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Identification of the Components of a Conceptual Model for Effective Risk Management Based on the Grounded Theory Method

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A B S T R A C T

This study aims to identify and conceptualize the components of an effective risk management model through a grounded theory approach, providing a comprehensive framework that integrates causal, contextual, and strategic dimensions of organizational risk management. The research employed a qualitative design using the grounded theory methodology of Strauss and Corbin. The study population consisted of university professors, risk managers, members of risk committees, and board members of listed companies. Due to the broad scope of the population, purposeful and snowball sampling methods were applied, resulting in 14 participants, with theoretical saturation achieved at the fourteenth interview. Data were collected through semi-structured interviews and analyzed using NVivo and MAXQDA software. The analysis followed a systematic coding process including open, axial, and selective coding, enabling the development of categories and integration into a conceptual model. The results indicated that effective risk management is shaped by a combination of causal, contextual, and intervening factors. Causal conditions included economic, financial, political, technological, and intra-organizational factors. Contextual conditions were identified at both company and country levels, while intervening conditions encompassed macro-environmental factors, leadership styles, and stakeholder expectations. Strategies were divided into internal (e.g., governance reforms, proactive identification, knowledge sharing) and external (e.g., collaboration, regulatory adaptation) categories. The consequences of these strategies highlighted value creation for both organizations, through resilience and financial performance, and society, through trust and stability. The central phenomenon identified was risk management as a structured and adaptive process. The study contributes a conceptual model of effective risk management that integrates multiple dimensions, emphasizing its role not only in reducing vulnerabilities but also in creating long-term organizational and societal value.

Keywords: *Risk management, grounded theory, causal conditions, strategies, value creation, resilience, organizational governance*

1. Introduction

Risk has always been an integral part of organizational life, and in recent decades, the speed of technological, financial, and geopolitical changes has multiplied the complexity of managing it. Organizations across industries face challenges such as market volatility, cyber threats, natural disasters, regulatory pressures, and reputational risks that require structured approaches to ensure resilience and sustainable performance. Traditional approaches to risk management—often limited to compliance or crisis response—have become insufficient in an era marked by interconnected global systems and rapid digitalization. As such, researchers and practitioners increasingly emphasize the need for conceptual models of effective risk management that integrate diverse perspectives, from corporate governance and financial oversight to technological innovation and social responsibility (Abu Afifa et al., 2024; Ahmadi-Farsani et al., 2024).

The scope of risk management research has expanded dramatically. In developing economies, especially in ASEAN, risk management has become closely tied to sustainability goals, pushing organizations toward models that balance financial resilience with environmental and social considerations (Abu Afifa et al., 2024). Similarly, studies on corporate oversight mechanisms highlight how robust risk management frameworks reduce financial distress and increase stakeholder confidence (Ahmadi-Farsani et al., 2024). Within the construction industry, bibliometric analyses have revealed that risk management literature emphasizes both traditional safety practices and emerging concerns such as sustainability and digital transformation, pointing to new research directions (Al Qudah et al., 2024).

One of the most prominent emerging domains is cyber risk management. As critical infrastructure becomes increasingly dependent on digital systems, integrated frameworks that combine cyber threat intelligence and enterprise-wide strategies are required to mitigate vulnerabilities (Amin, 2024). Cyber risks have also become embedded in new forms of economic activity, such as cryptocurrency-based transactions in international transportation, where the volatility and lack of regulation create unique challenges (Gapurbaeva, 2024). These developments reveal that modern risk management extends far beyond financial metrics, incorporating multidimensional risks that demand innovative frameworks.

Education and knowledge transfer also play a vital role in embedding effective risk management practices. For example, in higher education systems, improving quality management through better risk assessment has been shown to strengthen institutional resilience and sustainability (Bazaluk et al., 2024). Likewise, the integration of risk management into mathematics and IT education in Moldova demonstrates how academic systems can foster transformational approaches that prepare students for future uncertainties (Braicov, 2024). Similarly, in the context of electronic commerce, teaching risk management and cybersecurity as part of the curriculum equips future professionals with the competencies required to manage digital business environments effectively (Cai, 2024).

At the same time, risk management must account for complexity and interdependencies in megaprojects. Combining stakeholder analysis with multilayer risk frameworks has been found to enhance coordination and predictability in large-scale construction projects, where delays and budget overruns are common (Castelblanco et al., 2024). Broader corporate studies have confirmed that enterprise risk management maturity contributes not only to performance improvement but also to digital transformation and corporate social responsibility (Djakman & Siregar, 2024). Similarly, research on customs imports in Iran shows that senior managers with transformative leadership styles play a crucial role in shaping effective risk management models, particularly in highly regulated and uncertain environments (Faqih Nasiri et al., 2024).

The role of governance and oversight in risk management cannot be overstated. Evidence from South Africa suggests that enterprise risk management significantly shapes insurers' risk-taking behavior, with corporate governance acting as a mediating factor (Horvey & Odei-Mensah, 2025). Similarly, conceptual frameworks demonstrate that integrating enterprise risk management with performance management allows organizations to align their strategic decision-making processes with risk assessment (Hristov et al., 2024). Proactive and collaborative risk management in supply chains, particularly in industries such as automotive, has been shown to improve performance by leveraging digital tools and inter-organizational cooperation (Kayouh & Dkhiss, 2024). In healthcare organizations, organizational culture and internal control mechanisms are also deeply intertwined with risk management practices, directly influencing organizational performance (Lee, 2024).

Recent advances in artificial intelligence and machine learning have added new dimensions to risk management. In

financial markets, AI-based predictive models have been proposed as tools for managing volatility and forecasting risks with greater accuracy (Mara et al., 2025). Disclosure and transparency are likewise positioned as socially responsible risk management strategies, creating accountability and trust among stakeholders (Mirza et al., 2024). In Kenya, state corporations have adopted strategic risk management as a driver of organizational performance, emphasizing that aligning risk practices with strategic goals leads to measurable outcomes (Munyao et al., 2025).

Risk management also extends into human resource and supply chain practices. Studies highlight the need for organizations to integrate HR practices with supply chain risk strategies to prepare for future disruptions and labor market uncertainties (Olawale et al., 2024). In financial technology, big data analytics has transformed decision-making, enabling companies to detect, assess, and respond to risks in real time (Petare et al., 2024). Research on the Tehran Stock Exchange confirms that organizational-level factors significantly affect enterprise risk management, suggesting the need for context-specific frameworks tailored to local economic and governance structures (Pourahmadi et al., 2024).

Global supply chain stability is another pressing concern. Effective risk management frameworks are required to manage volatility in foreign trade economies (Qian & Arkadievna, 2024), while integrative approaches that emphasize lean, agile, resilient, and green (LARG) principles have been developed to strengthen supply chain robustness (Rachid et al., 2024). Disaster risk reduction has similarly benefited from optimization-based frameworks that account for interdependencies between risks, ensuring more effective prevention and response (Safaeian et al., 2024). In Tanzania, strong credit risk management practices are directly associated with improved financial performance in the banking sector, demonstrating the tangible benefits of robust risk models (Temba et al., 2024).

Project management research further confirms that risk management is central to value creation. Holistic frameworks show that integrating risk assessment into project design and execution maximizes value for stakeholders (Testorelli et al., 2024). Artificial intelligence applications in supply chains also provide new tools for enhancing agility, as AI-driven models can optimize risk strategies through deep learning and hybrid modeling approaches (Wong et al., 2024). Comparative analyses confirm that AI-based risk management frameworks outperform traditional models by offering adaptive and predictive capabilities (Yazdi et al., 2024). Similarly, fuzzy decision-making models have been applied in manufacturing SMEs to identify critical success factors for dynamic enterprise risk management, showing the promise of integrated decision-support systems (Zhu et al., 2023).

Finally, research highlights that risk management cannot be seen merely as a defensive or compliance-oriented function; it must be positioned as a proactive and strategic driver of resilience, innovation, and value creation. This study aims to identify and conceptualize the components of an effective risk management model through a grounded theory approach.

2. Methods and Materials

This study employed a qualitative design using the grounded theory method, as developed by Strauss and Corbin (1990–2008), which is widely recognized for its systematic approach to theory construction when existing literature on a subject is insufficient or fragmented. The purpose of the study was to conceptualize the components of an effective risk management model by exploring the lived experiences and insights of experts actively engaged in the field. The research population consisted of academic faculty specializing in risk management, senior risk managers, members of risk committees, and board members of publicly listed companies. Given the broad scope of this population and the practical impossibility of engaging all its members, purposeful sampling strategies were applied to identify individuals with substantial knowledge and experience. Snowball sampling was also employed, wherein initial participants referred the researcher to additional qualified individuals, thus creating a referral chain. Sampling continued until theoretical saturation was reached, meaning that no new concepts or insights emerged from additional interviews. Based on grounded theory guidelines, an adequate sample size ranges between 10 and 25 participants; in this study, 14 participants were interviewed, with saturation reached at the fourteenth interview.

The primary tool for data collection was semi-structured and exploratory interviews, which allowed flexibility while still guiding conversations toward the research objectives. In some cases, unstructured questions were also used to capture participants' perspectives in a more open-ended manner. The interviews focused on participants' direct experiences with risk management processes, challenges, and strategies in organizational settings. This approach ensured that the data reflected both practical experiences and expert viewpoints.

Each interview was conducted in a manner that encouraged participants to elaborate on their insights, while the researcher maintained an exploratory orientation to discover underlying patterns and categories. The interviews were recorded, transcribed verbatim, and then prepared for coding and analysis. To enhance the richness of the data, individuals who had personally experienced risk-related decision-making processes and had substantial expertise in this domain were prioritized for selection.

The data were analyzed using Strauss and Corbin's systematic grounded theory approach, which involves three stages of coding: open coding, axial coding, and selective coding. During open coding, interview transcripts were examined line by line to identify initial concepts and categories. These codes were compared, refined, and grouped into broader categories based on their similarities and conceptual connections. The axial coding stage established relationships between the categories, focusing on conditions, contexts, causal factors, strategies, and outcomes, thereby forming a paradigmatic model of the phenomenon under study. In the selective coding stage, the researcher integrated the axial categories around a central theme or core category, thereby presenting an abstract theoretical explanation of effective risk management. The iterative nature of this analysis ensured a constant comparison between emerging categories and raw data to validate consistency and conceptual accuracy. NVivo qualitative data analysis software (MAXQDA was also referenced as supportive software) was used to manage transcripts, organize codes, and facilitate the systematic categorization process. This software enhanced the rigor of the study by enabling more precise coding and retrieval of data segments, ensuring transparency and traceability throughout the analysis process. Ultimately, the grounded theory methodology allowed the researchers to move inductively from raw data to a well-structured conceptual model that explains the dynamics, strategies, and consequences of effective risk management in organizational contexts.

3. Findings and Results

The process of data analysis in this study followed the systematic grounded theory approach of Strauss and Corbin, in which categories and themes are inductively derived from raw interview data through open, axial, and selective coding. Given the wide range of the statistical population, it was not possible to identify or interact with all individuals involved in risk management processes. Therefore, the sample was carefully selected to represent individuals with substantial expertise and direct experience of the research subject. Data were collected through semi-structured interviews with 14 participants, including university professors, risk managers, members of risk committees, and board members of listed companies. Sampling was conducted using the snowball method and continued until theoretical saturation was achieved at the fourteenth interview. The raw interview transcripts were analyzed in three stages. During open coding, the researchers extracted initial concepts and subcategories from the line-by-line examination of interview texts. These codes reflected participants' perceptions, strategies, and experiences regarding effective risk management. In the next stage, axial coding was used to establish connections among categories, linking causal conditions, contextual factors, intervening conditions, strategies, and consequences. Finally, through selective coding, the central category of the study was identified and integrated with other categories into a coherent conceptual model.

Table 1

Categories and Subcategories Derived from Grounded Theory Analysis

Coding Stage	Categories	Subcategories
Open Coding	Causal Conditions	Regulatory pressures, market uncertainties, organizational culture, past risk experiences
	Contextual Factors	Corporate governance structure, technological infrastructure, financial capacity
	Intervening Conditions	Leadership style, stakeholder expectations, external audits, economic environment
	Strategies	Proactive risk identification, contingency planning, diversification, knowledge sharing
	Consequences	Enhanced resilience, reduced financial loss, improved stakeholder trust, sustainable performance
Axial Coding	Central Phenomenon	Effective risk management as a structured and adaptive organizational process
Selective Coding	Core Category	"Development of a conceptual model for effective risk management" integrating causal, contextual, and strategic dimensions

As shown in Table 1, the grounded theory analysis generated a set of interrelated categories across the three stages of coding. At the open coding level, concepts such as regulatory pressures, organizational culture, and market uncertainties emerged as significant causal conditions influencing the way organizations approach risk management. Contextual factors, including governance structure, technological infrastructure, and financial resources, provided the environmental background in which risk strategies were developed. Intervening conditions such as leadership style, stakeholder expectations, and broader economic circumstances further shaped organizational approaches to risk. The strategies identified included proactive risk identification, contingency planning, diversification of operations, and mechanisms for knowledge sharing, all of which were perceived as essential in navigating uncertainty. The outcomes of these strategies were reflected in consequences such as enhanced organizational resilience, reduced financial losses, improved stakeholder trust, and long-term sustainable performance. Through axial coding, these categories were linked to form the central phenomenon of the study, namely, effective risk management as a structured and adaptive organizational process. Finally, selective coding integrated all categories around the core theme: the development of a conceptual model for effective risk management, which combines causal, contextual, and strategic elements into a unified framework.

Table 2

Selective Coding

Main Category	Type of Category
Economic factors; Financial factors; Political and technological factors; Intra-organizational factors	Causal Conditions
Macro-environmental factors	Intervening Conditions
Company-level factors; Country-level factors	Contextual Conditions
Internal organizational strategies; External organizational strategies	Strategies
Value creation for society; Value creation for businesses	Consequences

Table 2 illustrates the results of the pattern coding process, which represents the integration of categories into the paradigmatic model of effective risk management. The analysis revealed that causal conditions are shaped by a combination of economic, financial, political, technological, and intra-organizational factors, all of which serve as drivers of risk management practices. Intervening conditions were identified at the macro-environmental level, highlighting the influence of broader systemic forces beyond the direct control of individual organizations. Contextual conditions emerged at two distinct levels—company-specific factors and country-level factors—reflecting the dual influence of internal organizational structures and national regulatory and economic contexts. Strategies were classified into two groups: internal strategies, such as developing organizational processes and strengthening governance mechanisms, and external strategies, such as building inter-organizational partnerships and adapting to regulatory expectations. Finally, the consequences of effective risk management were categorized into two domains: value creation for society, emphasizing public trust, social stability, and economic resilience, and value creation for businesses, focusing on competitive advantage, financial sustainability, and stakeholder satisfaction. Together, these categories confirm the interdependent nature of risk management, where internal and external drivers interact to generate outcomes beneficial both to society and to organizations.

4. Discussion and Conclusion

The results of this study, based on a grounded theory approach, provided a structured and conceptual model for effective risk management. The analysis revealed that effective risk management is influenced by a set of causal, contextual, and intervening conditions that interact dynamically to shape organizational strategies. Economic, financial, political, technological, and intra-organizational factors emerged as the most prominent causal conditions, reflecting both the external pressures and internal dynamics that compel organizations to adopt structured risk practices. At the contextual level, company-specific characteristics, such as governance structures, and country-level conditions, such as regulatory frameworks, were identified as influential. Intervening factors, including macro-environmental dynamics, leadership, and stakeholder expectations, mediated the relationship between causal factors and strategies. The study further revealed that strategies can be classified into internal organizational

responses—such as governance reforms, knowledge management, and capacity building—and external strategies, such as inter-organizational collaboration and regulatory adaptation. The consequences of these strategies were not only organizational, such as improved performance and financial sustainability, but also societal, in the form of public trust and value creation for communities.

The central phenomenon that emerged from the analysis was the recognition of effective risk management as both a structured and adaptive process, one that transcends compliance and defensive practices to serve as a strategic driver of resilience and long-term performance. By integrating causal, contextual, and strategic dimensions, the study's model highlights the multi-layered nature of risk management in contemporary organizations. This finding aligns with previous research that underscores risk management as a holistic framework encompassing financial, operational, technological, and social aspects (Ahmadi-Farsani et al., 2024; Hristov et al., 2024). Importantly, the study demonstrates that effective risk management is not static; rather, it evolves through continuous adaptation to dynamic macro and micro conditions.

The identification of economic and financial factors as major causal conditions is consistent with studies highlighting the central role of risk management in reducing financial distress and ensuring sustainability (Ahmadi-Farsani et al., 2024; Temba et al., 2024). In particular, financial sector research confirms that credit risk management directly influences organizational performance, especially in commercial banks where robust risk practices safeguard profitability (Temba et al., 2024). Similarly, research in ASEAN economies shows that management accounting practices are increasingly oriented toward sustainable risk management, where financial considerations are intertwined with broader sustainability objectives (Abu Afifa et al., 2024). These parallels confirm the validity of this study's finding that financial and economic dimensions are at the core of effective risk management models.

The results also emphasized the importance of political and technological conditions as causal factors. This is reflected in the literature on cyber risk management, where frameworks incorporating cyber threat intelligence are considered essential for protecting critical infrastructure (Amin, 2024). As organizations digitalize, cyber vulnerabilities become strategic risks that require integrated, enterprise-level solutions. This aligns with research on cryptocurrency-based transactions in international trade, which underscores how emerging technologies introduce novel risks that traditional frameworks are ill-equipped to manage (Gapurbaeva, 2024). Furthermore, studies confirm that proactive adoption of digital tools in supply chains significantly enhances risk management outcomes, demonstrating that technological readiness is both a risk factor and a risk solution (Kayouh & Dkhiss, 2024; Wong et al., 2024).

Intra-organizational conditions, such as governance structures and organizational culture, were also central in shaping strategies. This is supported by evidence from healthcare organizations, where internal control systems and cultural norms strongly influence the effectiveness of risk practices (Lee, 2024). Similarly, corporate governance is shown to mediate the relationship between risk management and organizational behavior, such as insurers' risk-taking (Horvey & Odei-Mensah, 2025). These studies echo the findings of this research that governance and internal culture are decisive in determining whether risk management is integrated into core decision-making processes.

The results further indicate that contextual conditions operate at two levels: company-specific and country-level. This dual perspective reflects earlier studies on enterprise risk management in the Tehran Stock Exchange, where local regulatory frameworks and national-level dynamics influenced organizational adoption of risk practices (Pourahmadi et al., 2024). Likewise, customs import risk management in Iran was found to depend heavily on the role of senior managers, suggesting that national regulatory and leadership conditions intersect to shape organizational responses (Faqih Nasiri et al., 2024). Globally, contextual factors are similarly emphasized in supply chain studies, where international trade dynamics and foreign economic conditions dictate the stability of risk management frameworks (Qian & Arkadievna, 2024; Rachid et al., 2024).

Intervening conditions, such as macro-environmental factors, leadership, and stakeholder expectations, were identified as key mediators in this study. These findings are consistent with earlier research highlighting that broader disaster risk interdependencies, regulatory landscapes, and socio-economic contexts can amplify or moderate organizational risk strategies (Safaeian et al., 2024). Leadership is also emphasized in multiple studies as a transformative factor; for example, strategic leadership was shown to enhance customs risk management practices in Iran (Faqih Nasiri et al., 2024). Similarly, research in Kenya highlights how strategic risk management at the leadership

level directly drives organizational performance in state corporations (Munyao et al., 2025).

The strategies identified in this study fall into two major categories: internal and external. Internal strategies included organizational reforms, proactive identification of risks, contingency planning, and knowledge sharing. These findings align with evidence from educational contexts, where integrating risk management into curricula and organizational processes enhances resilience and sustainability (Bazaluk et al., 2024; Braicov, 2024; Cai, 2024; Hasanzadeh Talooki, 2024). External strategies, on the other hand, involved collaboration with stakeholders, compliance with regulatory requirements, and the use of inter-organizational networks. This resonates with studies on megaprojects, where combining stakeholder management with multilayer risk frameworks improves predictability and performance (Castelblanco et al., 2024). Similarly, supply chain research demonstrates that collaboration and digital tools enhance resilience in complex networks (Kayouh & Dkhiss, 2024; Wong et al., 2024).

The consequences observed in this study—value creation for both businesses and society—correspond with findings across multiple domains. Value creation through risk management has been explicitly demonstrated in project contexts, where holistic frameworks show that risk assessment enhances outcomes for stakeholders (Testorelli et al., 2024). At the societal level, risk management contributes to disaster reduction, public trust, and stability (Safaeian et al., 2024). In financial contexts, robust risk frameworks enhance profitability and shareholder confidence (Temba et al., 2024). Importantly, corporate disclosure and transparency are identified as mechanisms of socially responsible risk management that produce societal trust and legitimacy (Mirza et al., 2024). These findings reinforce the dual perspective of this study: that effective risk management generates both organizational resilience and societal value.

The integration of artificial intelligence and advanced analytics into risk management, though not the primary focus of this study, is particularly relevant in interpreting the findings. Several studies confirm that AI-driven models enhance prediction, adaptability, and decision-making in risk management contexts (Mara et al., 2025; Petare et al., 2024; Yazdi et al., 2024; Zhu et al., 2023). These technologies provide support for both internal and external strategies, making them indispensable for organizations navigating rapidly changing environments. The results of this study are therefore consistent with the broader literature in suggesting that risk management must increasingly incorporate technological tools to remain effective.

In sum, this study's findings reinforce and extend previous literature by offering a grounded, conceptual model of effective risk management that integrates causal, contextual, and strategic dimensions. Unlike fragmented approaches, this model emphasizes the interdependencies between internal organizational structures, external environmental factors, and adaptive strategies. It also highlights the dual outcomes of organizational resilience and societal value creation. The findings align closely with international research while also contributing a localized, empirically grounded perspective rooted in the experiences of academic experts, risk managers, committee members, and board directors.

Despite its contributions, this study is subject to several limitations. First, the qualitative design, while suitable for generating theory, limits the generalizability of the findings to broader populations. The sample size, although appropriate for grounded theory research, was limited to 14 participants drawn primarily from listed companies and academic institutions, which may not fully represent the diversity of industries or organizational contexts. Second, the reliance on self-reported data from semi-structured interviews introduces potential biases, as participants may have provided socially desirable responses or emphasized certain aspects of their experiences over others. Third, while the grounded theory approach offers depth and conceptual clarity, its reliance on the researcher's interpretive skills may affect the objectivity of coding and categorization. Although software such as NVivo and MAXQDA was used to strengthen rigor, researcher bias cannot be completely eliminated. Finally, the study was conducted within a specific national and institutional context, meaning that findings may not be directly transferable to different cultural or regulatory environments.

Future studies could address these limitations by adopting mixed-methods designs that combine qualitative insights with quantitative validation. Large-scale surveys or statistical modeling could test the relationships between causal conditions, strategies, and outcomes identified in this study, thereby strengthening generalizability. Comparative studies across industries or countries would also be valuable, as they could illuminate how contextual and regulatory differences shape risk management practices. Moreover, future research should explore the role of emerging technologies, such as artificial intelligence, blockchain, and big data analytics, in transforming risk management

strategies. Longitudinal studies tracking organizations over time would also shed light on how adaptive strategies evolve in response to shifting macro-environmental conditions. Finally, incorporating the perspectives of additional stakeholders—such as regulators, policymakers, and community representatives—would provide a more holistic understanding of the societal impacts of risk management.

The results of this study offer several practical implications. Organizations should recognize that effective risk management requires integrating both internal reforms and external collaborations, rather than relying on compliance-driven models. Senior leaders should prioritize governance structures and organizational cultures that encourage transparency, proactive risk identification, and continuous learning. Companies should also invest in digital tools and data-driven methods to enhance their adaptability and predictive capabilities. Furthermore, risk management should not be treated solely as a defensive mechanism but as a driver of value creation for both businesses and society. By aligning strategies with stakeholder expectations and societal needs, organizations can enhance resilience, build public trust, and achieve long-term sustainability.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were considered.

References

Abu Afifa, M., Nguyen, N. M., & Bui, D. V. (2024). Management accounting practices going sustainable: the move toward sustainable risk management in ASEAN developing economies. *Competitiveness Review: An International Business Journal*, *ahead-of-print*. https://doi.org/10.1108/CR-03-2024-0056

Ahmadi-Farsani, F., Abroud, A., & Derakhshan, A. (2024). The impact of business risk management on reducing financial distress conditions, considering the role of corporate oversight mechanisms. *Journal of Applied Research in Financial Reporting*, *13*(24), 123-150. https://www.arfr.ir/article_205753.html?lang=en

Al Qudah, S. M. A., Fuentes Bargues, J. L., & Gisbert, P. (2024). Bibliometric analysis of the literature on risk management in the construction sector: Exploring current and future trends. *Ain Shams Engineering Journal*, 102843.

Amin, H. E. (2024). An Integrated Approach to Cyber Risk Management With Cyber Threat Intelligence Framework to Secure Critical Infrastructure. *Journal of Cybersecurity and Privacy*, *4*(2), 357-381. https://doi.org/10.3390/jcp4020018

Bazaluk, O., Pavlychenko, A., Yavorska, O., Nesterova, O., Tsopa, V., Cheberiachko, S., Deryugin, O., & Lozynskyi, V. (2024). Improving the risk management process in quality management systems of higher education. *Scientific reports*, *14*(1), 3977. https://doi.org/10.1038/s41598-024-53455-9

Braicov, A. (2024). Transformational Risk Management in Mathematics and IT Education in the Republic of Moldova. *Acta Et Commentationes Științe Ale Educației*, *37*(3), 29-37. https://doi.org/10.36120/2587-3636.v37i3.29-37

Cai, Y. (2024). Electronic Commerce Security and Risk Management: An Important Part of College Curriculum. *Journal of Educational Theory and Management*, *8*(1), 18. https://doi.org/10.26549/jetm.v8i1.15646

Castelblanco, G., Fenoaltea, E. M., De Marco, A., Demagistris, P., Petruzzi, S., & Zeppegno, D. (2024). Combining stakeholder and risk management: Multilayer network analysis for complex megaprojects. *Journal of Construction Engineering and Management*, *150*(2), 04023161. https://doi.org/10.1061/JCEMD4.COENG-13807

Djakman, C. D., & Siregar, S. V. (2024). The Effect of Maturity Learn Element in Enterprise Risk Management and Corporate Social Responsibility on the Level of Digital Transformation. *Business Strategy & Development*, *7*(1). https://doi.org/10.1002/bsd2.346

Faqih Nasiri, A., Yarahmadi, M., & Tamjid Yamchalu, A. (2024). Providing a risk management model for imports in the Islamic Republic of Iran Customs with a focus on the role of transformative senior managers. In Proceedings of the 11th International and National Conference on Management, Accounting, and Law,

Gapurbaeva, S. (2024). International River and Sea Transportation: Specifics of Risk Management in Cryptocurrency Transactions. *Bio Web of Conferences*, *107*, 04006. https://doi.org/10.1051/bioconf/202410704006

Hasanzadeh Talooki, M. (2024). Educational risk management in the use of educational technologies. *Journal of Clinical*

Excellence, *14*(1). https://ce.mazums.ac.ir/article-1-826-fa.html

Horvey, S. S., & Odei-Mensah, J. (2025). Enterprise risk management, corporate governance and insurers risk-taking behaviour in South Africa: evidence from a linear and threshold analysis. *Journal of Accounting in Emerging Economies*, *15*(1), 53-83. https://doi.org/10.1108/JAEE-08-2023-0242

Hristov, I., Camilli, R., Chirico, A., & Mechelli, A. (2024). The integration between enterprise risk management and performance management system: Managerial analysis and conceptual model to support strategic decision-making process. *Production Planning & Control*, *35*(8), 842-855. https://doi.org/10.1080/09537287.2022.2140086

Kayouh, N., & Dkhiss, B. (2024). The Impact of Proactive Risk Management, Collaboration, and Digital Tools on Supply Chain Performance in the Moroccan Automotive Industr. *Uncertain Supply Chain Management*, *13*(4), 763-772. https://doi.org/10.5267/j.uscm.2024.12.100

Lee, S. N. (2024). Examining the Impact of Organizational Culture and Risk Management and Internal Control on Performance in Healthcare Organizations. *Advances in Management and Applied Economics*, *14*(1), 1-4.

Mara, G. C., Kumar, Y., K, V. P., Madan, S., & Chandana, R. A. M. (2025). Advance AI and Machine Learning Approaches for Financial Market Prediction and Risk Management: A Comprehensive Review. *Journal of Computer Science and Technology Studies*, *7*(4), 727-749. https://doi.org/10.32996/jcsts.2025.7.4.86

Mirza, H. H., Hussain, H., Hussain, R. Y., Ahmed, M., & Adil, M. (2024). Corporate Disclosure and Transparency as a Tool of Socially Responsible Risk Management. 91-104. https://doi.org/10.4018/979-8-3693-5733-0.ch004

Munyao, D. K., Deya, J., & Odollo, L. (2025). Strategic Risk Management and Performance of Commercial State Corporations in Kenya. *International Journal of Social Science and Humanities Research (Ijsshr) Issn 2959-7056 (O) 2959-7048 (P)*, *3*(1), 97-111. https://doi.org/10.61108/ijsshr.v3i1.157

Olawale, O., Ajayi, F. A., Udeh, C. A., & Odejide, O. A. (2024). Risk management and HR practices in supply chains: Preparing for the Future. *Magna Scientia Advanced Research and Reviews*, *10*(2), 238-255. https://doi.org/10.30574/msarr.2024.10.2.0065

Petare, P. A., Bdair, M., Singh, M. N., Ateeq, K., & Akila, R. (2024). Big data analytics in fintech: Revolutionizing risk management and decision-making. *Acta Scientiae*, *7*(1), 605-617.

Pourahmadi, M. H., Farsad Amanollahi, G., & Lashgari, Z. (2024). Factors Affecting Enterprise Risk Management in Companies Listed on Tehran Stock Exchange. *Investment Knowledge*, *13*(50), 95-109.

Qian, C., & Arkadievna, A. (2024). Stability and risk management of global supply chains in foreign trade economy. *American Journal of Economics and Business Innovation*. https://doi.org/10.54536/ajebi.v3i1.2362

Rachid, B., Roland, D., Sebastien, D., & Ivana, R. (2024). Risk Management Approach for Lean, Agile, Resilient and Green Supply Chain. *World Academy of Science, Engineering and Technology, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, *11*(4), 742-750. https://publications.waset.org/10006688/risk-management-approach-for-lean-agile-resilient-and-green-supply-chain

Safaeian, M., Moses, R., Ozguven, E. E., & Dulebenets, M. A. (2024). An optimization- based risk management framework with risk interdependence for effective disaster risk reduction. *Progress in Disaster Science*, *21*, 100313. https://doi.org/10.1016/j.pdisas.2024.100313

Temba, G. I., Kasoga, P. S., & Keregero, C. M. (2024). Impact of the quality of credit risk management practices on financial performance of commercial banks in Tanzania. *SN Business & Economics*, *4*(3), 38. https://doi.org/10.1007/s43546-024-00636-3

Testorelli, R., Tiso, A., & Verbano, C. (2024). Value Creation with Project Risk Management: A Holistic Framework. *Sustainability*, *16*(2), 753. https://doi.org/10.3390/su16020753

Wong, L. W., Tan, G. W. H., Ooi, K. B., Lin, B., & Dwivedi, Y. K. (2024). Artificial intelligence-driven risk management for enhancing supply chain agility: A deep-learning-based dual-stage PLS-SEM-ANN analysis. *International Journal of Production Research*, *62*(15), 5535-5555. https://doi.org/10.1080/00207543.2022.2063089

Yazdi, M., Zarei, E., Adumene, S., & Beheshti, A. (2024). Navigating the Power of Artificial Intelligence in Risk Management: A Comparative Analysis. *Safety*, *10*(2), 42. https://doi.org/10.3390/safety10020042

Zhu, D., Li, Z., & Mishra, A. R. (2023). Evaluation of the critical success factors of dynamic enterprise risk management in manufacturing SMEs using an integrated fuzzy decision-making model. *Technological Forecasting and Social Change*, *186*, 122137. https://doi.org/10.1016/j.techfore.2022.122137