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Risk Identification and Risk Prioritization During Project Execution in Industrial Technology Company

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Abstract

The increasing complexity of modern project management highlights the critical need for structured risk management, particularly in projects delivering integrated solutions that combine hardware, software, and professional services. These highly interdependent environments require continuous risk assessment throughout the entire project lifecycle, from initiation to closure, as fragmented or insufficient evaluation can significantly impair financial performance, leading to cost overruns, margin erosion, cash flow instability, and liquidity constraints. Effective mitigation therefore depends on a cross-functional risk identification process involving sales, engineering, project management, finance, and supply chain functions to systematically capture operational, technical, commercial, and financial risks arising from daily activities. Identified risks are subsequently assessed using a structured Probability–Impact method that enables prioritization across departments and alignment with strategic objectives. By quantifying both the likelihood and potential severity of disruptions, organizations can make informed decisions regarding mitigation strategies and resource allocation, thereby strengthening the resilient delivery of integrated solutions in volatile and competitive market environments.

Keywords
Risk Management, Project Cycle, Risk Identification, Risk Prioritization

1. Introduction

Modern project management complexity has rendered traditional, static risk models obsolete, as risks now emerge from dense network interdependencies rather than isolated incidents (Fang and Marle 2012). In specialized sectors like chemical processing or Precast Blended Project Supply Chains, failing to identify these stakeholder-driven interactions can lead to systemic instability and catastrophic failures (Wang et al. 2023; Wang et al. 2025). A fundamental weakness remains in the conventional tendency to analyze threats in a vacuum, which fails to capture multi-level interactions (Fang and Marle 2012; Wang et al. 2025). Moreover, the lack of structured assessment mechanisms often leads to systematic bias and subjective probabilistic modeling, making it difficult to accurately rank and address high-impact threats (Xu et al. 2025).

The motivation for this research stems from the severe consequences of ineffective risk prioritization, including project delays, budget overruns, and the erosion of corporate reputation (Okika et al. 2025; Wang et al. 2025). Such failures represent a breakdown in strategic objectives, necessitating a robust ranking methodology to enhance systemic resilience and safeguard commercial viability. This need is further underscored by the observed tendency of project managers to assess risks in isolation rather than through a holistic, integrated lens. Without a standardized ranking system to categorize threats effectively, organizations face diminished profitability and disrupted cash flows as resources are misallocated away from the most critical risks identified through formal analysis.

1.1 Objectives

This research aims to establish an integrated framework for risk identification and ranking that moves beyond conventional, isolated assessments to address the complex interdependencies of modern project environments (Fang and Marle 2012; Wang et al. 2025). By implementing a standardized ranking system using Probability-Impact calculations, the study provides a data-driven approach to prioritize resources toward critical risks. Furthermore, it addresses a persistent research gap regarding the cumulative impact of departmental interdependencies—such as Sales, Engineering, and Supply Chain—on financial stability and liquidity throughout the project lifecycle. By analyzing the project as a continuous cross-functional flow, this research seeks to provide a comprehensive framework that explains how internal, operational risks evolve from the point of sale to final project closure.

2. Literature Review

2.1 Concept of Risks

Risk is defined as a multidimensional uncertainty inherent in complex engineering and supply chain environments, where scholars focus on the "likelihood" and "severity" of factors disrupting performance, safety, and timelines (Araibi et al. 2024; Sanni-Anibire et al. 2020). By identifying structural components like delay and accident factors, this perspective treats risk as a set of variables—ranging from occupational hazards to project-specific delays—that must be categorized to establish a resilient project foundation.

Analytically, risk is a quantifiable objective evaluated through data-driven tools such as Bayesian Belief Networks and Fuzzy DEMATEL to move beyond simple intuition (Enyoghasi and Badurdeen 2023; Seker and Zavadskas 2017). This approach decomposes threats into granular data points to assess their impact on system reliability, a view further broadened by the PMBOK Guide to include any "uncertain event or condition" that presents either a threat or an opportunity to project objectives (PMI 2021).

2.2 Risk Impact

The consequences of unmanaged risk span financial, operational, and strategic dimensions, beginning with direct economic losses such as cost overruns, revenue deficits, and systemic "ripple effects" across global industries and supply chains (Alajmi and Memon 2022; Zakaria et al. 2025; Han et al. 2025). Beyond monetary metrics, risks significantly compromise human safety and operational integrity, leading to site accidents, infrastructure damage, and ethical or legal complications in high-stakes environments (Zhang et al. 2019; Wang and Yan 2025). Ultimately, these failures erode long-term organizational resilience and strategic reputation, damaging stakeholder trust and the sustainability of collaborative networks (Zhou et al. 2025; Fang and Marle 2012). This degradation of service quality and reliability across sectors like urban transit and electronics underscores the necessity of a comprehensive risk mitigation framework (Xu et al. 2025; Araibi et al. 2024). In supply chain industry, the impact of risk in supply chains is characterized by its ability to propagate through interconnected nodes, creating cascading disruptions that necessitate the integration of robust resilience strategies to ensure long-term stability (Imbiri et al. 2023). Similary, risk impact in the case of in the China-Europe Railway network, is seen as a cascading "ripple effect," where disruptions at specific hubs propagate through the system and significantly degrade overall network performance based on a station's geographic importance and connectivity (Lyu, Shuai, Zhang, & Li, 2023). In other cases, such as in the construction industry, the impact of risk manifests as a sequence of interrelated contributing factors across multiple system levels that ultimately cause accidents and safety failures (Goncalves Filho et al. 2021).

2.3 Risk Identification & Risk Ranking

The literature indicates a shift toward computational and data-driven methodologies, such as Bayesian Belief Networks (BBN) and data mining, to identify causal relationships in sustainable design and processing (Enyoghasi and Badurdeen 2023; Wang et al. 2025). Complementing these are mathematical frameworks like Fuzzy DEMATEL, which capture human judgment to weigh occupational risks, alongside structured qualitative tools like the Likelihood/Severity Matrix and systematic reviews used to identify critical delay factors (Seker and Zavadskas 2017; Alajmi and Memon 2022; Araibi et al. 2024).

Emerging technologies further automate this process, with Natural Language Processing (NLP) and Building Information Modeling (BIM) extracting risk data from historical reports and design phases to uncover "blind spots" (Zhang et al. 2019; Zou et al. 2017). These tools represent an evolution from manual registers to real-time, tech-enabled identification, allowing project teams to move beyond traditional checklists toward a more dynamic and integrated gathering of risk data.

Risk ranking is formalized through the Likelihood/Severity Matrix and Fuzzy DEMATEL, which categorize threats into hierarchical levels—low, medium, or high—while accounting for the vagueness of expert judgment (Araibi et al. 2024; Sanni-Anibire et al. 2020; Seker and Zavadskas 2017). Advanced models also utilize probabilistic ranking and Relative Importance Indices (RII) to determine the most likely root causes of failures, ensuring that prioritization is based on dynamic conditional dependencies and historical frequency (Enyoghasi and Badurdeen 2023; Alajmi and Memon 2022; Okika et al. 2025).

Despite these analytical advances, current research primarily treats risk as a localized phenomenon centered on technical or safety failures within isolated project phases (Araibi et al. 2024; Enyoghasi and Badurdeen 2023). A significant gap remains in the study of Energy Performance Contracting (EPC) and supply chain resilience, where internal administrative and financial workflows connecting various project stages are frequently overlooked, highlighting a need for more holistic, cross-functional analysis.

3. Methods

The research consists of two main phases. The first phase focuses on comprehensive risk identification through a systematic literature review and semi-structured face-to-face interviews conducted within a leading industrial technology company specializing in automation and electrification projects in Indonesia. Drawing on insights from experts in Sales, Project Management, Engineering, Finance, and Supply Chain, this stage captures practical, day-to-day operational risks and interdepartmental inefficiencies, ensuring the risk register reflects both theoretical foundations and organizational realities. The second phase involves a quantitative assessment in which 30 subject matter experts evaluate the identified risks using a Probability–Impact (P–I) ranking, particularly in relation to project liquidity and total cost performance. By calculating the cross-product of likelihood and impact, the study systematically prioritizes risks and establishes an evidence-based link between operational activities and financial risk exposure (Table 1):

Table 1. Research Flow

Steps	Description
1	**Comprehensive Risk Identification:** This procedure involves a systematic literature review, analysis of organizational records, and expert input obtained through structured interviews with key organizational stakeholders, including Supply Chain Management (SCM), Engineering Management (EM), Project Management (PM) personnel, Sales, and Finance, across the various phases of the project lifecycle.
2	**Risk Classification:** This stage involves the systematic categorization and grouping of all identified risk factors according to project phase and the relevant departmental risk owner, in order to ensure a structured and coherent analysis.
3	**Severity and Probability Analysis:** This stage involves conducting a quantitative risk assessment using the Risk Magnitude Index (Severity × Probability) to prioritize the most significant risks within each department.

2.3 Probability Impact Methodology

The Probability–Impact (P–I) method provides a structured framework to convert qualitative observations into a prioritized quantitative hierarchy. In this study, each risk is assessed on two dimensions: probability (P), indicating the likelihood of a departmental failure, and impact (I), reflecting the potential cost overrun or liquidity disruption. The Risk Score, or Risk Priority Number (RPN), is calculated using the formula:

$$Risk\ Score = P\ x\ I$$

To ensure the integrity of the data collection, the research employs a reliability test, most commonly through Cronbach's Alpha (α). This statistical measure evaluates the internal consistency of the questionnaire, ensuring that the experts are responding to the probability and impact scales in a consistent and reliable manner. A high alpha coefficient indicates that the items in the questionnaire are effectively measuring the same underlying construct (project risk). The formula for Cronbach's Alpha is :

$$\alpha = \frac{k}{k-1}(1 - \sum \frac{\sigma^2 y_i}{\sigma_x^2})$$

Where :

- k is the number of items (risks) in the questionnaire.
- σ_x^2 is the the variance of the total scores.
- $\sigma^2 y_i$is the variance of component i for the sample.

In this study, an alpha value above 0.70 is considered essential to ensure that expert feedback is statistically reliable and that the resulting risk rankings provide a dependable basis for the proposed management strategy in the automation and electrification sector. Additionally, the Coefficient of Variation (CV) is used to assess the consistency of expert responses, defined as the ratio of the standard deviation (σ) to the mean (φ). Lower CV values indicate greater agreement among experts on a given risk ranking. The formula expresses as:

$$CV = \frac{\sigma}{\varphi}$$

Where:

- σ **:** Standard Deviation measures the amount of variation or dispersion of the expert scores.
- φ : Mean measures the average score assigned by the experts for a specific risk's probability or impact.

In this research, applying the CV formula is essential for validating the expert ranking process. Typically, CV value of less than 0.5 (or 50%) is considered an acceptable level of consensus, indicating that the experts' opinions are converging on a similar ranking. By utilizing this metric alongside the Cronbach's Alpha reliability test, the study ensures that the final prioritized list of risks is not only reliable but also reflects a strong professional consensus across the automation and electrification organization.

4. Data Collection

This research was conducted in a technology industry company operating in the engineering and industrial technology sector serving various customers in Indonesia. The company has been established in Indonesia since 1970s and has executed numerous project phases across several business domains, including Industrial Automation, Electrification, Robotics and Motion and Energy/Power Technology (power grid solutions and electrical power systems). The research was taken during Dec 2025-Jan 2026.

4.1 Risk Identification.

Data collection began with risk identification through workplace observations and a literature review to map common project execution risks. The preliminary list was then validated and refined through in-depth interviews with subject-matter experts involved in monthly and quarterly project performance reviews, ensuring both theoretical relevance and practical insight for the final risk register. These included :

- 2 Sales team representatives with 10–15 years of experience handling national and international clients in Indonesia.
- 2 Supply Chain Management team representatives with 5–10 years of experience in supply chain operations
- 1 Technical Manager team representatives with 17 years of experience leading automation installation projects in the paper, cement, and mining industries in Indonesia.
- 2 Project Management team representatives based in Indonesia and Singapore with 15–20 years of experience in project management
- 2 Finance team representatives serving as project controllers in Indonesia with 10–15 years of experience.

Data were collected through face-to-face or online interviews to capture experts' perspectives in depth. This method was chosen to account for interdependencies among professional backgrounds and to explore causal relationships between risks, which are often missed in anonymous methods like the Delphi technique. The interviews allowed probing of technical nuances and divergent opinions essential for accurate risk analysis. During the interviews experts were asked (Table 2):

Table 2. Expert Interview Questions

No	Question Details
1	Are the compiled risks genuinely occurred in practice within the organization's project execution?
2	Are there any significant liquidity- or cost-related risks were missing?
3	Are there any listed risks were no longer relevant?
4	Are the assigned departmental risk owners being appropriate or required reassignment?

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4.2 Probability Impact Inputs

At this stage, data collection was conducted through the distribution of a structured questionnaire developed based on the results of the risk identification phase. The sample consisted of 30 expert respondents representing principals, consultants, and vendors. The respondents included professionals directly involved in project execution, with work experience ranging from 5 to 20 years. The demographic profile of the respondents is presented below in Figure 1 and Figure 2.

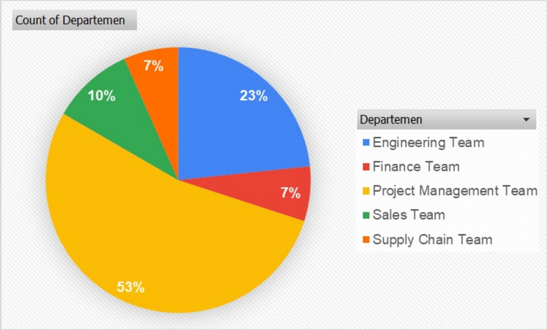

Figure 1 Distribution of respondents based on Department

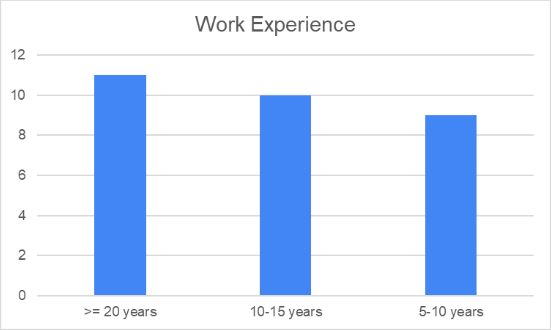

Figure 2 Distribution of respondents based on Work Experience

The questionnaire is shared with 30 respondents through online tools with sets of question as below (Table 3- Table 5) :

Table 3. Question For Probability Rating

Based on your professional experience, please indicate the likelihood of this risk occurring.	
Rating	Options
1	Very unlikely to occur, but may arise only under exceptional circumstances.
2	Unlikely to occur, although it has occurred in similar projects in the past.
3	Moderately likely to occur; approximately a 50/50 probability.
4	Highly likely to occur under most circumstances; represents a persistent issue.
5	Almost certain to occur; essentially a known issue that must be actively managed.

Table 4. Question For Impact Cost Rating

If this risk materializes, please assess the level of impact it would have on overall project cost performance.	
Rating	Options
1	Negligible impact on project costs.
2	Minor cost impact. Any additional costs can still be managed by the project team through project savings.
3	Moderate cost increase. Costs are noticeable and cannot be fully offset by other savings. Project Risk and Contingency funds are used to compensate, and the project's gross margin remains unaffected.

4	Major cost increase (over 10% of total project cost). Project Risk and Contingency funds cannot fully cover the impact, resulting in reduced margins, although gross margin remains positive.
5	Excessive cost increase (over 20% of total project cost). Risk reserves and contingency funds are insufficient, and the project incurs a loss with a negative gross margin.

Table 5. Question For Impact Liquidity Rating

If this risk materializes, please assess the level of impact it would have on liquidity (client payment receipts)?	
Rating	Options
1	No impact on working capital or billing.
2	Short-term delay: 15–30 days delay in billing; missing one monthly billing cycle; cash flow shifted to the following month.
3	Moderate delay: 30–60 days delay; payments are held due to documentation or on-site execution issues but are still received within the same quarter.
4	Liquidity gap: 60–90 days delay; quarterly payment targets are missed, creating a significant working capital gap.
5	Project freeze: More than 90 days delay; risk of legal disputes, bad debts, or complete work stoppage due to insufficient funds.

With respect to the impact rating, two variables were used to measure impact, namely cost impact and liquidity impact. This study adopts the higher value between these two variables to determine the overall risk impact rating.

5. Results and Discussion

5.1 Risk Identification

Based on organizational data, several risks that can impact financial performance have been identified across various departments as below (Table 6- Table 8):

Table 6. Risk Table from Organization Data

No	**Department**	**Risk Description**
1	Sales	Profitability Risk: Underestimation of costs can reduce profit margins or result in losses.
2	Sales	Client Trust Risk: Inaccurate estimates can undermine the company's credibility with clients.
3	Sales	Operational Disruption Risk: Inaccurate sales data can hinder execution and operational planning.
4	Engineering	Design Error Risk: Technical failures in designing solutions or products.
5	Engineering	Rework Cost Risk: Additional expenses incurred for corrections and rework due to design errors.
6	Engineering	Delay Risk: Technical errors that extend project duration.
7	Project Management	Oversight Risk: Insufficient control leading to cost overruns.
8	Project Management	Scope Creep Risk: Uncontrolled changes or additions without budget adjustments.
9	Project Management	Planning Risk: Unrealistic scheduling and budgeting.
10	Supply Chain Management	Price Volatility Risk: Supplier uncertainty or invalid pricing affecting project cost structure.
11	Supply Chain Management	Inventory/Stock Risk: Unavailability of required materials, directly impacting project execution.

Based on literature review, combined with organizational data and expert review, the risks below are summarized as the final risk for further analysist on Probability Impact Rating.

Table 7. Final Risk Table from Risk Identification Process

Risk No	**Final Risk Name**	**Original Risk Source**	**Relevant Literature / Notes**
R1	Unidentified Risks During Tender	Organization Data (Sales 1,3) & Literature (Sales 2)	Combines profitability and price estimation issues; Negara et al., 2024
R2	Technology Feasibility Gap	Literature (Eng. 7)	Refines "Integration Risk" into concrete technology feasibility; Zhao et al., 2021
R3	Price Validity	Literature (SCM 8) & Organization Data (SCM 10)	Validates market price volatility and supplier data; MDPI Sustainability, 2024
R4	Delayed Supporting Documents for DP Billing	Literature (Finance 17)	Specifies payment risk into administrative/document constraint; Shibani et al., 2022
R5	Over-Promising During Tender	Organization Data (Sales 2)	Translates client trust risk into concrete action; Nikjow et al., 2021
R6	Inaccurate Engineering Workforce Planning	Literature (PM 13)	Shifts general HR risk to technical engineering context; Khairullah et al., 2022
R7	Material Shortages	Organization Data (SCM 11)	Operational stock constraints; Cagno & Micheli, 2024
R8	Unreliable Project Schedule	Organization Data (PM 9) & Literature (PM 12)	Merges planning and decision-making uncertainties; Wang et al., 2023
R9	Engineer Unavailability	Literature (PM 13)	Focuses on expert resource availability; Khairullah et al., 2022
R10	Inaccurate Billing	Literature (Finance 17)	Emphasizes financial output quality to avoid payment delays; Shibani et al., 2022
R11	No Clear Vendor Pricing	**Expert Findings**	Practical procurement risk from field experience; new finding
R12	Design Errors (Hardware/Software)	Literature (Eng. 5) & Organization Data (Eng. 4)	Synchronizes technical design failures; Vo et al., 2025
R13	Wrong Material Purchase (Specification/Quantity)	**Expert Findings**	Critical SCM operational risk; new finding
R14	Undefined Project Scope	Literature (Sales 3) & Organization Data (PM 8)	Sharpens scope creep and initial work definition; Negara et al., 2024
R15	Currency Fluctuation	Literature (Finance 16)	Maintains relevance of financial market risk; Shibani et al., 2022
R16	Ambiguous Contract or PO Clauses	Literature (Sales 1)	Focus on legal and contractual aspects; Negara et al., 2024
R17	Long Procurement Lead Time	Literature (SCM 9)	Logistics risk specifying duration; MDPI Sustainability, 2024
R18	Late Vendor Payments	Literature (Finance 15)	Focus on cash-out management; Shibani et al., 2022
R19	Improper Change Order Handling	Literature (Eng. 6) & Organization Data (PM 8)	Integrates technical changes and scope control; Vo et al., 2025
R20	Incomplete Engineer Reporting Data	Organization Data (Sales 3)	Develops data disruption into technical reporting requirement; Khairullah et al., 2022
R21	Customs Delivery Issues	Literature (SCM 9)	International logistics risk (cross-border bureaucracy); MDPI Sustainability, 2024

R22	Unmonitored Billing Invoices	Literature (Finance 15/17)	Focus on internal cash-in monitoring; Shibani et al., 2022
R23	Material Defects	**Expert Findings**	Emphasizes quality control not captured initially; new finding
R24	Untracked Project Milestones	Organization Data (PM 7,9)	Highlights schedule control to prevent delays; Wang et al., 2023
R25	Contractor/Supplier Competence	**Expert Findings**	Evaluates third-party capacity; new finding
R26	Incomplete Project Documentation	**Expert Findings**	Develops communication risk into administrative evidence; new finding
R27	Unfinished Punchlist	**Expert Findings**	Specific closing-phase risk; new finding
R28	Single Supplier Dependency	**Expert Findings**	Strategic procurement risk from reliance on one source; new finding

Table 8. Risk Distribution Against Project Phase and Department

Phase \ Department	**INTERNAL**				
	Sales	Engineering	SCM	Project Management	Financial
INITIATION	R1	R2	R3		
	R5				
	R11				
	R16				
PLANNING		R6	R7	R14	R4
			R13	R8	
			R17		
			R28		
EXECUTION		R9	R21		R10
		R12	R23		R15
			R25		R18
MONITORING & CONTROLLING		R20		R19	R22
				R24	
				R26	
CLOSING				R27	

5.1 Probability Impact Rating

Based on the risk Table 9 developed during the Risk Identification process, further data analysis was conducted. A structured set of questions was distributed to 30 expert respondents to evaluate the identified risks. Based on the data collected, the following ratings were obtained for each risk.

Table 9. Probability Impact Rating Result

No	Risk No	Department	Risk Description	PI	P CV	I CV
1	R1	Sales	Unidentified Risks During Tender	14.677	29.39%	16.86%
2	R2	Engineering	Technology Feasibility Gap	9.392	44.02%	27.24%
3	R3	SCM	Price Validity	7.724	36.62%	29.60%
4	R4	Finance	Delayed Supporting Documents for Down Payment Billing	7.373	34.33%	36.62%
5	R5	Sales	Over-Promising During Tender	11.447	29.69%	29.51%
6	R6	Engineering	Inaccurate Engineering Workforce Planning	8.656	28.72%	22.07%
7	R7	SCM	Material Shortages	7.529	39.21%	32.20%
8	R8	Project Management	Unreliable Project Schedule	9.460	38.58%	33.90%
9	R9	Engineering	Engineer Unavailability	7.440	42.65%	35.63%
10	R10	Finance	Inaccurate Billing	6.002	43.55%	39.92%
11	R11	Sales	No Clear Vendor Pricing	7.500	45.49%	32.75%
12	R12	Engineering	Design Errors (Hardware/Software)	7.040	38.41%	30.97%
13	R13	SCM	Wrong Material Purchase (Specification/Quantity)	7.178	40.02%	31.12%
14	R14	Project Management	Undefined Project Scope	7.933	37.89%	33.31%
15	R15	Finance	Currency Fluctuation	6.767	46.86%	34.30%
16	R16	Sales	Ambiguous Contract or PO Clauses	6.689	45.49%	39.65%
17	R17	SCM	Long Procurement Lead Time	7.637	39.24%	36.62%
18	R18	Finance	Late Vendor Payments	5.200	44.58%	43.84%
19	R19	Project Management	Improper Change Order Handling	8.427	37.95%	38.84%
20	R20	Engineering	Incomplete Engineer Reporting Data	5.838	37.99%	39.21%
21	R21	SCM	Customs Delivery Issues	6.400	43.22%	34.58%
22	R22	Finance	Unmonitored Billing Invoices	4.180	34.83%	43.70%
23	R23	SCM	Material Defects	6.500	40.35%	24.76%
24	R24	Project Management	Untracked Project Milestones	6.104	36.59%	35.86%
25	R25	SCM	Contractor/Supplier Competence	8.083	37.51%	26.55%
26	R26	Project Management	Incomplete Project Documentation	6.440	36.38%	35.59%
27	R27	Project Management	Unfinished Punchlist	6.813	42.74%	34.33%
28	R28	SCM	Single Supplier Dependency	7.260	43.70%	29.94%

Based on the survey results, the following Cronbach's alpha coefficient was obtained to assess the internal consistency reliability of the measurement scale.

Cronbach Alpha Probability	:	0.930297257
Cronbach Alpha Impact	:	0.91939067

5.2 Interpretation Result

Through extensive one-on-one interviews, the original organizational risks were expanded to 28, including 7 newly identified from day-to-day project activities across Sales, Project Management, Finance, Engineering, and Supply

Chain. Probability–Impact (PI) ratings show several high-exposure risks, with R1 (Unidentified Risks During Tender) leading at PI 14.677 (P CV 29.39%; I CV 16.86%), followed by R5, R2, and R8. Some risks, like R15 and R9, exhibit high probability variability but moderate overall PI, indicating that overall exposure depends on both probability and impact. While certain risks show high CVs reflecting less consensus (e.g., R16, R18, R27), others like R1 show stronger agreement on impact. The highest PI does not exceed 16 on the 5-point scale, suggesting no risk is a critical "show stopper," though risks—particularly in Sales—still require managerial attention and mitigation.

5.3 Proposed Improvements

The results obtained from the Risk Identification and Probability–Impact Rating can be further analyzed to generate deeper insights. The existing literatures strongly suggests that risks are interdependent and do not arise in isolation. Accordingly, these risks may be examined at the departmental level to better understand the interrelationships among them and to assess how risks originating in one department may influence or amplify risks in other departments. Such an approach would provide a more holistic understanding of organizational risk exposure and support the development of integrated mitigation strategies.

6. Conclusion

In conclusion, the risk identification and Probability–Impact analysis expanded the original organizational risks into 28, including 7 newly surfaced from day-to-day project activities across Sales, Project Management, Finance, Engineering, and Supply Chain. While several risks, such as R1 and R5, exhibit relatively high PI scores, none reach the maximum critical threshold, indicating that these risks are significant but not project "show stoppers." Variability in probability and impact, reflected in the CV values, highlights areas of disagreement among experts, underscoring the importance of departmental interdependencies. These findings suggest that while no single risk is overwhelmingly critical, targeted mitigation—particularly for high-ranking risks—combined with a departmental-level analysis of interrelated risks, can provide a comprehensive framework for proactive risk management.

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