2024, on a sample of 146 employees, with a response rate of 71.23% (104 respondents). The findings indicate that IMS, guided by the COSO ERM model, supports proactive risk identification and assessment, confirming a sustainable organizational context.

Keywords:

operational risks, COSO, ERM, (IMS), PDCA cycle, SWOT analysis.

1. INTRODUCTION¹

Nowadays, risks are an integral part of every business environment. According to Barjaktarovic (2015), the rational nature of humans leads to taking action, i.e., managing risk. Risk management, in a broad sense, is the art of making decisions in an unpredictable environment. Every economic entity develops its own internal risk management guidelines, which are approved and adopted by the competent management bodies of the economic entity (Barjaktarović, 2015).

ERM is defined as the culture, capabilities, and practices integrated with strategy setting and performance, on which organizations rely to manage risk in creating, preserving, and realizing value (Site COSO ERM, 2017). A detailed look at the definition of enterprise risk management emphasizes its focus on managing risk through:

- Recognizing culture;
- Developing capabilities;
- Applying practices;
- Integrating with strategy setting and performance;
- Managing risk in relation to strategy and business objectives;
- Connecting with value.

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¹ To ensure data protection, the authors have decided not to disclose the name of the scientific research organization in this study. Going forward, the term 'scientific research organization' or the 'Institute' will be used throughout the text.



Considering the fact that the research is about managing operational risks, operational risk is defined by Mestchian (2003) as the risk caused by inadequate or incorrect internal processes, people, and systems, as well as external events.

Moosa (2007) pointed out that the key characteristics of operational risk are:

- Greater diversity and variety;
- Absence of risk-return trade-off;
- Exclusively negative impact of risk;
- Non-systematic, or idiosyncratic nature;
- Inability to precisely determine the extent of risk exposure.

Source of Operational Risk according to Segal (2006) are:

- people - operational risks originating from people can arise from areas such as information disclosure, health and safety issues, and internal fraud,
- processes - human errors and process failures are common sources of operational risk,
- technology - operational risks can stem from problems and failures in hardware, software, security, systems, and telecommunications.
- external events - risks can also come from external fraud, natural disasters, and man-made disasters like theft, money laundering, data and property destruction, floods, hurricanes, earthquakes, terrorist attacks, and wars.

The rapid development of technology, increasingly aggressive competition, and globalization expose the Institute that falls under a scientific research organization to growing operational risks. The subject of this research is to determine whether the implementation of Integrated Management Systems (IMS) according to the COSO (Committee of Sponsoring Organizations) Enterprise Risk Management (ERM) model provides a sustainable business context for the scientific research organization. The aim of the research is to understand and improve the context of the scientific research organization, enabling better responses to demands, risks, and strategic planning. To effectively manage operational risks, it is necessary to use comprehensive methods of analysis and continuous improvement, such as SWOT (Strengths, Weakness, Opportunities and Threats) analysis and the PDCA (Plan-Do-Check-Act) cycle.

According to the above, the main hypothesis of the work is:

H0: The implementation of the IMS according to the COSO ERM model for risk management, combined with SWOT analysis and the PDCA cycle, can significantly improve performance for managing operational risks and opportunities in the scientific research organization.

The scientific research organization, in which the primary research - SWOT analysis was conducted according to the COSO ERM model has an IMS consisting of:

- Q(L)MS - Quality Management System (ISO 9001) and Laboratory Accreditation (ISO/IEC 17025);
- EMS - Environmental Management System (ISO 14001);
- OMS - Occupational Health and Safety Management System (ISO 45001).

The paper is structured into four chapters. The first chapter provides an introduction to the study. The second chapter outlines the methodology employed. The third chapter presents the results of the primary research. Finally, the fourth chapter presents the conclusion.

2. METHODOLOGY

To conduct primary scientific research on the improvement or optimization of operational risk management in a scientific research organization, the following methods were used: observation method, employee interviews, monitoring, anonymous closed-ended questionnaires, quantitative method in the preparation of the SWOT analysis, illustrative method for presenting the results of primary research, PDCA cycle and deductive method. To prepare the anonymous questionnaire, which forms the basis for the SWOT analysis, the following were used: observation method, employee interviews and monitoring. It was designed to capture the attitudes, opinions, and perceptions of employees on key business aspects and contain 35 questions divided into four parts. The first part of the questionnaire on the potential strengths of the internal business context of the scientific research organization contains 10 questions. The second part of the anonymous questionnaire relates to the potential weaknesses of the internal business context of the scientific research organization and has 9 questions. The third part indicates potential opportunities in the external business context of the scientific research organization and contains 9 questions. The fourth part of the questionnaire relates to potential threats in the external business context of the scientific research organization and consists of 7 questions. Anonymous closed-ended questionnaires have their limitations. One of them is that respondents answer each question by choosing one from five provided answers, and there is no flexibility in the responses. Participants responded using a five-point Likert scale, where 1 indicated strong disagreement, 2 disagreement, 3 partial agreement, 4 agreement, and 5 absolutely agree. A SWOT (stands for Strengths, Weakness, Opportunities and Threats) analysis is a framework to help assess and understand the internal and external forces that may create opportunities or risks for an organization (Site Corporate Finance Institute, 2024).



SWOT analysis is a key instrument that helps a scientific research organization align its goals with the current business conditions. Based on the survey conducted, using the quantitative method, a SWOT analysis was carried out to improve and better understand the context of the scientific research organization and minimize possible operational risks. The results obtained from the SWOT analysis were presented using an illustrative method. The PDCA cycle enables continuous process improvement through the phases of planning, doing, checking, and acting, thereby continuously improving operational activities and mitigating operational risks. The deductive method forms the basis for drawing conclusions. Data collection lasted from March 31, 2023, to February 8, 2024. The survey, SWOT analysis, was sent to 146 employee addresses, and 104 respondents answered, i.e., 71.23% of the participants in the survey. The report on the context of the scientific research organization - the conducted SWOT analysis was presented on April 10, 2024. The results of the SWOT analysis in the scientific research organization are presented in the following illustrations.

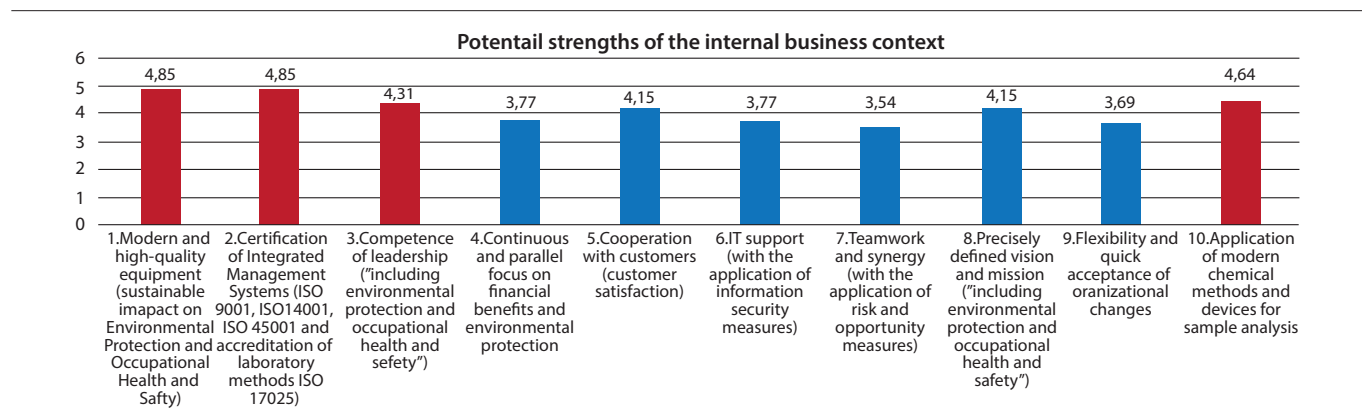
3. RESULTS AND DISCUSSION

The results from the SWOT analysis, based on the primary research to identify potential strengths and weaknesses within the internal context, as well as opportunities and threats in the external context of the scientific research organization, are illustrated in Figures 1, 2, 3, 4 and Table 1. These figures were created by the authors based on the primary research data.

Figure 1 illustrates the potential strengths of the internal business context.

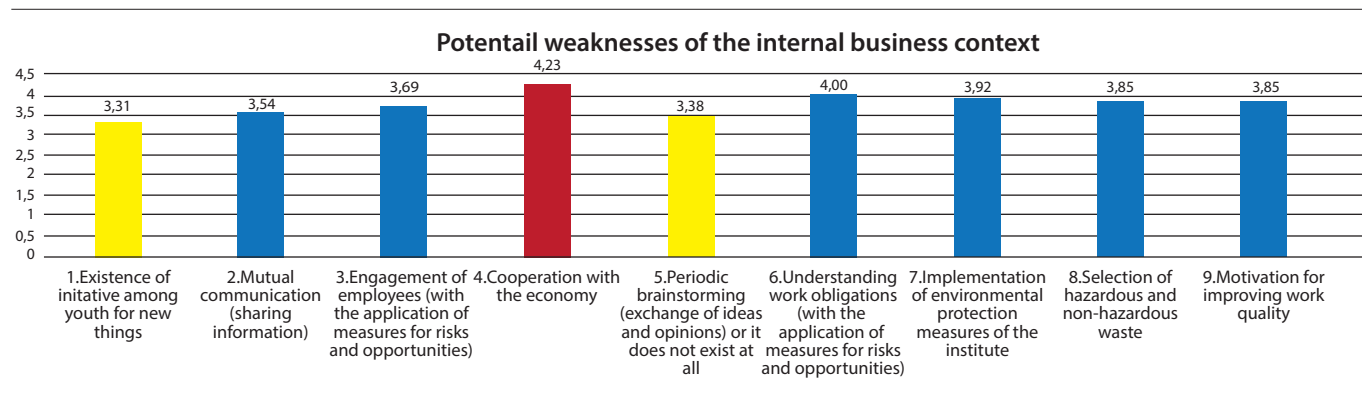
The Institute demonstrates a robust internal business context with an average survey rating of 4.15. The highest rating of 4.85 is achieved for the quality of modern and high-quality equipment, which positively impacts environmental sustainability and occupational safety and health. The same high rating is also given for IMS certification, including ISO 9001, ISO 14001, ISO 45001, and ISO 17025. However, the lowest rating of 3.54 for teamwork and synergy suggests a need for improvement in these areas. To address this, it is recommended to conduct workshops focusing on the importance of teamwork and flexibility in accepting organizational changes.

Figure 1. Potential strengths of the internal business context².



Source: Authors' data.

Figure 2. Potential weaknesses of the internal business context³.



Source: Authors' data.

2 Legend: Possible strengths: >4.20; Sustainable context: >2.60<4.20; Possible weaknesses: <2.60
 3 Legend: Possible strengths: >4.20; Sustainable context: >2.60<4.20; Possible weaknesses: <2.60



Figure 2 illustrates the potential weaknesses of the internal business context.

The survey on potential weaknesses indicates a generally sustainable internal business context with an average rating of 3.75. The lowest rating of 3.31 is given for the initiative among young people for new ideas, highlighting a need to foster innovation and idea exchange among younger employees. Conversely, the highest rating of 4.23 for cooperation with the industry suggests strong external partnerships. To mitigate the identified weakness, the scientific research organization should explore strategies to encourage young employees to take initiative and share their ideas. When it comes to possible weakness, performance can be improved by applying the PDCA cycle (questions no. 1 and 5, Figure 2), which can eliminate potential threats within the timeframe provided for the implementation of necessary measures and conduct a new SWOT analysis during 2025.

Figure 3 illustrates the potential opportunities of the external business context.

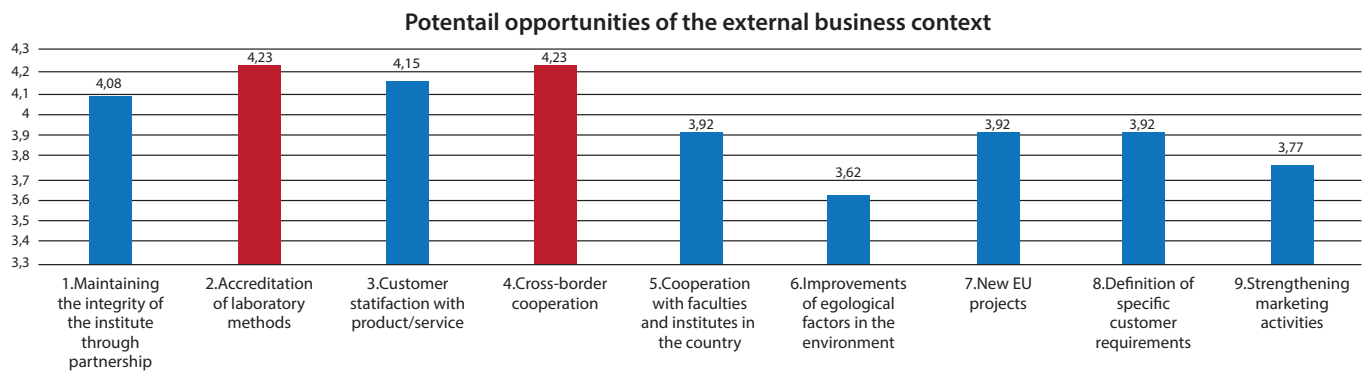
In terms of external business context, the Institute has an average survey rating of 3.98, indicating significant potential for growth and improvement.

The highest rating of 4.23 was given for the accreditation of laboratory methods and cross-border cooperation, reflecting strong opportunities in these areas. However, the lowest rating of 3.62 for improving environmental factors in the surroundings suggests room for enhancement. The scientific research organization should leverage its strengths in accreditation and cooperation to address environmental challenges and capitalize on external opportunities.

Figure 4 illustrates the potential threats of the external business context.

The survey on potential threats in the external business context reveals several key points. The highest score 3.77 is given for the question on flexibility in tracking changes in customer requirements. This indicates that the Institute is relatively well-prepared to adapt to changing customer needs. The lowest score of 3.15 is given for the question on external assistance in the event of health and safety threats. This suggests a significant area for improvement, as external support in such critical situations is currently perceived as inadequate. The average score of 3.46 indicates that while some external threats are beyond the Institute's control, there is a need to develop strategies to mitigate these risks.

Figure 3. Potential opportunities of the external business context³.



Source: Authors' data.

Figure 4. Potential threats of the external business context⁴.



Source: Authors' data.

4 Legend: Possible strengths: >4.20; Sustainable context: >2.60<4.20; Possible weaknesses: <2.60
5 Legend: Possible strengths: >4.20; Sustainable context: >2.60<4.20; Possible weaknesses: <2.60



This could involve establishing agreements with local municipalities and broader communities to enhance resilience against external threats. To address potential weaknesses, the PDCA cycle can be applied to questions 5, 6, 7. This approach aims to eliminate the identified weaknesses (risks) within the designated timeframe for implementing the necessary measures and conduct a new SWOT analysis during 2025. Table 1 illustrates the conducted SWOT analysis.

The conducted SWOT analysis achieved an average score of 3.85, reflecting a sustainable business environment for the scientific research organization. This validates hypothesis H0, which asserts that the adoption of the IMS aligned with the COSO ERM model for risk management, together with SWOT analysis and the PDCA cycle, enhances the organization's performance in managing risks and opportunities.

In conclusion, the authors emphasize that the IMS in the scientific research organization where the primary research was conducted is crucial due to its customized adaptation of procedures to specific processes and activities. Both SWOT analysis and the PDCA cycle were used to improve risk assessment and management in this primary research. Consequently, the operational risk management process is meticulously tailored to meet the unique needs of the organization.

4. CONCLUSION

Based on the identified weaknesses/risks in all four parts of the anonymous questionnaire that constitute the SWOT analysis, the risk management sector of the scientific research organization has taken measures to eliminate or mitigate the weaknesses/risks (conducting training on the identified weaknesses/risks), as well as re-evaluation through the PDCA cycle and conducting a new SWOT analysis during 2025. Overall, the scientific research organization shows a sustainable and strong internal business context with excellent capabilities in recognizing and leveraging its strengths. However, there is a need to improve teamwork, encourage young employees to take initiative, and enhance environmental factors in the external context. By addressing these areas, the Institute can further strengthen its position and achieve sustainable growth. The Institute demonstrates a strong ability to adapt to changing customer requirements and maintains a favorable working environment. Also, there are critical areas for improvement, particularly in enhancing external assistance for health and safety threats and increasing preparedness for emergency situations. By addressing these areas through targeted training and strategic agreements with external entities, the scientific research organization can further strengthen its resilience and operational effectiveness. The hypothesis of this primary research is confirmed by the fact that the SWOT analysis shows a sustainable business context and confirms that the implementation of the IMS according to the COSO ERM model for risk management, in combination with the SWOT analysis and PDCA cycle, can significantly improve performance for managing operational risks and opportunities

Table 1. SWOT Analysis-operational context report of the scientific research organization.

SWOT Analysis	
Internal context	<p>STRENGTHS</p> <ul style="list-style-type: none"> • Modern and high-quality equipment (sustainable impact on Environmental Protection and Occupational Health and Safety) (4,85) • Certification of Integrated Management Systems (ISO 9001, ISO 14001, ISO 45001 and accreditation of laboratory methods ISO 17025) (4,85) • Application of modern chemical methods and devices for sample analysis (4,46) • Competence of leadership (“including environmental protection and occupational health and safety”) (4,31)
	<p>WEAKNESSES</p> <ul style="list-style-type: none"> • Existence of initiative among youth for new things (3,31) • Periodic brainstorming (exchange of ideas and opinions) or it does not exist at all (3,38)
External context	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Accreditation of laboratory methods (4,23) • Cross-border cooperation (4,23)
	<p>THREATS</p> <ul style="list-style-type: none"> • Economic condition in the region (3,38) • Economic condition in the country (3,23) • External assistance in health and safety threats (3,15)

Source: created by the authors based on the survey conducted.



in a scientific research organization. The active role of management is crucial for identifying and assessing risks, as well as determining the effectiveness of measures and their alignment with the business policy of the scientific research organization, laws, standards, and regulations. By applying the IMS according to the COSO ERM model and the procedure based on the PDCA cycle, the organization can effectively manage operational risks and reduce the likelihood of unforeseen losses and their impact on the financial effects of business operations. Future research directions would focus on identifying critical points and risks in the operations of scientific research organizations, as well as their mitigation. The research should include an analysis of the risk management sector's reports on the context of the scientific research organization's operations (the conducted SWOT analyses and the implemented measures, as well as the results of corrective actions carried out using the PDCA cycle) for the period from 2021 to 2024. The goal is to fully align business moves and operational plans with the strategy, mission, and vision of the scientific research organization.

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