RISK-MM-GEORGIA: FACILITATING THE EFFECTIVE RISK MANAGEMENT IN THE GEORGIAN PUBLIC SECTOR

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How to cite this paper: Nadirashvili, K., de Lorena, A. L. F., Costa, A. P. C. S., Menteshahsvili, M., & Surguladze, T. (2026). Risk-MM-Georgia: Facilitating the effective risk management in the Georgian public sector. *Risk Governance and Control: Financial Markets & Institutions, 16*(1), 112–125. https://doi.org/10.22495/rgcv16i1p10

ISSN Online: 2077-4303
ISSN Print: 2077-429X

Received: 12.08.2025
Revised: 10.11.2025; 03.01.2026; 30.01.2026
Accepted: 09.02.2026

JEL Classification: G3, H11, H12
DOI: 10.22495/rgcv16i1p10

Abstract

Risk management maturity models (RMMMs) have been increasingly integrated into public organizations to promote structured and proactive risk management. Several studies across different countries proposed frameworks to guide institutions in strengthening their practices. Despite these developments, a persistent imbalance between scientific rigor and practical applicability remains, leaving many public institutions with either complex models to implement or overly simplified frameworks that lack meaningful insights. This gap is particularly evident in the Georgian public sector, where adoption of a comprehensive risk management framework has been significantly delayed. The present study introduces Risk-MM-Georgia, a novel RMMM developed using the design science research (DSR) methodology. The model was applied to nine major public organizations and externally validated against Brazil's PRisk-MM, a framework successfully implemented within the Brazilian public sector (de Lorena & Costa, 2023b). The analysis yielded consistent findings, with 77.78 percent of the organizations achieving the same maturity level under both models, thereby supporting the reliability of the proposed framework. Overall, Risk-MM-Georgia bridges theory and practice by providing step-by-step guidance for public institutions and demonstrating global relevance through cross-national benchmarking.

Keywords: Maturity Models, Risk Assessment, Risk Management Framework, Public Sector, Model-Based Process Improvement, Practice-Based Model, Scientific Model

Authors' individual contribution: Conceptualization — K.N. and A.L.F.d.L.; Methodology — A.L.F.d.L., M.M., and T.S.; Validation — K.N. and A.L.F.d.L.; Investigation — K.N. and T.S.; Resources — K.N., A.L.F.d.L., M.M., and T.S.; Data Curation — K.N. and A.L.F.d.L.; Writing — Original Draft — K.N.; Writing — Review & Editing — A.L.F.d.L.; Visualization — K.N., A.L.F.d.L., and T.S.; Supervision — A.P.C.S.C.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

Public sector organizations often face greater challenges in implementing robust risk management systems compared to private companies. These difficulties stem from distinctive characteristics of the public sector, such as bureaucratic "red tape" and procedural delays (Andersen & Young, 2021). Barriers identified by Braig et al. (2011) include mission complexity, frequent leadership changes, limited awareness, and weak risk culture, which are particularly severe in government institutions. In some cases, risk management is perceived merely as a compliance exercise, resulting in limited interest and trust in its value (Arena et al., 2011; de Lorena & Costa, 2024). Several studies have explicitly examined country-specific barriers to risk management implementation: limited competence and knowledge gaps in Poland (Mormul, 2021), cultural resistance and the absence of standardized frameworks in the United States (Stanton, 2015), weak leadership commitment and an underdeveloped risk culture in Indonesia, and conflicting institutional logics in Saudi Arabia (Vuong, 2023; Murr & Carrera, 2022).

Furthermore, Bracci et al. (2021) emphasize that public sector risk management research often suffers from an imbalance between scientific rigor and practical applicability, with much of the literature focused on theoretical frameworks rather than actionable tools for practitioners. This disconnect means that although risk management concepts are well-developed academically, public organizations struggle to translate them into effective governance practices. In a similar vein, Bracci et al. (2021) demonstrate that frameworks for integrating performance management and risk management in the public sector, while conceptually strong, frequently fail in practice due to disintegration between actors, systems, and organizational processes. Taken together, these studies highlight a persistent scientific–practical gap: risk management research advances theory but often neglects practicality, leaving public institutions without standardized, context-sensitive frameworks capable of bridging academic insights with real-world governance outcomes.

Considering the challenges identified in prior studies, this research aims to develop a new risk management maturity model (RMMM) that bridges theoretical advancement with practical usability and provides prescriptive guidance for implementing risk management in the public sector of Georgia. The study adopts the design science research (DSR) approach, which supports the creation and evaluation of models designed to address broadly relevant practical problems (Dresch et al., 2015; De Sordi, 2021). At the same time, the model is grounded in practice-based frameworks from Denewet et al. (2019) and Deloitte (2023), ensuring both global relevance and practical applicability. Importantly, the model integrates two critical dimensions — capabilities and activities — enabling public institutions to achieve sustainable advancements in risk management.

Risk-MM-Georgia was applied to nine public organizations using a maturity assessment tool and externally validated against the PRisk-MM, a scientifically based model developed by de Lorena and Costa (2023b), which was successfully implemented in Brazil. Despite differences in development, both models produced consistent results, with 77.78% of organizations achieving the same maturity level, thereby supporting the reliability of Risk-MM-Georgia.

The structure of this article is as follows. Section 2 provides a comprehensive literature review, with particular emphasis on risk maturity models and their critical relevance in the public sector. Section 3 outlines the research methodology, grounded in DSR, which serves as a creative engine for model innovation. Section 4 presents and discusses the research results, reinforcing the model's reliability and applicability. Finally, Section 5 concludes the study by addressing both practical and scientific implications, charting a clear path forward for advancing risk management maturity within public institutions.

2. LITERATURE REVIEW

Model-based process improvement involves using a model to guide the upgrading processes within an organization. This approach has its roots in the work of Deming, Crosby, and Juran, which connects organizational capabilities with process improvements (Ahern et al., 2004). A similar approach is applied in maturity models, which describe the processes, practices, and capabilities necessary for each level of improvement to achieve a desirable outcome. Maturity models help identify weaknesses or deficiencies in processes and propose valuable changes, making them extensively used in process improvement (Helgesson et al., 2012). They propose a steady and systematic development and/or improvement of processes or structures of an organization (Mettler, 2011; Santos-Neto & Costa, 2019). Thus, they help organizations to strengthen internal processes by ensuring the organizations have adequate capacities to manage such improvements (Santos-Neto & Costa, 2019).

In the risk management domain, a RMMM is a management tool designed to assess and enhance an organization's risk management effectiveness (Antonucci, 2016). Moreover, it is a practical tool, supporting step-by-step improvement of organizational capabilities. RMMMs guide requirements, accelerating the enhancement and step-by-step development of risk management processes or overall system (Aas-Haug & Haskins, 2021). It sets a roadmap by indicating the next steps for improvement, necessary actions, milestones, and capabilities. Maturity represents the measure of progress while depicting the evolution of a particular process (Saleh, 2011).

In mature organizations, risk management processes are well-structured, systematized, and fully integrated into governance mechanisms, with evidence showing a positive and statistically significant relationship between risk management maturity and firm value (Meskovic, 2024). Organizations with higher levels of risk maturity also demonstrate greater resilience during crises (Bąk & Jedynak, 2022), and strong correlations have been established between maturity levels and the quality of organizational processes and capabilities (Alijoyo & Norimarna, 2021). Overall, mature risk management systems enhance efficiency

and effectiveness, strengthen governance, improve operational quality, reduce costs, ensure compliance, and ultimately boost performance. However, risk maturity cannot be achieved through static, compliance-driven approaches alone; it requires a shift toward dynamic, adaptive risk management, where operational insights continuously inform strategic decisions through interactive processes that foster dialogue, learning, and adaptability (Andersen & Young, 2023). Several studies suggested the deployment of risk maturity models for improving risk management activities in the public sector. For instance, Norwegian government institutions implemented a risk maturity model at different organizational levels after a lack of progress and stagnation in their risk management activities (Aas-Haug & Haskins, 2021). Another example was given by Cienfuegos (2019), introducing the comprehensive RMMM for Dutch municipalities, whereas the progressive learning process was identified as a critical element for improvement. Another important study was conducted for the public sector of Brazil, proposing a framework with relevant attributes and contingent factors demonstrating how risk management shall be executed in Brazilian public organizations (de Lorena & Costa, 2023b).

While scientific studies often remain theoretical, practitioners employ RMMMs as action-oriented tools that both identify weaknesses and provide roadmaps for continuous improvement. Denewet et al. (2019) proposed a matrix-based model mapping elements and activities across maturity levels (informal, developing, implementing, optimized), with tailored recommendations for progression. Deloitte (2023) distinguishes four types of RMMMs: capability-based, activity-based, hybrid, and outcome-based. Capability-based models assess personnel expertise, activity-based models focus on risk management processes, and hybrid models integrate both dimensions for a comprehensive evaluation. Outcome-based models, in turn, measure maturity by linking performed activities to achieved results. Among these hybrid approach provides a more comprehensive assessment of an organization's risk management practices by integrating the strengths of both capability and activity-based models (Deloitte, 2023).

Based on both scientific and practitioner approaches, RMMMs can effectively support the evolution of risk management processes in public institutions. Nevertheless, despite the abundance of models developed, there remains a lack of empirical validation and practical application (Wendler, 2012; Tarhan et al., 2016), as well as a shortage of prescriptive frameworks that provide clear guidance for advancement (Santos-Neto & Costa, 2019). Should be considered that country-specific RMMMs offer tailored insights aligned with national policy and institutional contexts, yet their limited scope and weak integration with universal standards restrict opportunities for cross-country adoption and prevent organizations from fully leveraging global best practices.

As revised literature demonstrates, RMMMs remain constrained by several notable gaps that hinder their broader utility. Existing studies often emphasize theoretical constructs, resulting in limited practical applicability and leaving public organizations without clear guidance for implementation. Furthermore, the absence of international benchmarking or external validation restricts opportunities for comparative assessment and shared learning across diverse governance contexts. Finally, the prevailing scientific orientation of current models has produced primarily diagnostic tools that measure maturity but fail to prescribe actionable pathways for advancement. Addressing these shortcomings requires the development of validated, prescriptive RMMMs to accelerate the adoption of robust risk management systems across diverse governance contexts.

3. RESEARCH METHODOLOGY

3.1. Design science research method

This study employs DSR, a methodological approach rooted in the problem-solving paradigm within organizational contexts (Dresch et al., 2015; Hevner et al., 2004). DSR represents a scientific process of studying and inventing artifacts as they are developed and applied by practitioners, with the overarching goal of addressing practical problems of broad relevance. Importantly, DSR emphasizes not only the construction of new artifacts — such as models, methods, or systems — but also the refinement and enhancement of existing ones to address specific, real-world challenges (Johannesson & Perjons, 2014). Accordingly, this study adopts a pragmatic orientation, focusing on practical solutions to overcome implementation challenges in practice (Gillespie et al., 2024).

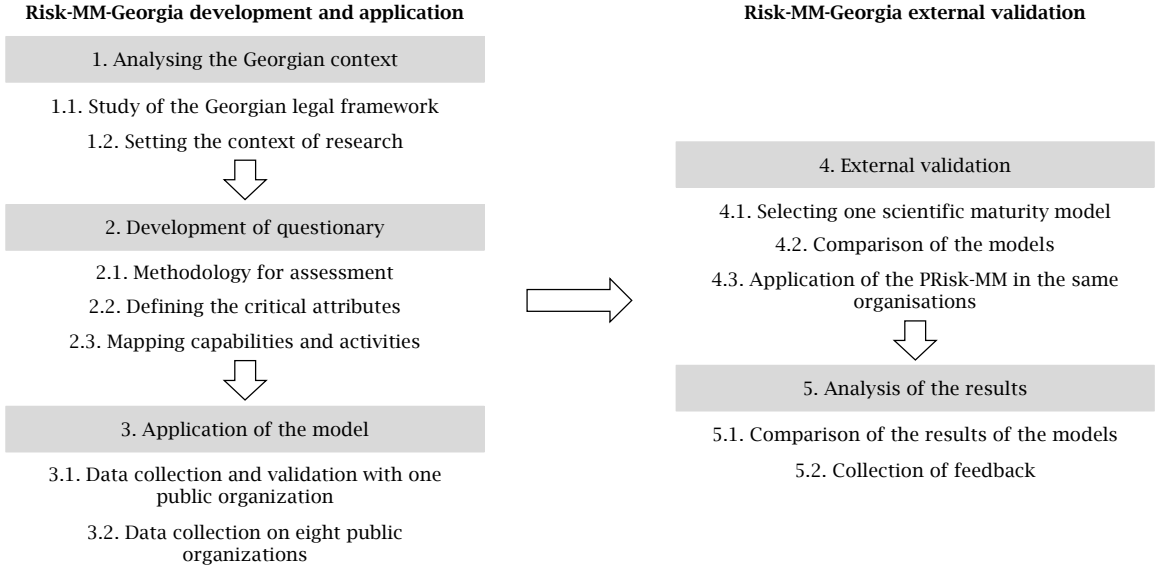
In line with the approaches of Mettler (2011) and de Lorena and Costa (2023a, 2023b), DSR is particularly well-suited for the development of RMMMs, as it provides a structured design process divided into clear phases, ensures systematic evaluation, and supports balanced design decisions. Moreover, it offers a robust methodological foundation by facilitating a systematic and iterative design process, enabling researchers and practitioners to develop, evaluate, validate, and refine artifacts (Dresch et al., 2015). Beyond problem-solving, an important expected outcome of applying DSR is the reduction of the persistent gap between theory and practice (Van Aken, 2004).

Hence, the chosen methodological approach is directly aligned with the aim of the study: to design, validate, and position a new model — Risk-MM-Georgia, specifically tailored to the Georgian public sector while retaining potential for broader generalization. The model is practice-based, reflecting the pragmatic orientation of Denewet et al. (2019) matrix-driven maturity framework by systematically mapping attributes and activities across five maturity levels. At the same time, Risk-MM-Georgia adopts an integrative design, enabling comprehensive risk management implementation through a hybrid approach that emphasizes both organizational capabilities and operational activities (Deloitte, 2023). This dual focus ensures a step-by-step progression in strengthening risk management systems. Crucially, the model's credibility will be reinforced through external validation, involving comparative benchmarking against the Brazilian maturity model and consultation with practitioners and experts beyond the Georgian context. Such validation not only enhances robustness and transferability but also positions Risk-MM-Georgia

as a framework capable of accelerating the institutionalization of risk management practices within Georgia while offering insights of broader relevance to the international public sector.

Consequently, this research consists of two phases: the development and application of the Risk-MM-Georgia, and its external validation with a science-based RMMM. Figure 1 depicts the steps in detail below.

Figure 1. Development and application of the Risk-MM-Georgia



Source: Authors' elaboration.

The development and application of the Risk-MM-Georgia comprises three main steps: analysing the Georgian context (step 1); developing the model (step 2); applying the model (step 3). For external validation purposes, a second model, the PRisk-MM, was selected (substep 4.1) and applied in the same Georgian public organizations (substep 4.3), as it was successfully applied in the Brazilian public sector. The PRisk-MM is also based on the DSR but considers multivariate statistical results in its development, thus reflecting a scientific approach (de Lorena & Costa, 2023a, 2023b). In addition, this article compares Risk-MM-Georgia and PRisk-MM to identify the similarities and distinguishing characteristics of practice-based and science-based models (substep 4.2). Afterwards, step 5 is performed by comparing the results of both models and collecting respondents' feedback.

To support the purpose of data collection and maturity assessment, a maturity assessment tool (see Appendix B) was developed, consisting of 27 statements. These statements were structured around predefined attributes, and each expected response option was assigned a score. To ensure that the analysis accurately captured the relative importance of different aspects of the model, each attribute was assigned a specific weight based on its significance within the overall framework. This approach allowed for a more nuanced and balanced assessment, ensuring that critical areas capture greater influence on the final results.

3.2. Risk-MM-Georgia development and application

As mentioned above, in accordance with the DSR methodology, specific phases and steps were defined with the goal of providing an RMMM that facilitates the rapid implementation and continuous improvement of the risk management system in the public sector of Georgia. In the first phase, step 1 refers to the analysis of the Georgian context. Therefore, the related Georgian legal framework was reviewed and analysed (substep 1.1), including all relevant legislative acts, laws, and government orders adopted during the period of 2010–2022. In accordance with the legal framework, the risk management system stands under the financial management and control system, which in turn is a part of the state's internal financial control reform. After analysing and understanding the legal requirements, nine public organizations having a central role in the government reform process were identified and selected for research purposes (substep 1.2). Such organizations were codified as Org1–Org9. Next, step 2 refers to the development of the Risk-MM-Georgia with the introduction of five critical attributes: risk governance and structure, risk management process, risk reporting, risk culture, and risk management integration. These attributes were selected in alignment with requirements found in the Georgian legal framework (Parliament of Georgia, 2011; Government of Georgia, 2017), which itself reflects international standards (International Organization for Standardization [ISO], 2018; Committee of Sponsoring Organizations of the Treadway Commission [COSO], 2013). Moreover, based on the relative importance of each attribute, which is discussed below, weights were assigned to each, with 25 being the highest weight, 15 being the lowest, and 20 being medium.

Governance and organizational structure: In public sector organizations, governance and organizational structure are foundational elements that significantly influence how effectively

an institution operates and delivers public services. They establish rules and procedures at all levels of the organization and help make structural uncertainties and ambiguities manageable (Moeller, 2011; Stein et al., 2019). Due to its foundational importance and relevance, a high weight of 25 was assigned to this attribute.

The risk management process: In general, this is a central attribute involving the implementation of key processes such as risk identification, analysis, assessment, reporting, and monitoring (ISO, 2018). Although fundamental, these stages reflect the overall maturity of risk management through the synergy and cohesion (Bąk & Jedynak, 2022). It is important to note that the risk management process is explicitly guided by the Law of Georgia on Public Internal Financial Control (Parliament of Georgia, 2011; Government of Georgia, 2017), which mandates the establishment of risk management practices. Given such legal and operational imperatives, a high weight (25) was assigned to this attribute.

Risk reporting: A key technique for communicating risks across an organization. It typically includes information on current risk exposures, materialized risk events, and the overall risk profile of the organization. In the public sector, effective risk communication supports better budgeting and decision-making, while also helping to avoid criticism of government institutions for failures stemming from uncommunicated risks (Bhatta, 2008). A fundamental element of comprehensive risk reporting is transparency, which applies to both internal and external disclosure practices (Nichita, 2018). Furthermore, a strong correlation has been found between organizations' risk levels and their disclosure techniques, as evidenced by studies on UK companies (Linsley & Shrives, 2006). Considering the importance of the attribute, it should be implemented through a logical sequence, hence medium weight (20) was assigned to the "Risk reporting".

Risk culture: The International Risk Management Institute defines risk culture as the shared values, beliefs, and attitudes toward risks; it shapes how individuals within an organization recognize and respond to risks (Institute of Risk Management [IRM], 2012). Building a strong risk culture requires gradual progress in awareness, staff engagement, and trust in risk processes. As priority was given to fundamental attributes that contribute to the development of risk culture, the "Risk culture" attribute itself was assigned a lower weight (15).

Risk integration: This attribute reflects how well an organization incorporates both existing and emerging risks into overall management systems, decision-making, and strategy. In high-maturity public organizations, risk management is often embedded within strategic frameworks (Bąk & Jedynak, 2022), and integration is seen as a continuous, evolving process (Denewet et al., 2019). As integration typically follows the successful implementation of core risk processes and represents a more advanced stage of maturity, a low weight (15) was assigned to this attribute.

For data collection purposes, a maturity assessment tool (see Appendix B) was developed based on the abovementioned attributes and comprising 27 statements (substep 2.2). The structure of the risk maturity assessment tool is shown in Table 1. Importantly, each attribute's total weight was evenly distributed across its respective statements. For example, as attribute risk structure and governance have been assigned a weight of 25%, and with five associated statements, each contributes 5% to the overall score. This corresponds to a maximum score of 5 per statement when the most favorable response is selected.

Table 1. The structure of the risk maturity assessment tool

No.	*Attributes*	*Assigned weights (%)*	*Number of statements*	*Score per question*
1	Risk structure and governance	25	5	5
2	Risk management process	25	7	3.57
3	Risk reporting	20	6	3.33
4	Risk culture	15	6	2.5
5	Risk integration	15	3	5

Source: Authors' elaboration.

As for the next substep 2.3, five maturity levels were defined (Table 2): initial, developing, implementing, optimized, and advanced (Denewet et al., 2019). While the public sector often finds it difficult to implement risk management due to its complexity and multi-dimensional nature, adopting a five-level maturity framework provides the necessary granularity to guide institutions along a more detailed and structured pathway. By breaking progress into five distinct stages, public institutions can move systematically from fragmented, reactive practices toward proactive and optimized risk management. This granularity ensures that critical attributes — such as governance, culture, process (identification, assessment, treatment), reporting, and integration — are addressed progressively, making the framework both practical for implementation and effective in supporting accountability, transparency, and continuous improvement (Santos-Neto & Costa, 2019).

Furthermore, for each level of maturity and attribute, specific activities were mapped to corresponding capabilities (Deloitte, 2023). As a result, a matrix-based risk maturity model was developed, providing step-by-step guidance for improving activities and capabilities at each level of maturity (see Table A.1 in Appendix A). These two aspects, capabilities and activities, are strongly interconnected: to achieve a specific maturity level, the necessary capabilities must be in place to support the defined activities.

The risk maturity assessment tool was distributed to middle managers across nine government institutions. These managers have been responsible for implementing and supporting the risk management system (substep 3.1).

Table 2. The description of the Risk-MM-Georgia maturity levels

Maturity levels	*Description*
Foundational	The risk management function does not exist; the risk management process is decentralized.
Developing	The risk management function is established, and roles and responsibilities are defined. The elements of risk management exist, but are not fully formalized.
Implementing	The risk management process is formalized but still fragmented. Risk management tools and techniques are implemented; policy and governance structure are formalized. Regular capacity-building programs are conducted.
Optimized	The risk management system is fully functional, centralized, and integrated in all processes. Risk appetite is formalized and embedded in decision making process. Risk management is aligned to internal control system.
Advanced	Risk management is a strategic process, integrated into strategy setting, change management, and budgeting. Risk management is forward looking system that considers potential risks and responds with contingency plans.

Source: Authors' elaboration.

The risk maturity assessment tool produced a maturity score for each organization. The collected data (see Table 3) was validated by a centralized, independent function overseeing risk management system implementation across the public sector. The proposed results (see Table 4) were deemed logical, accurately reflecting the current maturity level and clearly outlining the requirements for future improvement (substep 3.2).

Table 3. Collected data assessment

Attributes	*Weights*	*Org1*	*Org2*	*Org3*	*Org4*	*Org5*	*Org6*	*Org7*	*Org8*	*Org9*
Risk structure and governance	25	13.50	11.00	8.50	18.50	11.00	8.50	17.00	11.00	11.00
Risk culture	15	10.50	5.00	0.00	15.00	5.00	2.50	5.00	5.00	4.37
Risk reporting	20	18.00	5.00	3.00	18.00	5.00	4.00	5.00	5.00	5.00
Risk management process	25	23.57	8.93	8.93	23.57	8.93	8.93	8.93	8.93	8.93
Risk integration	15	8.00	7.00	6.50	15.00	8.50	6.50	6.5.	6.50	6.50
Total	100	73.571	37.26	27.26	90.07	38.76	30.76	42.76	36.76	36.14

Source: Authors' elaboration.

Table 4. Results of the Risk-MM-Georgia application

Maturity level	*Range*	*Number of organizations*
Advanced	≥ 85	1
Optimized	≥ 75	0
Implementing	≥ 55	1
Developing	≥ 35	5
Foundational	≥ 15	2

Source: Authors' elaboration.

3.3. Risk-MM-Georgia external validation

The second phase (Risk-MM-Georgia external validation) comprises the last two steps. Step 4 regards the external validation *per se*, with the selection of a scientific RMMM (substep 4.1). The Brazilian PRisk-MM was selected based on an extensive literature review on the Scopus database, and observing the similar objective of this study. The PRisk-MM is a maturity model developed for the Brazilian public organizations, and follows a scientific rigour found in the literature on maturity models. The PRisk-MM has five levels of maturity, 23 attributes related to 15 dimensions, and its assessment procedure uses triangular fuzzy numbers (de Lorena & Costa, 2023b). For research purposes, it was important to compare the models and demonstrate the key similarities and differences of PRisk-MM and Risk-MM-Georgia (substep 4.2). In this respect, five main characteristics were defined based on Santos-Neto and Costa (2019) and compared as observed in Table 5.

Table 5. Comparing the characteristics of the models

Characteristics	*Risk-MM-Georgia*	*PRisk-MM*
Model approach	Prescriptive	Prescriptive
Design of the management model	Top-down	Bottom-up
Metrics	Quantitative	Quantitative
Procedure for setting the maturity level	Scores	Fuzzy number
Method for validation	Case-study	Case-study

Source: Authors' elaboration.

Based on characteristics, it should be noted that both models are prescriptive, as they provide step-by-step guidance for improvement, enabling the development of a precise roadmap across five levels of maturity. Regarding the design of maturity models, in the case of Risk-MM-Georgia, a top-down approach was used as the levels of maturity were outlined first and then followed by assessment items and breakdown of actions (Mettler, 2011). On the contrary, the bottom-up approach was used for the PRisk-MM because the statistical results found in de Lorena and Costa (2023a) fostered the use of critical attributes that work as vetoes in the calculation of the model and, consequently, define its levels of maturity (de Lorena & Costa, 2023b). Also, both models were quantitative, relying on the collection of data and the assessment of respondents. In particular, the Risk-MM-Georgia was based on a maturity assessment tool using a scoring methodology. On the other hand, the PRisk-MM transforms its assigned scores into triangular fuzzy numbers and calculates a final index which is then "defuzzified" to provide the final level of maturity (de Lorena & Costa, 2023b). Finally, for validation purposes, both models used the case study method: the Risk-MM-Georgia was applied to nine public organizations, while the PRisk-MM was applied to five organizations.

Following substep 4.3, the PRisk-MM was also applied to the same nine Georgian institutions.

4. RESULTS AND DISCUSSION

Overall, the application of the two models (Risk-MM-Georgia and PRisk-MM) produced highly consistent results, as illustrated in the matrix of Figure 2. Seven organizations (77.78%) displayed identical maturity levels across both frameworks. Specifically, Org6 demonstrated the lowest level of maturity, while Org2, Org5, Org7, Org8, and Org9 were all classified within the "developing/initial" category, corresponding to the second level of maturity. In contrast, minor discrepancies emerged for two institutions, though the overall direction of assessment remained aligned. For instance, Org1 was assessed at the "Implementing" stage under Risk-MM-Georgia, but reached the "Managed and participative" level according to PRisk-MM. Similarly, Org3 was categorized as "Foundational" (level one) by Risk-MM-Georgia, yet achieved level two under PRisk-MM.

Figure 2. Matrix comparing the application of the maturity models

PRisk-MM						
	Strategic and integrated					Org4
	Managed and participative			Org1		
	Constant					
	Initial	Org3	Org2, Org5, Org7, Org8, Org9			
	Ad hoc	Org6				
		Foundational	**Developing**	**Implementing**	**Optimized**	**Advanced**
				Risk-MM-Georgia		

Source: Authors' elaboration.

In the final substep 5.2, structured feedback was requested from managers to validate and refine the results obtained through the application of the models. Overall, the feedback was positive, confirming the usefulness and relevance of the maturity assessment framework. However, discussions with managers highlighted differences in the cases of Org1 and Org3, which required further adjustment. For Org3, managers emphasized that the governance structure was weaker than suggested in the initial self-assessment. Specifically, the organization lacked a formalized risk management structure and a designated governing body responsible for overseeing and enabling risk management implementation. Hence, the level of maturity was justified as an *ad hoc* maturity level.

In contrast, Org1 presented the opposite situation. The initial self-assessment had undervalued the organization's risk culture, failing to capture the extent to which risk awareness and participative practices were embedded across managerial levels. Through dialogue with managers, it became evident that risk management was more systematically integrated into organizational processes than initially reported. As a result, Org1's maturity level was adjusted upward to level 4, reflecting a more advanced stage of implementation and a stronger alignment between risk culture and governance practices. These refinements underscore the importance of incorporating managerial feedback into the evaluation process.

The application of two independent models (Risk-MM-Georgia and PRisk-MM), followed by managerial feedback, provided convergent evidence of the models' reliability. The high level of consistency observed across seven institutions strengthens confidence in the robustness of Risk-MM-Georgia. Taken together, these findings indicate that the model has achieved a form of external validation and can be recommended for practical application within the public sector.

Although the study was limited to nine organizations, these institutions represent major actors within the Georgian public sector. Their size, influence, and central role in governance provide a strong basis for assessing risk management maturity, as practices within these organizations often set standards and shape expectations across the wider institutional landscape. Thus, while the sample is numerically small, its strategic relevance enhances the credibility of the findings and supports the validity of the model's application.

5. CONCLUSION

The present study introduces Risk-MM-Georgia, a novel RMMM developed using the DSR methodology. The model was applied to nine major public organizations and externally validated against Brazil's PRisk-MM, a framework successfully implemented within the Brazilian public sector (de Lorena & Costa, 2023b). The analysis yielded consistent findings, with 77.78% of the organizations achieving the same maturity level under both models, thereby supporting the reliability of the proposed framework. Importantly, the results suggested that most of the institutions remain in transitional phases, underscoring the need for sustained capacity-building and long-term institutional commitment to risk management. In particular, only one organization reached the advanced maturity level, while another was positioned at the implementing stage. The majority, five organizations (55.6%), were classified as developing, indicating progress but with considerable room for improvement. Finally, two organizations remained at the initial stage, lacking the adoption of risk management practices.

The model represents a significant advancement in the field of risk management maturity by offering a structured, validated, and practical roadmap for public sector organizations. Its external validation against the Brazilian PRisk-MM (de Lorena & Costa, 2023a, 2023b) strengthens both its theoretical foundation and practical credibility, demonstrating that the model can reliably guide policymakers in addressing long-standing challenges of delayed risk management adoption.

Finally, the Risk-MM-Georgia model addresses a critical imbalance in public sector risk management research: the persistent gap between scientific rigor and practical applicability. Much of the existing literature has emphasized theoretical frameworks, yet public organizations continue to struggle with translating these concepts into effective governance practices. As highlighted by Bracci et al. (2021), even conceptually strong frameworks often fail in practice due to fragmentation among actors, systems, and organizational processes. By offering a structured,

externally validated, and context-sensitive roadmap, the Risk-MM-Georgia model not only provides policymakers with actionable guidance for overcoming implementation challenges but also contributes to academic discourse by demonstrating that RMMM can be both scientifically robust and practically effective.

While the study confirms the model's relevance in Georgia, broader testing across diverse public sector contexts is needed to ensure robustness and generalizability. Future research should extend validation internationally, positioning Risk-MM-Georgia as a versatile and reliable tool for advancing risk management maturity worldwide.

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APPENDIX A

Table A.1. Risk-MM-Georgia-matrix-based maturity model

Attributes	*Capabilities*	*Activities for the maturity levels*				
		Initial	***Developing***	***Implementing***	***Optimized***	***Advanced***
Risk governance and structure	Governance roles and responsibilities	• Create a role of risk manager/officer. • Propose a risk management structure. • Propose a concept on risk management governance.	• Establish a risk management function. • Define and formalize roles and responsibilities for risk management staff and the governance body.	• Establish a governance body-risk committee.	• Establish the roles of risk champions across the institution.	• Formalise and communicate risk management policy.
Risk culture	People	• Develop a plan for training and awareness campaigns.	• Deliver general risk management training across the institution.	• Deliver tailored training for management and specific teams.	• Communicate the results of risk management programs and identify improvement opportunities.	• Continuously improve risk management culture, incorporate lessons learned, and communicate with internal and external stakeholders.
Risk reporting	Technology or communication channels	• Define the working application (for instance, Excel) and establish access.	• Establish an initial reporting system within the organization.	• Establish shared visibility on risk information for all relevant parties.	• Develop risk reporting tools at different levels of governance.	• Acquire and implement risk management software.
Risk management process	Process	• Select and propose a risk management framework.	• Develop risk and control self-assessment templates. • Define risk categories/taxonomy.	• Conduct risk and controls self-assessment sessions across the organization. • Develop an incident management system.	• Align incidents, risks, and internal controls. • Develop a plan for control measures development.	• Formalize risk and control self-assessment results. • Communicate incidents and risk assessment results with relevant parties.
Risk integration	Process			• Integrate risk management in the project management system.	• Integrate the risk management process into all budgeting and operational strategies.	• Integrate the risk management process in strategy setting and change management.

Source: Authors' elaboration.

APPENDIX B

This tool was prepared to assess the level of maturity of the risk management system in the public sector of Georgia.

Part 1: Risk structure and governance (Weight of attribute: 25)

1. Which statement defines the risk management structure in your organization

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	An independent structural unit responsible for risk management is established in the organization, which has a manager.	1	5
B	A risk officer is responsible for risk management in the organization, although there is no independent structure.	0.7	3.5
C	Risk management in the organization is decentralized (under different departments).	0.2	1

*Note: * To calculate the score of each answer, one should divide the total weight of the attribute by the number of questions within that attribute, and then multiply the result by the pre-assigned score to the selected answer, e.g., for the first question under risk structure and governance, if the total attribute weight is 25, there are five questions, and answer (a) has a assigned score -1, the calculated score would be 25/5 × 1 = 5.*

2. Roles and responsibilities in relation to identifying, assessing, and managing risks

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	The roles and responsibilities regarding the identification, assessment, and management of risks are not defined.	0	0
B	Heads of the departments are responsible for identifying, assessing, and managing risks.	0.5	2.5
C	The formal procedure is developed in the organization, clearly defining the roles and responsibilities for the identification, assessment, and management of risks.	0.5	2.5

3. Accountability of the risk management process

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	Top management is responsible for overseeing the risk management process.	1	5
B	The audit committee is the responsible body for overseeeing risk management process.	0.5	2.5
C	Any other committee is responsible for overseeing the risk management process.	0.2	1

4. Risk management team expertise

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	The risk management team has basic knowledge and needs improvement.	0	0
B	A competent risk management team is in place.	0.5	2.5

5. Three-line defense model (circle the correct answer)

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	Currently, three-line defense models are not implemented in the organization.	0	0
B	In the organization, the third line and the second line are separated.	0.5	2.5
C	The first, second, and third lines of defense are separated in the organization, but the cooperation between them is not effective.	0.7	3.5
D	In the organization, three line defence model is implemented. Collaboration is efficient as all risk findings, results, or plans are shared.	1	5

Part 2: Risk culture (Weight of attribute: 15)

1. Role and involvement of senior management

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	The risk management policy is discussed, reviewed, and approved by the senior management.	0.25	0.625
B	The acceptable level of risks is discussed and approved by top management.	0.25	0.625
C	The implementation of the risk management framework is overseen by senior management.	0.25	0.625
D	The results achieved by the risk management policy are reviewed and assessed by senior management.	0.25	0.625

2. The acceptable level of risks

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	An acceptable level of risk is not defined.	0	0
B	An acceptable level of risk is defined and formalized as a Risk Appetite Statement.	1	2.5
C	The verbal statement about an acceptable level of risk is made by senior management.	0.4	1
D	An acceptable level of risk is defined but not formalized.	0.6	1.5

3. The degree to which risk management is embedded in the organization

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	Risk management is incorporated into employees' daily work plans.	0.25	0.625
B	Risk management is incorporated into the audit plan.	0.25	0.625
C	Risk management is incorporated in budget planning.	0.25	0.625
D	Risk management is incorporated in decision-making at strategic and operational levels.	0.25	0.625

4. Risk taxonomy/Classification

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	There is no risk classification/taxonomy established in the organization.	0	0
B	The classification/taxonomy has been established in the organization, though not formalized.	0.5	1.25
C	The risk classification/taxonomy is established and formalized in the organization.	1	2.5

5. The results of the risk management process (circle one or more answers

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	Risk management results are shared only at the concept level.	0.25	0.625
B	The results of risk management are shared in relation to the effectiveness and efficiency of the organization.	0.25	0.625
C	The results of risk management are shared in relation to the reduction of losses of the organization.	0.25	0.625
D	The results of risk management are shared in relation to the organization's reputation only.	0.25	0.625

6. Attitude of the organization's personnel regarding the risk management process

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	The organization has an approved risk management framework/regulation that is trusted by all staff.	0.5	1.25
B	Regular risk management training/events are conducted and well-received by all staff of the organization.	0.5	1.25

Part 3: Risk reporting (Weight of attribute: 20)

1. Risk reporting includes

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	Information about the results of the risk assessment.	0.3	1
B	Information about newly emerging risks.	0.3	1
C	About operational losses/ incidents.	0.2	0.666667
D	Scenario analysis and stress testing results.	0.2	0.666667

2. Reporting about key risks

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	A risk report is prepared in the organization about the key risks (at regular basis).	0.5	1.666666667
B	The risk information is clear to all recipients of the report.	0.5	1.666666667
C	The organization does not prepare a report on the key risks.	0	0

3. Responsibility of departments to prepare risk reporting

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	Departments are not responsible for preparing risk information/reports.	0	0
B	Departments prepare complete/clear information/reporting on risks.	1	3.333333

4. Recipients of risk reporting/reports

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	The risk report is submitted to senior management.	0.4	1.333333
B	The risk report is submitted to middle management.	0.2	0.666667
C	The risk report is submitted to the internal audit.	0.2	0.666667
D	The risk report is submitted to only the involved parties.	0.2	0.666667

5. Monitoring of risk mitigation control mechanisms

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	A report on risk mitigation control mechanisms and an action plan is prepared in the organization.	1	3.333333
B	The report on risk mitigation control mechanisms and action plans has not prepared in the organization.	0	0

6. Risk matrix/risk map (circle the correct answer)

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute**
A	No risk matrix/map has been developed in the organization.	0	0
B	The risk matrix/map is developed in the organization, which illustrates the probability/impact dimensions for each risk.	0.7	2.333333
C	The risk matrix/map is developed in the organization, which illustrates probability/impact dimensions for each risk and includes additional information about root causes and treatment plans.	1	3.333333

Part 4: Risk management process (Weight of attribute: 25)

1. Risk treatment (mitigation, acceptance, transfer/avoidance) is the responsibility of

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	Not defined	0	0
B	Risk owner	0.7	2.5
C	Risk management unit	0.3	1.071429

2. Risks are assessed by

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	Quantitative method	0.4	1.428571
B	Qualitative method	0.6	2.142857

3. Risk management is supported by organizational documentation:

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	Risk management procedure	0.4	1.428571
B	Risk management policy	0.6	2.142857
C	Risk management procedure and policy	1	3.571429

4. Categories of risks

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	The organization manages both financial and non-financial risks	1	3.571429
B	The organization manages financial risks	0.5	1.785714
C	The organization manages non-financial risks	0.5	1.785714

5. Cost-benefit principle

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	When implementing risk response mechanisms, the organization considers cost-benefit analysis.	1	3.571429
B	When implementing risk response mechanisms, the organization does not consider cost-benefit analysis.	0	0

6. Contingency plans

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	The organization has no contingency plan in place.	0	0
B	The contingency plan is developed in the organization.	0.5	1.785714
C	The organization has a comprehensive contingency plan-tested periodically.	1	3.571429

7. When assessing the key risks, the organization considers

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	The level of inherent risks	0.3	1.071429
B	Level of residual risks	0.7	2.5
C	Inherent and residual risk level	1	3.571429

Part 5: Risk integration (Weight of attribute: 15)

1. The organization uses risk information:

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	When making operational-level decisions	0.3	1.5
B	When making tactical decisions	0.3	1.5
C	When making strategic decisions	0.4	2

2. Aligning strategy development with risk management results

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	The organization integrates risk management outcomes into strategic planning.	1	5
B	The organization does not align strategy development to risk management outcomes.	0	0

3. Project management (circle the correct answer)

Part	*Question/Statement for assessment*	*Assigned score*	*Calculated score considering the weight of the attribute*
A	Risk management process is fully integrated into project management (initiation, testing, implementation, completion, monitoring.	1	5
B	Risk management is not integrated with project management (initiation, testing, implementation, completion, monitoring).	0	0