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Risk Maturity for Sustainability Assitance: A Longitudinal Study in Construction Company

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A B S T R A C T

A risk maturity assessment is a useful tool for construction firms to evaluate both their strengths and weaknesses in risk management procedures and take the required steps to improve them. The assessment was conducted in a building construction project, to determine the level of risk maturity for two consecutive years in May, 20023 and 2024. The activities were carried out in four projects, covering the most important activities of risk management and analyzing the improvement. The RMM matrix used in this article is adapted from the Logic Manager, which consists of seven sections, each focusing on a different core ERM attribute. These seven areas are further broken down into 25 success components and 71 competency drivers that show exactly where an organization's ERM program stands on five maturity levels, ranging from Ad Hoc to Leadership. The model helps construction companies understand their current risk management performance. We tested the model by measuring the risk maturity level of an industrial partner working on civil infrastructure projects in Indonesia. The result of the Risk Maturity Level (RML) assessment is 3.6 (Managed), an increase of 0.3 points from the result in 2023 (3.3), reflected in several achievements in criteria 1, 2, 3, 4, 6 and 7, including a Risk committee formed to plan based on external and internal analysis of the organization. This study demonstrates that employing risk maturity management techniques may promote corporate development and efficiency, resulting in resilience and sustainability.

Keywords: *Risk Maturity Model, Enterprise Risk Management, Construction Project.*

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INTRODUCTION

Construction project hazards can arise at any point throughout the project's lifespan, including the design, execution, operation, renovation, and destruction phases (Chen, Meng, Zhang, & Xu, 2024; Špak, Mandičák, Spišáková, & Verčimák, 2023). In general, risk may be described as an uncertain future occurrence that may result in a bad outcome or expose the individual to danger. In other terms, risk is defined as the potential

for loss, or possibility of loss, multiplied by the frequency of occurrence (Vivek & Rao, 2022). According to ISO standards, risk is defined as the sum of an event's consequences and the chance of its occurrence (Suryani, Widiasanti, Nurjaman, & Ramdani, 2019). A key factor in the effective completion of building projects is risk management. Planning risk management, identifying risks, conducting qualitative and quantitative risk analyses, planning risk responses, putting those plans into action, monitoring risks, and identifying risks are all considered risk management processes (Roghabadi & Moselhi, 2020; Zhou, Peng, Gan, Wang, & Liu, 2024).

Risk management is critical not only for addressing serious hazards but also for ensuring the efficiency of building projects (Špak et al., 2023). Some writers define efficiency as the capacity to attain the lowest expenses while being profitable (Galjanić, Marović, & Jajac, 2022; Johansson, Sudzina, & Pucihar, 2014). Cost reduction is a critical component of improving efficiency in building projects. Risk management in the building of concrete structures must be consistent with the overall efficiency of the project (Galjanić et al., 2022). As a result, risk management can have an impact on performance metrics and, ultimately, efficiency. Since a risk cannot be effectively managed if it is not well planned, the first step in a risk management program is the most crucial (Institute, 2009; Zhou et al., 2024).

The Risk Maturity Model (RMM) is a best-practice framework for enterprise risk management. Developed as an umbrella framework of the international, cross-industry standards, an RMM risk management assessment allows organizations to measure how well their risk management efforts align with these best practices (Minsky, 2017). As a result, organizations are provided a maturity score and actionable guidelines to improve their programs and gain the many benefits associated with maturity. The RMM matrix used in this article is adapted from the Logic Manager, which consists of seven sections, each focusing on a different core ERM attribute. These seven areas are further broken down into 25 success components and 71 competency drivers that show exactly where an organization's ERM program stands on five maturity levels, ranging from Ad Hoc to Leadership (Minsky, 2017).

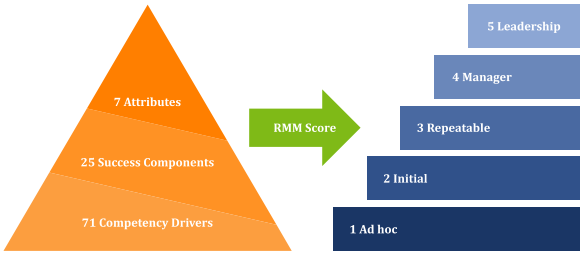

Figure 1. Risk Maturity Model

This paper presents an empirical longitudinal study in 2023 and 2024, evaluating RMM on construction projects using the framework of Logic Manager in company STU. The assessment covers the most important activities of risk management and analyzes the improvement. Unlike other assessments, the team also provides training to supervisors and managers on risk management and processes, especially on prevention, control, and continuous improvement. The places for the training and assessment were two construction of apartment projects (Jakarta, 2023), a shoe factory, and a traditional market multi-story building (Pekalongan, Central Java, 2024).

METHODS

The activities were carried out from, field and office assessment, training scoring RMM, formulating the action plan of the reported findings (Fig. 2).

Assessment in the field and office is carried out by interviewing and examining documents on risk identification, risk control activities that have been carried out, evaluating the effectiveness

of mitigation, checking documentation on improvements that have been made, or documenting incidents. The team consists of three assessors since the preparation phase involves a review of risk management documents to see the framework, implementation process, and implementation as a review of the implementation of risk management.

Criteria assessed are 1) Adoption of an ERM-based approach, which measures the organization's risk culture and how much support there is from the top for managing risks 2) Uncovering Risk, which measures the quality and coverage of your risk assessments. It looks at how risks are collected, and assessed, and if there are any patterns across the whole company 3) ERM process management, which measures how well the organization uses an ERM methodology and how well the risk management program identifies, assesses, evaluates, mitigates, and monitors risks. 4) Risk appetite management, which looks at how aware people are of the risks and rewards involved, who is responsible for managing risks, and whether the organization is effective in managing risks 5) Root cause discipline, which looks at how well an organization identifies the real cause of risk, rather than just the symptoms, to strengthen response and mitigation efforts 6) Resiliency and sustainability, attribute evaluates the extent to which business continuity, operational planning, and other sustainability activities are approached with a risk-based methodology 7) Performance Management, shows how well an organization carries out its plans, and measures its goals. Each criterion consists of sub-criteria and items (Table 1).

The criteria were prepared to evaluate the implementation of risk management in the project. Data was collected using a questionnaire containing statements about risk management. The scale used is the Likert Scale of 1 to 5, with the following order: 1 (Very Poor), 2 (Poor), 3 (Moderate), 4 (Good) 5 (Very Good). The sampling technique used is purposive sampling, we asked leaders, managers, and supervisors. In-depth interviews were conducted on the survey results of the implementing parties in the organization to discuss the findings of the survey results and the actual situation.

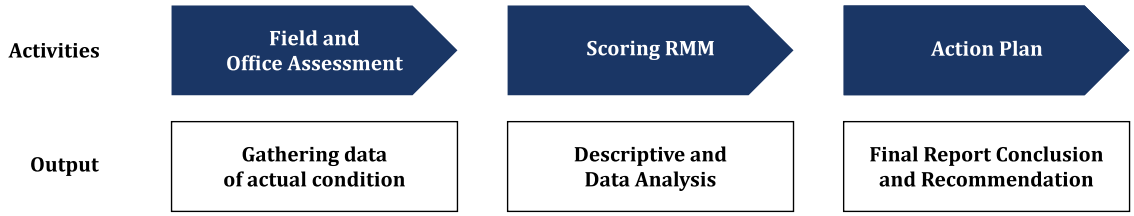

Figure 2. Methods of RMM assessment

Table 1. Criteria and Sub-Criteria

Criteria	Sub-criteria				
1) Adoption of ERM-based approach.	1.1 Business Process Definition & Risk Ownership	1.2 Process Owner Participation	1.3 Risk Management Vision	1.4 Executive Support on ERM	
2) Uncovering Risk	2.1 Risk ownership by business area	2.2 Formalized Risk Indicators and Measures	2.3 Follow-up Reporting	2.4 Adverse Events as Opportunities	
3) ERM process management	3.1 ERM Program Oversight	3.2 ERM Process Steps	3.3 Risk Culture, Accountability and Communication	3.4 Risk Management Reporting	3.5 Repeatability and Scalability

4)	Risk Appetite Management	4.1 Risk Portfolio View	4.2 Risk-Reward Tradeoffs		
5)	Root cause discipline	5.1 Root Cause Consideration	5.2 Risk and Opportunity Information Collection	5.3 Information Classification	5.4 Dependencies and Consequences
6)	Resiliency and Sustainability	6.1 Risk-Based Planning	6.2 Understanding Consequences	6.3 Resiliency and Operational Planning	
7)	Performance Management.	7.1 Communicating Goals	7.2 ERM Information and Planning	7.3 ERM Process Goals and Activities	

RESULT AND DISCUSSION

Stage 1. Field and office assessment

Criteria 1 Adoption of ERM based approach

Implementation in the field generally meets the requirements, for example, there is already an organizational structure, job description and SOP for each function in the project and at the head office. Risk identification lists are also in place. The risks faced by the organization are officially documented very well. Risk assessments are carried out in all parts and processes of the business, the relationship between hazards, risks, controls and monitoring activities is well understood. Business areas have long-term action plans to meet risk management objectives. The organization promotes accountability by having frontliners identify, assess, and periodically review risks.

Figure 3a. Assessment Plan and
3b. Field assessment in project office

Qualitative risk assessments are also conducted for every major project, new product, and business model change. There is an updated risk prioritization document that the Risk Committee presents to the board and has been approved for implementation. Risk management is part of individual competencies at performance reviews at all levels of the organization.

Criteria 2 Uncovering Risk

The criteria measure the quality and coverage of company risk assessments. Decentralized risk identification at the owner closest to the risk and propose appropriate mitigation. risk assessment at Shoes factory, and Pasar Ceria Sari both in Pekalongan is carried out, analyzed, and reviewed by the process owner using standard evaluation criteria is very good. The organization considers the positives and negatives of the risks identified in its ERM reporting. Mitigation and control activities are tested regularly to ensure they are effective at reducing risk. The evaluation in this section is to ensure that the organization in addition to recognizing negative risks also recognizes its positive risks.

Criteria 3 ERM Process Management

The indicator on ERM Process Management is the number of risk assessments that have been completed in the last 3 months. All divisions, departments, or business processes must have completed a risk assessment in the past year. Communication plan and risk owner. Each business area has a designated individual

responsible for identifying risks, maintaining regulatory compliance, and meeting performance objectives. Accountability for risk management is delegated across sections and projects. Managers actively participate in the oversight of the ERM program.

Figure 4a. Field assessment in apartments project office **4b.** in Shoes Manufacturing

Meetings have been held attended by the Director of Operations and President Director with the material discussed is bad debt, cashflow, SOP tender process and project realization plan. Communication is carried out at the operation level in the morning (at the Hospital project, Shoes manufacturing and Ceria Sari Market), with HSE boards visualized at the Hospital project only, at the shoes manufacturing project and the Ceria Sari Pekalongan market project, the number display is not updated and looks empty. Facility inspections are conducted (Fig. 5)

Reports measuring the progress of ERM programs and activities are provided to stakeholders on a regular basis. risk-related documents should be published and updated quarterly. Reports should include key risk percentages, monitoring, key resources associated with one or more sub-processes and risk ownership. Reporting should include the ability to focus on specific data of interest to executives e.g., priorities and budgets. The ERM Committee should meet formally at least 4 times a year (quarterly) and risk Committee members should be committed to attend. Performance management (corporate objectives) should be formally linked to all key risks. On-site assessment by way of checking progress reports of ERM programs and activities, have been

Figure 5. Morning meeting on-site project

provided to stakeholders at least 4 times a year.

Criteria 4 Risk Appetite Management

The evaluation of this section is carried out by checking all major risks have risk tolerance, and the level of risk tolerance is analyzed. Risk control is determined by the level of mitigated risk. risks that the organization can bear. It examined he ranking and categorization of enterprise risks, and the type of analysis that sets the boundaries within which management can operate. Managers' performance goal indicators are formally linked to risks to business processes, and a risk assessment process is proposed alongside the budgeting process. On-site assessments check understanding of risk-reward trade-offs and risk mitigation activities, and resources are allocated.

Criteria 5 Root cause discipline

The root cause approach has not been fully carried out, the root cause has not been identified in the risk register, meaning that analyzing the root cause has not become part of preventive action so that the incident does not recur and becomes a lesson learned in future projects. Mechanisms for collecting data on processes and associated risks on a regular basis have been identified but not for all processes in the project. Training should be conducted to improve the understanding of the root causes of problems, especially for project supervisors and managers. The risk register needs to be evaluated weekly or monthly to determine whether the mitigation carried out has been categorized as the root cause of the problem and has been effectively carried out.

Criteria 6 Resiliency and Sustainability

Business resilience has been analyzed using far-sighted scenario analysis and documented. The organization determines priorities qualitatively and quantitatively, with consistent and objective criteria on an annual basis and evaluated monthly. An area for improvement is the use of SWOT analysis for consideration in annual planning. The components of priority, budget, opportunity, risk tolerance and mitigation effectiveness, and status need to be part of regular reports. Risk planning should be emphasized especially if it is related to local government regulations on the project. The risk assessment conducted will drive business continuity analysis and planning, and upstream and downstream dependencies on key resources (people, vendors, IT applications) are understood across business areas, and considered during the ERM process.

Criteria 7 Performance Management

Evaluations are conducted to ensure resources can be allocated to activities with the highest impact. All activities that contribute significantly to strategic objectives should be documented and reported to track progress towards achieving the company's strategic objectives. In this section, the project objectives and company objectives are communicated very well. There are KPIs in each section that are linked to company goals, evidence that strategic objectives have been communicated very well. Employees already understand the risks associated with work on the project. Communication from the project to the head office has also been done specially to reduce the risk of project delays. Before risks occur such as project delays due to late payments to suppliers, many efforts have been made to prevent it such as e-mail reminders, and daily communication from the project to the head office and vice versa.

Stage 2. Scoring RMM

The assessment of the risk maturity level in 2023 and 2024 is shown in the table below. Between 2023 and 2024, monitoring and mentoring will be conducted to improve the RMM score.

As seen in the chart above, the maturity level score has increased from 3.3 in 2023 to 3.6 in 2024. The risk maturity level score ranges from Leadership (4 to 5), Managed (3 to 4), Repeatable (2 to 3), Initial (1 to 2), and Ad Hoc (0 to 1). The

most significant improvement is in criterion ERM process management and Performance management (Figure 6).

Fig. 2 shows that performance management improved from 3.4 to 4. This is because ERM process goals and activities were managed

Table 2. Assessment Result

	Score	
	2023	**2024**
1) Adoption of ERM-based approach.		
1.1 Business Process Definition & Risk Ownership	3	3
1.2 Process Owner Participation	3.5	3,5
1.3 Risk Management Vision	4	4
1.4 Executive Support on ERM	3	3,25
2) Uncovering Risk		
2.1 Risk ownership by business area	3	4
2.2 Formalized Risk Indicators and Measures	3.5	3.5
2.3 Follow-up Reporting	3	3.5
2.4 Adverse Events as Opportunities	3	3
3) ERM process management		
3.1 ERM Program Oversight	3.5	4.3
3.2. ERM Process Steps	3	4
3.3. Risk Culture, Accountability and Communication	3	3.5
3.4. Risk Management Reporting	3	4
3.5. Repeatability and Scalability	3.5	4
4) Risk Appetite Management		
4.1. Risk Portfolio View	3.2	3.2
4.2 Risk-Reward Tradeoffs	3.2	3.5
5) Root cause discipline		
5.1 Root Cause Consideration	3	3
5.2. Risk and Opportunity Information Collection	3.5	3.5
5.3 Information Classification	3.5	3.75
5.4 Dependencies and Consequences	3.5	3.3
6) Resiliency and Sustainability		
6.1 Risk-Based Planning	3.5	3.5
6.2 Understanding Consequences	3.5	3.5
6.3 Resiliency and Operational Planning	3.5	4
7) Performance Management.		
7.1. Communicating Goals	3.5	4
7.2 ERM Information and Planning	3.3	4
7.3 ERM Process Goals and Activities	3.3	4
Avg	3.3	3.6

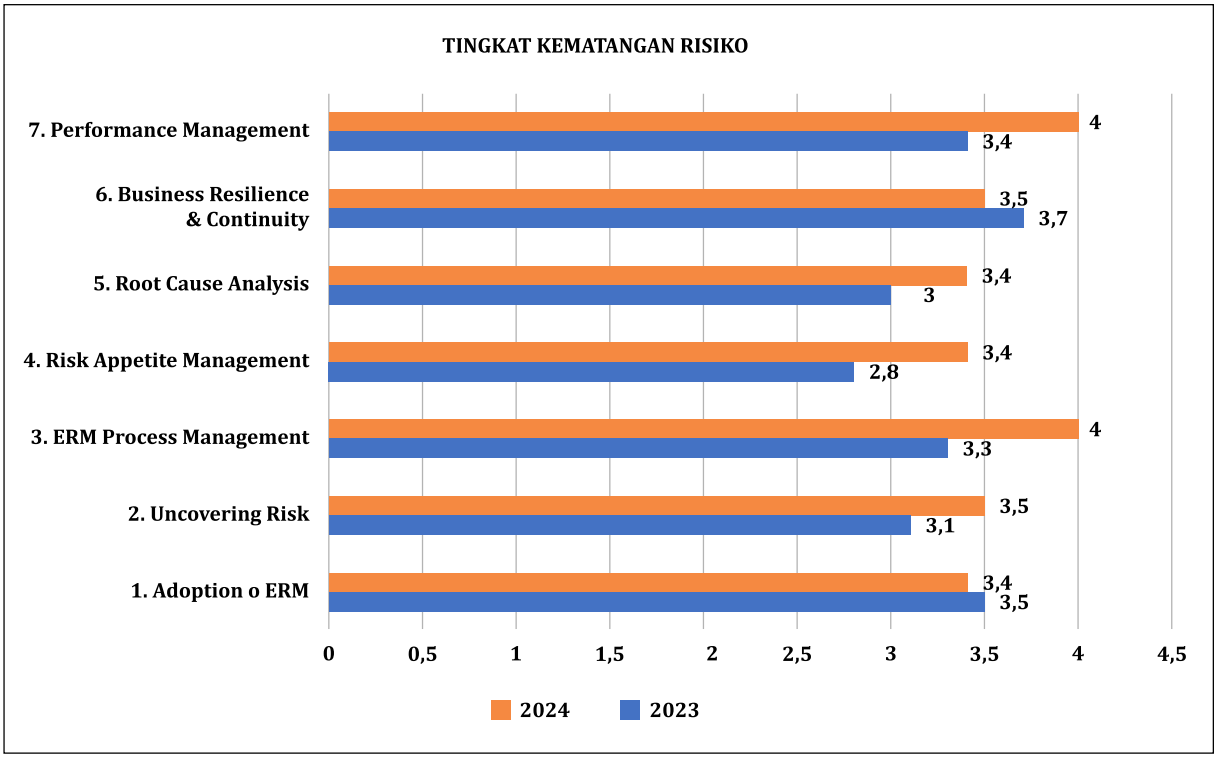

Figure 6. Risk Maturity Level 2023 vs 2024

according to requirements, when evaluating new opportunities, the organization measures and reports project risk management effectiveness to the board of directors. Business areas consider the impact on other areas of the organization when determining their objectives (e.g., financial, compliance, and other strategic implications). This can be achieved because of executive support and the establishment of a risk committee.

Stage 3. Formulate Action Plan

Based on the Risk Management framework, a road map was created, to prepare the company for ERM with a higher Risk Maturity Level. Design a framework for managing risks, incorporating the external and internal context derived from the SWOT. Ensure competent resources, and consider professional development and training needs in risk management. Add standardized evaluation criteria of priority scale and budget allocation, to rank improvements Root cause analysis (RCA) needs to be implemented. Review the risk register by adding a Root Cause Analysis column. Create a job description for each person with additional objectives and functions related to risk management.

CONCLUSION AND RECOMMENDATION

Risk management may be integrated into organizational objectives, governance, leadership and commitment, strategy, goals, and operations, rather than standing alone. To establish the process owner, it is required to have a process and sub-process mapping, as well as their relationship to other sections. This study demonstrates that employing risk maturity management techniques may promote corporate development and efficiency, resulting in resilience and sustainability. Prioritizing activities that impact a construction project's technical aspects and efficiency is a significant step forward for project management. According to research, the most significant dangers were encountered during the formwork preparation process. The concrete group faced the highest dangers with a high likelihood, particularly during transportation and preparation. Contractors should have better control over these procedures.

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