

Mapping the Relationship Between Enterprise Risk and Project Risks at Construction Company

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Abstract

The construction industry is described as a project-based industry that inherently carries a wide range of risks. These risks are not only limited to projects but also extend to organizational or enterprise-level risks involving the company's directors, departments, and divisions. This study aims to examine the relationship between construction project risks and enterprise risks within construction companies. Specifically, it investigates how risks originating at the project level may influence or correlate with broader organizational risks, and vice versa. The research method involves analyzing secondary data, including project risk management reports and enterprise risk management documentation from construction firms. Through qualitative analysis, this study found a significant reciprocal relationship between project-level risks and company-level risks, which include the financial nature of the project risks, strategic risks, operational risks, and public & legal risks. These findings suggest that effective integration of project risk management (PRM) and enterprise risk management (ERM) is essential for enhancing overall risk resilience and organizational performance in the construction sector.

Keywords: *enterprise risk management, project risk management, construction company, risk management*

1. Introduction

Unique goods, on-site manufacture, and ad hoc project timeframes with high cycle times are all associated with construction projects (Tserng et al., 2009). According to Liu et al. (2013), large and unmanageable risks are the primary drivers of project failure.

According to Sabiel, I. A. (2020), risk management is defined as the process of detecting, assessing, and prioritizing risks, followed by the implementation of measures to reduce, monitor, and control the chance and impact of unfortunate events. It is critical for attaining project goals, especially in complex situations like construction, where diverse risks might effect multiple stakeholders (Bahamid, R. A., Doh, S. I., Khoiry, M. A., Kassem, M. A., & Al-Sharafi, M. A., 2022).

Risks in the company are managed with the ERM

concept. ERM (Enterprise Risk Management) is the management of risk in an organization to ensure the company achieves its goals and creates added value for the organization. While risks in construction projects are managed with the PRM concept. PRM (Project Risk Management) is reviewed at the project level so that the project can achieve the goals that have been set: the right quality, on time, and on cost.

ERM is emphasizes a portfolio view of risks, integrating various types of risks such as operational, financial, strategic, and compliance risks (Urmanov, M., 2025). The Committee of Sponsoring Organizations of the Treadway Commission (COSO) emphasizes that ERM should embrace all types of risk, moving away from previous walled methods to a more integrated view (Maia, 2020). By adopting ERM, organizations can improve their competitive advantage, attract investor interest, and enhance overall firm value (Hong, N. T. H., 2023).

While PRM is the process aimed at increasing the probability and impact of positive events while

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decreasing the probability and impacts of negative events in a project. Effective PRM is linked to improved project outcomes, such as increased profits, reduced delays, and higher customer satisfaction (Perrenoud, A., Short, E., & Cowan, D., 2023). Project Risk Management (PRM) is a critical aspect of project management that focuses on identifying, assessing, and mitigating risks that could impact the success of a project. It encompasses a systematic approach to managing uncertainties throughout the project lifecycle, from initiation to closure. Understanding the definition and objectives of PRM is essential for improving project outcomes, particularly in complex environments like construction.

In projects and businesses, the ISO 31000:2018 standard is typically referred to as the risk management process. According to this guideline, setting the scene, detecting risk, analyzing risk, assessing risk, and addressing risk are the steps in the risk management process. Additionally, the procedure is observed and evaluated.

Some studies (Liu et al., 2013; Zhao & Singhaputtangkul, 2016) look at the relationship between PRM and ERM and the risks associated with building projects and construction companies. According to Liu et al. (2013), PRM can be seen as a crucial part of ERM since project risks are a part of construction businesses' total risk profile and ERM must be applied at all organizational levels, including the project level. All firms can increase the efficacy of ERM by using efficient PRM procedures that precisely control project risks. Additionally, because ERM adoption entails improved communication of project risk information, it helps management make better decisions and handle project risks more effectively and efficiently. This gives construction organizations new opportunities to increase PRM. The relationship between project risk and enterprise risk in construction organizations will be further examined in this study. The relationship between these risks will be examined when the risks in projects and businesses have been identified.

2. Materials and Methods

2.1 Required Data

The data used in this study consists of primary data and secondary data. To validate the research findings, primary data was gathered through interview techniques. On the other hand, enterprise risk management and project risk management data from construction business A are examples of secondary data. Enterprise risk at construction company A in 2023 and project risk in the same year, which was allocated to building projects, dam projects, and road and bridge infrastructure projects, were the samples examined in this study.

2.2 Research Methodology

The method used in this study is related to the identification of enterprise and project risks through the following steps: Reviewing secondary data in the form of project & enterprise risks, Determining risk classification and categories, Carrying out risk identification and categories, Compiling a hierarchy of project & enterprise risk identification. Furthermore, the method used in mapping the relationship between enterprise risk and project risk is by compiling a hierarchy of relationships between risks for project risk and enterprise risk. The results of this data analysis were validated by decision-makers on risk management in construction company A.

3. Result and Discussion

3.1 PRM and ERM Relationship Study

Liu et al. (2013) conducted a study on the relationship between ERM and PRM, and found that ERM can positively affect PRM in the construction industry and business, in implementing PRM. According to Zhao (2013), ERM is referred to as top-down risk management because it requires input from top management and is related to business strategy (Olson and Wu, 2008). Both PRM and ERM are tools to reduce the risks faced by businesses, although at different levels (Liu et al., 2013). Both have the same management process, where risk identification, analysis, and response are important steps. However, ERM and PRM have different goals because of their different levels of focus. ERM handles risk at the enterprise level, the integration of ERM into corporate governance has become essential, as firms recognize the importance of proactively managing risks that could impact long-term performance and reputation (Urmanov, M., 2025), while PRM handles risk at the project level and focuses on project objectives, such as time, cost, quality, and safety objectives. In detail, PRM and ERM are categorized in Table 1.

Based on an analysis of Table 1's risk characteristics, it seems that enterprise risk and project risk are related but come from separate sources. PRM is a component of ERM, according to Liu et al. (2013). According to Zhao & Singhaputtangkul (2016), PRM is part of the whole ERM risk profile. Figure 1 provides more details on the link between PRM and ERM.

3.2 Identifying Risks in Enterprise and Risks in Project at Construction Companies

The concepts of ERM and PRM are tools used in construction companies to manage risks at different levels with different objectives (Liu et al., 2011). ERM reduces risk at the enterprise level and focuses on the company's strategic, operational, reporting, and compliance objectives (COSO, 2004), while PRM

reduces risk at the project level and focuses on project objectives (Liu et al., 2011). In practice, risks identified at the company level and at the project level overlap in some ways. Risks in construction projects can rise to the company level, because they cannot be resolved at the project level. Some company risks also appear at the project level.

3.2.1 Enterprise Risk Identification in Construction Companies

The process approach in ERM emphasizes managing activities as an integrated process, which is critical for construction companies due to the complex and sequential nature of their operations. This approach enhances critical success factors such as risk

identification, analysis, response, and integration across units, leading to reduced financial losses and improved business performance (Kheirandish & Banihashemi, 2016).

The case study on enterprise risk study was conducted in Company A. In reviewing this risk identification, it was based on the Key Performance Indicator targets in the company. In detail, the risk identification is as in Figure 2.

Risk classification and risk criteria that had been evaluated methodically and consistently were used to identify the company's risks in Construction Company A. The company established certain risk criteria and categories, and all risks across all business divisions are based on them. The following risk criteria are generally

Tabel 1. Comparison of PRM and ERM by category

Risk Characteristics	PRM	ERM	Reference
Scope	Project	Enterprise	(Shibani et al., 2022), (Tahir, 2011)
Objective	Completing the project successfully, this goal can be part of the ERM operations goal.	Aligned with four corporate objectives: strategic, operational, reporting, and compliance.	(Liu et al., 2013)
Framework	Only events that can affect a particular project are considered, such as cost, time, quality, safety, and environmental risks. And the framework in PRM can change from project to project.	Taking into account internal and external events that affect the achievement of the entity's objectives. In ERM the framework is relatively stable over a period of time.	(Liu et al., 2013)
Process	Risk planning, risk identification, risk assessment (qualitative and quantitative), risk analysis, risk response, risk monitoring, and recording of risk management processes.	Internal environmental assessment, objective determination, event identification, risk assessment, risk response, control activities, information and communication, monitoring.	(Serpella et al., 2014), (Sirait & Susanty, 2016)
Risk Factors	War risk, pandemic risk, construction material price inflation, late payment. In addition, risks also focus on construction arrangements related to site conditions, owner-contractor agreements, owner conditions, subcontractor conditions, project implementation, project preparation and planning, contract and administrative procedures, and external risks.	<ul style="list-style-type: none"> - Interest rate fluctuations, pandemic risk, corruption, accounting risk. - Risks also focus on strategic risk, market risk, operational risk, financial risk, and compliance risk. 	(T. Yuan et al., 2020), (Liu et al., 2013)
Method	Changes dynamically from project to project	Consistent over a certain period of time, related to the company's risk policy	(Liu et al., 2013)
Risk Manager	Project Manager	Company Manager	(Liu et al., 2013)

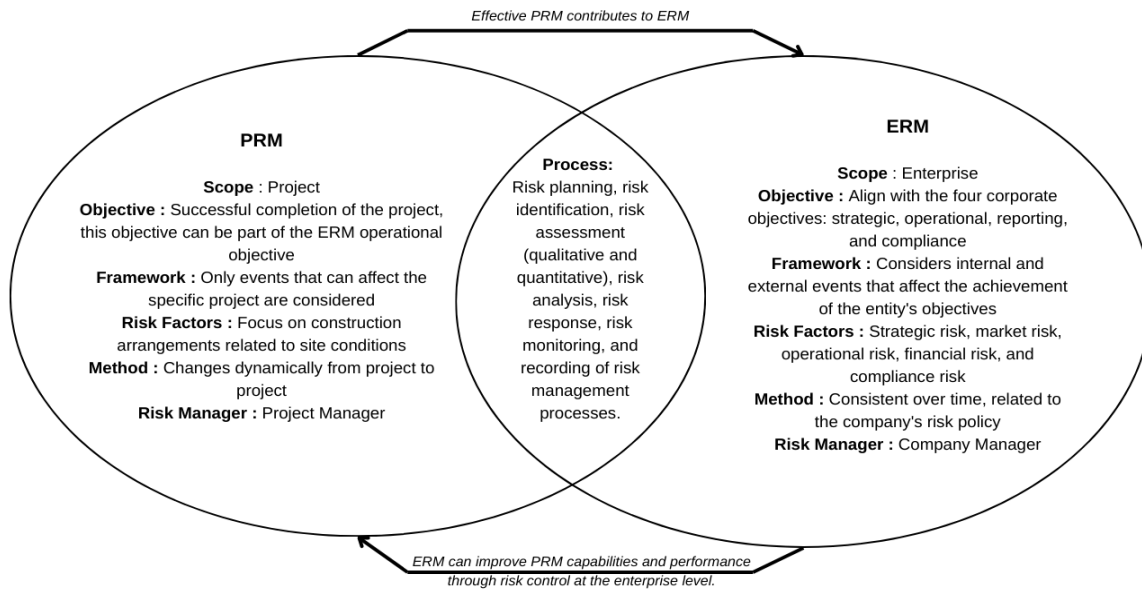


Figure 1. Relationship Between PRM and ERM

used to evaluate risk identification in Construction Company A: financial nature of the project, strategic, operational, and public & legal. Additionally, these risk criteria are divided into risk categories, which are used as a guide when detecting risks. These Risk Categories are as follows:

1. Financial Nature of The Project: Financial (Cash flow), and Revenue.
2. Strategic: Strategic & Planning.
3. Operational: SHE, Operational, Marketing, Production/Performance, and Human Resource.
4. Public & Legal: Law & Compliance, Social, and Third Party.

3.2.2 Project Risk Identification in Construction Companies

PRM is a critical component of overall project management, aimed at identifying, assessing, and mitigating risks that could impact project success. Integrating risk management with other project processes can improve decision-making and resource allocation, ultimately leading to better project outcomes.

A case study on Project Risk study was conducted in Company A. In reviewing risk identification in the project, it was based on the Key Performance Indicator targets in the company. For the risk category, the similarity between the company level and the project

level can be analyzed. In detail, the risk identification can be seen in Figure 3, Figure 4, and Figure 5.

Risk identification in construction projects is distinguished by the type of dam project, building construction, and road construction. The risk identification characteristics of these initiatives differ. Risk identification in building construction projects appears to be more complex than risks in other projects. This explains that with a large scope of work on building construction projects, the risk identification becomes greater.

3.3 Mapping The Relationship Between Construction Project Risk and Construction Enterprise Risk

Based on previous studies (Liu et al., 2013; Zhao & Singhaputtangkul, 2016), the investigation into the connection between PRM and ERM highlights several points of interaction between project-specific risks and broader organizational risks in construction firms:

1. **Financial Risk:** Construction projects have significant financial risks, such as rising building material costs, price fluctuations, labor costs, and changes in government policies. These financial risks can have a direct impact on the construction company's finances, liquidity, and the company's ability to manage the project effectively.

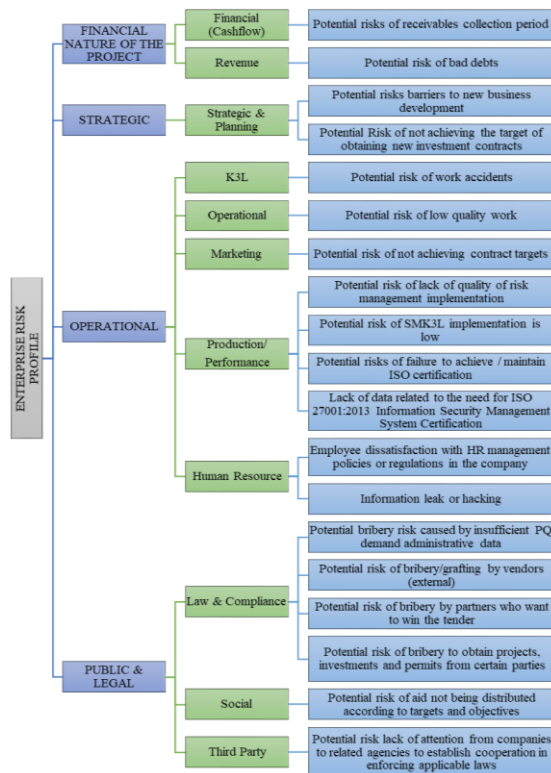


Figure 2. Identification of Enterprise Risk at Company A.

2. Operational Risk: Construction projects involve various operational aspects, such as material procurement, labor management, and logistics. Failure to manage operational aspects can lead to project delays, increased costs, and failure to meet contract requirements. These operational risks can impact on the construction company's reputation and the company's ability to obtain new projects in the future.
3. Legal and Regulatory Risks: Construction projects are often subject to stringent legal requirements and regulations. Violation of these regulations can result in legal sanctions, fines, or even project termination. Construction companies may also face the risk of legal claims arising from workplace accidents, breach of contract, or non-compliance with safety standards. These legal and regulatory risks can have serious impacts on a construction company's reputation and finances.
4. Project Risks: Each construction project has unique risks related to its location, environment, size, complexity, and other factors. These project risks can include changes in the legal or policy environment, unforeseen ground conditions, design changes, and quality issues. The success or failure of

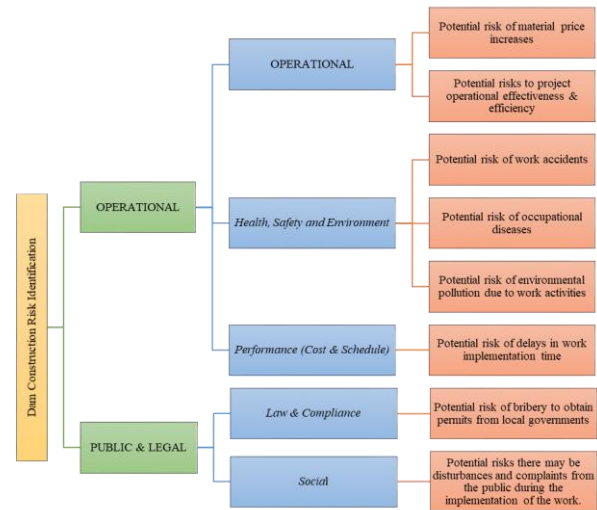


Figure 3. Identification of Project Risk in Dam Construction.

an individual project can have a direct impact on the reputation and credibility of a construction company.

Next, the reciprocal relationship will be studied between risks in the enterprise that will affect the project, as well as risks in the construction project that will impact risks in the enterprise. The risk identification hierarchy will be compared to see which risks impact each other (see Figures 6, 7, and 8).

Mapping the relationship between enterprise risk and project risk is reviewed in each project risk identification. Identification of interrelated risks is marked by the risk identification equation. This relationship can also be associated with the impact of the risk identification. Project risks that impact enterprise risk, or enterprise risks that will impact project risk, will be mapped as related risks.

As seen in Figures 6, 7, and 8, there is a relationship between project risk and enterprise risk. The figure shows that several project risk identifications affect enterprise risk on the same risk criteria. The criteria determined are the Financial Nature of The Project, Strategic, Operational, and Public and legal, which are used in documenting project risk and enterprise risk.

Risks that always arise related to work safety. This work safety risk in the project becomes a risk that needs to be mitigated so that the project can achieve its goal of zero accidents. While work safety risks in enterprise risk are related to aspects of ISO standardization and company reputation.

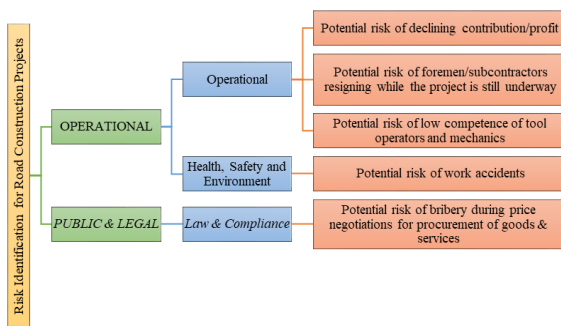


Figure 4. Identification of Project Risk in Road Construction.

Another important risk in enterprise risk is the potential risk of not achieving contract targets. Several risk identifications in project risk, especially those related to project profit, are contributors to this risk.

Not all risks are related, as can be seen by looking at the relationship between enterprise risk and project risk in Figures 6, 7, and 8. Enterprise risk is linked to the risks of a number of projects, and vice versa. This is because each risk should indeed be resolved at its level. Only project risks that cannot be resolved will level up. While enterprise risks that cannot be resolved will be distributed to construction projects.

Risk identification in building projects is more complex than risks in other projects. In dam projects, risk identification is minimal. This raises the assumption that building projects have more risks than road projects and dam projects. And dam projects are projects with minimal risk.

4. Conclusion

Risk identification is based on the Key Performance Indicator targets in the company. In Construction Company A, the company's risk identification is determined by the risk categorization and risk criteria that have been formulated by the company and used systematically and consistently. These Risk Criteria & Categories are determined by the company and all risks in all lines of the company and projects. In general, risk identification in Construction Company A is assessed based on the following Risk Criteria: Project Financial Nature, Strategic, Operational, and Public & Legal. Furthermore, these Risk Criteria are described in Risk Categories which are used as a reference in identifying risks. In each risk criterion, enterprise risk and project risk are identified. The interplay of relationships is seen in several risks between companies and projects. Further research can further examine the relationship between

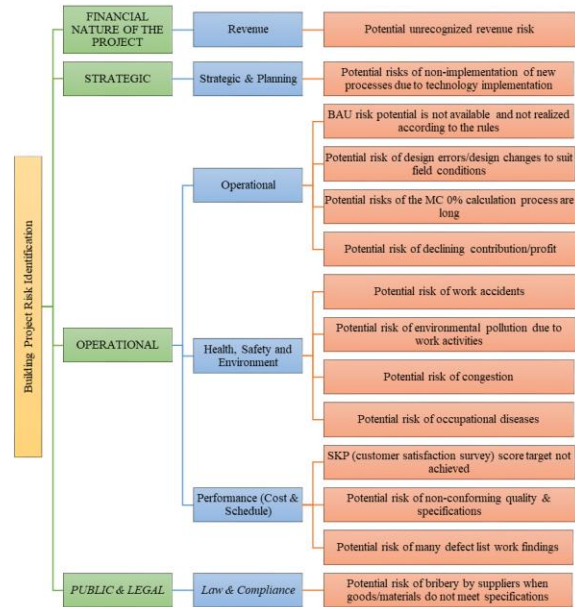


Figure 5. Identification of Project Risk in Building Construction.

enterprise risk and project risk in case studies of different types of projects.

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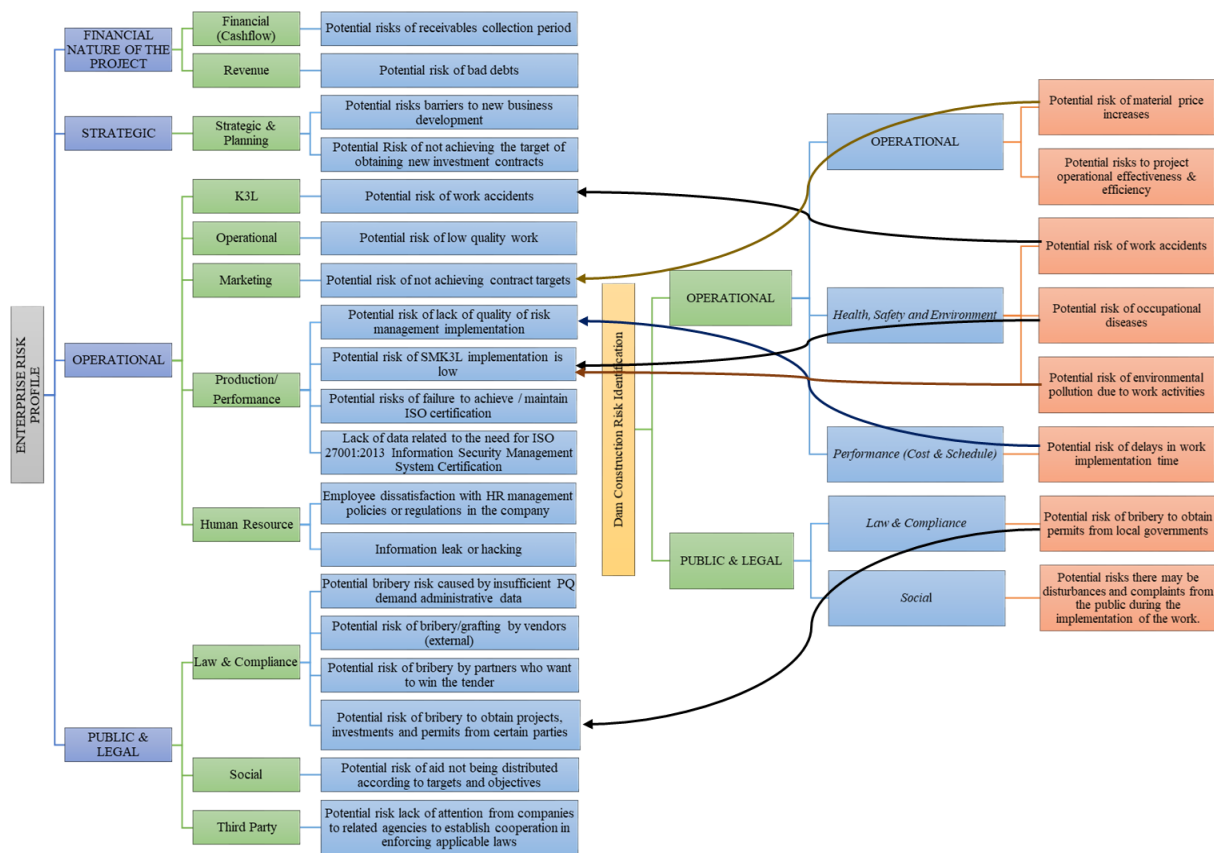


Figure 6. Risk Relationship Matrix between Enterprise Risk and Project Risk in Dam Construction.

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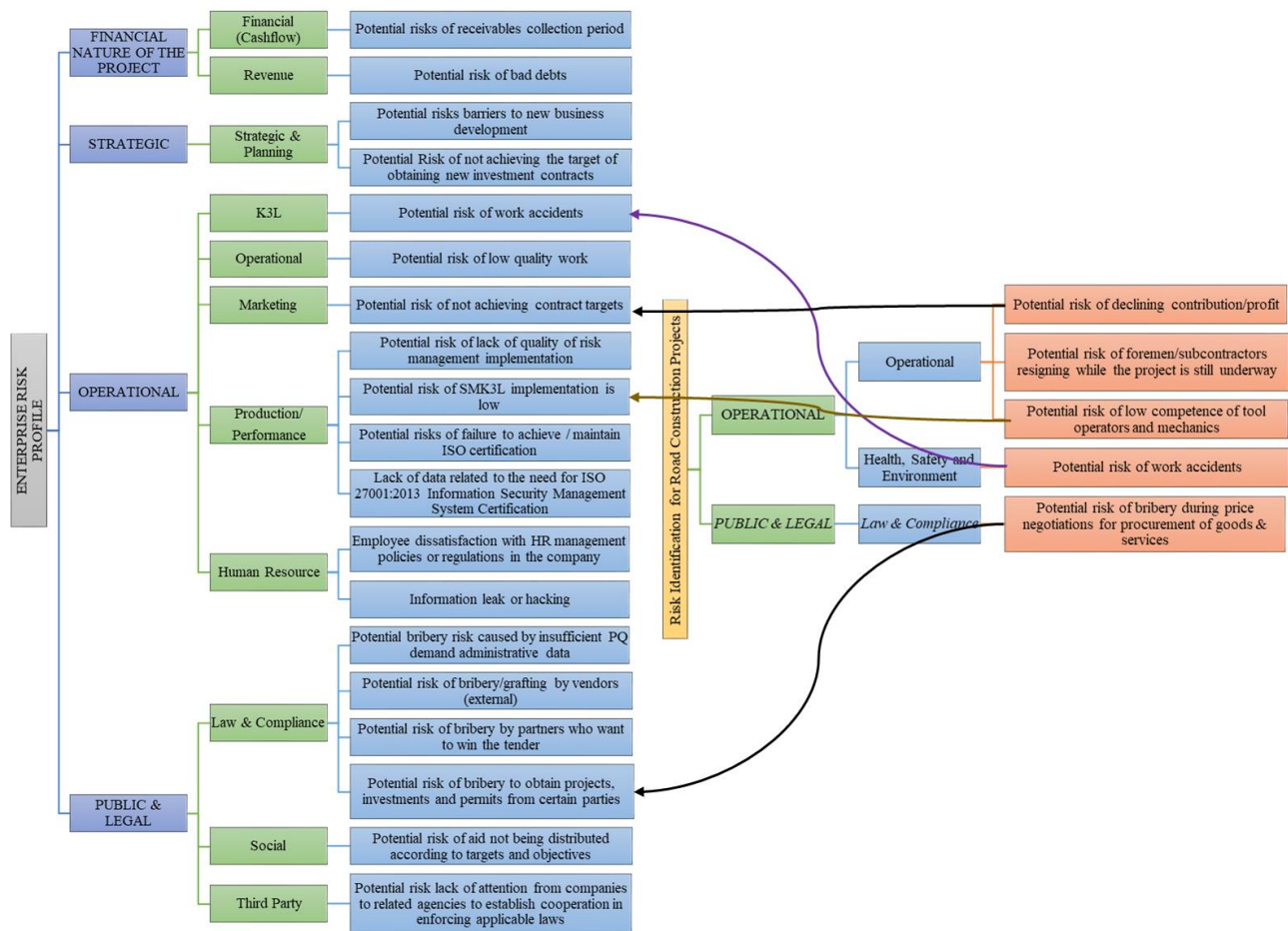


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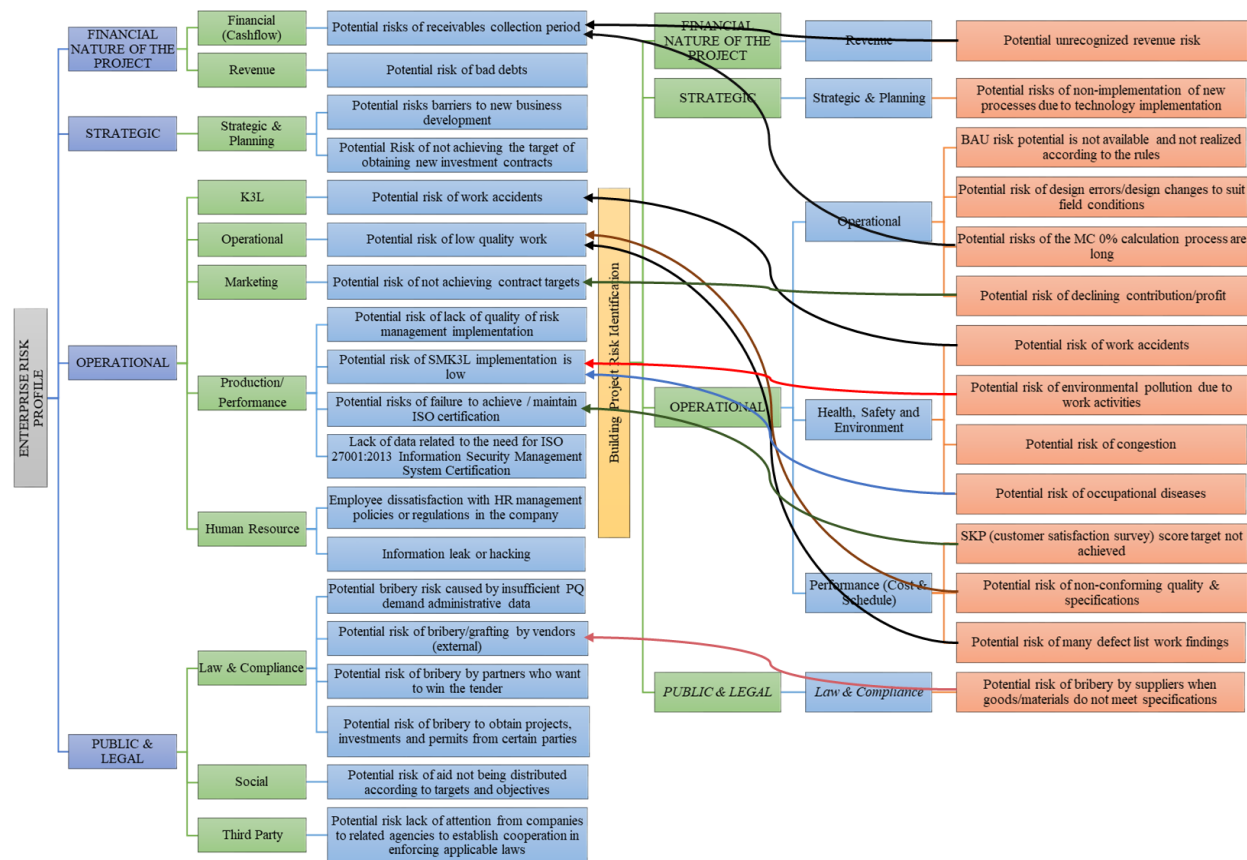


Figure 8. Risk Relationship Matrix between Enterprise Risk and Project Risk in Building Construction.