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Page. 63 - 79

Risk Management for PMO Transformation in Indonesian State-Owned Construction Enterprises

Dhia Tsuraya Nisrina[1)], Yusuf Latief[2)], Alin Veronika[3)]
[1), 2)] University of Indonesia (UI)

Corresponding author, e-mail: dhiatsuraya13@gmail.com

ABSTRACT
This research investigates the critical issue of risk management during Project Management Office (PMO) transformation within the Indonesian State-Owned Enterprise construction industry. The study employs a quantitative methodology to identify key risks that impede effective PMO implementation and to evaluate potential mitigation strategies. Survey data, gathered from a diverse sample of construction professionals in state-owned enterprises are analyzed to establish risk profiles and inform evidence-based recommendations. The findings highlight that operational and policy risks are paramount, emphasizing the importance of standardized processes, clear communication channels, and well-defined governance structures. Results further indicate that effective risk management requires tailored strategies that align with the unique characteristics of the organization and the project portfolio. Key strategies include strong leadership support, a robust change management process, and the alignment of PMO objectives with broader business goals. These results are related to previous research and recommendations based on data analysis, but future research with deep dives into the cases and other type of companies are also proposed. This research contributes to a more nuanced understanding of PMO transformation within a developing economy and provides actionable insights for construction industry stakeholders seeking to enhance project outcomes, improve organizational efficiency, and achieve sustainable development goals.

KEYWORDS
Project Management Office (PMO), Risk Management, PMO Transformation, Construction, State-Owned Enterprise

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1. INTRODUCTION

The escalating complexity of modern construction projects has amplified the need for specialized units to oversee and standardize project management practices. Project Management Offices (PMOs) are increasingly vital, serving as centralized hubs for communication, coordination, and resource allocation within construction organizations [1], [2] Their crucial role lies in ensuring a harmonious alignment between diverse resources, technical specifications, and stakeholder interests, significantly reducing the risk of project failures. PMOs are further expected to ensure that investments in project management generate yields appropriate with operational costs, with effectiveness determined by project success and stakeholder satisfaction [3].

While the adoption of PMOs has expanded across industries in Indonesia, including defence, agriculture, and information technology, the construction sector remains a key area of focus. The "PMO Kopi Nusantara" initiative, implemented by the Indonesian Ministry of State-Owned Enterprises (Kementerian BUMN), illustrates the broad applicability of PMO principles [4]. Yet, this broad adoption also highlights a need for context-specific adaptation, as PMOs in construction face unique challenges [5], [6].

The landscape of PMO implementation in the construction sector is indeed more than just a short-term trend; it is an innovative trend in business that can keep up with the contemporary business, with the PMO being a basic response to companies' needs [1]. However, the Indonesian construction industry, it must also be noted, has been experiencing major setbacks, despite of PMOs. The construction of the Indonesia's Light Rail Transit (LRT) Jabodebek project, faced major budget escalations, amounting from IDR 29.9 trillion to IDR 32.5 trillion and the Jakarta-Bandung High-Speed Rail project has been experiencing delays [7].

Furthermore, several state-owned construction enterprises (BUMN Karya), many of which have established PMO or similar project governance functions within their organizations, continue to struggle with substantial financial burdens. For instance, PT Hutama Karya (Persero) recorded outstanding debts of approximately IDR 30.07 trillion, primarily allocated to the completion of the Trans Sumatra Toll Road and the Ciawi Sukabumi Toll Road projects [60]. Other major construction companies also face high debt levels, with Waskita Karya at IDR 84.31 trillion, Wijaya Karya at IDR 56.7 trillion, PT PP at IDR 42.72 trillion, and Adhi Karya at IDR 30.42 trillion [61], reflecting the broader financial strain within Indonesia’s state-owned construction sector despite the presence of PMOs.

In order to solve some current issues and as a response to the complexities in PMO, there is need to have a focused attention and study of risk management in this sector. The transformation of PMOs, which may also have the same need for effective risk management, needs as a whole also be studied through careful examination [8], [9]. The effective operation of such offices will require the study of the risk factors that come with it.

The transformation of PMOs and the implementation of effective risk management are essential to addressing the ongoing challenges in Indonesia’s construction sector. As SOE within the construction industry continue to manage large-scale, capital-intensive projects, traditional PMOs that focus mainly on compliance and reporting must evolve into strategic entities that enable proactive decision-making and risk anticipation. This aligns with the broader evolution of PMOs globally, which have transitioned from administrative support units into strategic assets that drive project success through portfolio governance, knowledge management, and organizational alignment [10]–[12]. Strengthening both PMO capabilities and risk management frameworks is therefore critical for improving project performance, ensuring accountability, and maintaining the financial resilience of Indonesia’s state-owned construction enterprises [18], [19].

This study addresses this gap by focusing on "Risk Management of PMO Transformation in the Construction Industry in Indonesia."

The objectives of this research are:

- To identify key risks associated with PMO implementation within the Indonesian construction context.
- To evaluate risk management strategies for PMO transformation in the context of Indonesian construction industry.

By exploring these issues, this research aims to contribute to both theory and practice, to inform more effective PMO transformation strategies in the Indonesian construction industry. The findings will offer valuable insights for construction industry stakeholders striving to improve project outcomes and support Indonesia's sustainable development goals.

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2. LITERATURE REVIEW

2.1 Concept and Evolution of PMOs

The Project Management Office (PMO) has undergone a significant evolution, transitioning from its rudimentary origins to its contemporary role as a pivotal component of modern project management [10]. Initially conceived to deliver administrative support and enforce standardization, the PMO's mandate has broadened considerably to encompass strategic alignment, knowledge management, and portfolio governance [11]. This evolution mirrors the increasing complexity of projects and the escalating need for organizations to effectively manage them [12].

Early conceptualizations of project offices can be traced to the 19th century, with these offices serving as specialized departments within governmental entities [13]. By the mid-20th century, particularly in the wake of World War II, this concept experienced significant augmentation, finding its application in the management of large-scale defence and aerospace initiatives undertaken by the United States government [14], [15]. This era witnessed a shift towards centralized management structures designed to facilitate the oversight and coordination of project activities.

The latter part of the 20th and the beginning of the 21st centuries marked a watershed moment for the PMO, as it garnered widespread recognition as a distinct organizational entity with well-defined roles and responsibilities [16]. According to Ershadi (2021), a key characteristic of this period was the transition of PMOs from simple support units to more complex structures that integrated strategic considerations with project-level operations [17].

The growing sophistication of PMOs has led to the emergence of several distinct models, each tailored to specific organizational needs. Among these, three primary archetypes have been identified: administrative/reporting PMOs, which primarily focus on data collection and dissemination; managerial/proactive PMOs, which take a more active role in project planning and control; and hybrid PMOs, which combine elements of both administrative and managerial approaches to provide a flexible and adaptable solution [18].

This evolutionary trajectory underscores the growing recognition of PMOs as strategic assets capable of driving project success and enhancing organizational performance. As PMOs continue to adapt to the ever-changing demands of the business environment, their role in facilitating effective project management and achieving strategic objectives is likely to become even more critical [19].

2.2 Role of PMO in Construction Industry Globally and in Indonesia

The construction industry, characterized by its inherent complexity and dynamic nature, has witnessed increasing recognition of the Project Management Office (PMO) as a critical enabler of project success. Globally, PMOs in construction are tasked with a variety of responsibilities aimed at improving project outcomes, streamlining operations, and enhancing organizational performance. These responsibilities encompass facilitating communication, process standardization, and better risk management [6]. Studies have provided empirical evidence that PMOs in construction can contribute to increased adherence to project schedules, cost control, and stakeholder satisfaction [20]. Globally, PMO serves as centre of excellence, knowledge repository, and even performance improver [21] that proven increase company profits

In Indonesia, the adoption of PMOs in the construction industry is a more recent phenomenon, spurred by a desire to address prevalent project management challenges, such as delays and cost overruns. While PMOs are seen as a promising solution, their implementation and effectiveness have been inconsistent, often falling short of expectations [9]. Many Indonesian construction firms, especially the smaller companies, have only limited project management knowledge and limited tools to do better on their operational aspects [1]. It is a strategic weapon and offer a holistic and integrated for Indonesian growth in construction [3].

Several factors contribute to the suboptimal performance of PMOs in Indonesia's construction sector. A lack of clear authority and mandate often limits the PMO's ability to effectively influence project decisions [22]. Insufficient resources, both financial and human, further constrain the PMO's capacity to implement standardized processes and provide adequate support to project teams [23]. Moreover, a resistance to change and a lack of understanding of the PMO's value proposition among key stakeholders can hinder its acceptance and effectiveness [22]. There is lack of collaboration from the stakeholder as well because PMO’s benefits are not well communicated [5].

In addition to these challenges, the Indonesian construction industry faces unique contextual factors that can impact PMO effectiveness. These include a complex regulatory environment, a shortage of skilled labour, and a project-oriented culture which is more reactive [24]. The effective integration of PMOs into Indonesia's construction industry requires that companies evaluate their existing PMO tasks and features [25], adapt to the unique local environment, and create policies to facilitate innovation and productivity at the operational level. This requires an intense assessment from stakeholder to assess the existing problems [8].

Moving forward, research and practice must focus on addressing these challenges and exploring strategies for optimizing the role of PMOs in the Indonesian construction industry. This includes developing PMO models that are tailored to the specific needs and characteristics of the sector and that take into account the cultural and organizational context.

2.3 Challenges and Barriers in PMO Implementation

Despite the recognized benefits of PMOs, numerous challenges and barriers can impede their successful implementation, particularly within the complex and dynamic construction industry. Drawing upon a comprehensive review of the literature, these challenges can be categorized into seven key areas:

Table 1. Challenges and Barriers in PMO Implementation

Category	Challenge	References
Strategy	**Lack of Strategic Alignment**: PMO objectives are not clearly aligned with overall business strategy.	[26]–[28]

Category	Challenge	References
Policy	**Unclear Project Target**: Unclear project targeting and goals makes it difficult to measure and assess strategic alignment.	[29]
	Inadequate Policy Framework: Absence of a well-defined policy framework leads to inconsistencies and lack of accountability.	[22]
	Lack of Fixed Engagement Rules: Inconsistent project rules limit adaptation and reduce company impact.	[27]
Organization	**Inadequate Organizational Structure:** Lacks clearly defined roles, hindering effective implementation.	[26], [30]
	Low PMO Influence and Position: The PMO is placed too low, hindering authority and strategic decision-making.	[5], [22], [30]
Technology	**Technology Inefficacies**: Lack of integrated software and outdated tools.	[31], [32]
	Poor Technology Adoption: Difficulty in knowing which technologies to adopt for project streamline.	[33]
Operational	**Project Management Not Standardized:** Inability to align certain projects to the correct methodology due to industry dynamism.	[34]
Human Resource	**Inadequate Knowledge and Capability:** Limited knowledge and competencies of PMO stakeholders and team, accompanied by minimal training support.	[8], [20]
Organizational Culture	**Culture and Engagement-Related Issues:** Impedance of company from adapting to different situations.	[5], [26]

By categorizing these challenges, it becomes clearer where focused efforts are needed to improve PMO implementation and transformation within the Indonesian construction industry. This information will now help to shape PMO in the Indonesia business construction climate.

2.4 PMO Transformation and Risk Management

The existing body of research on Project Management Offices (PMOs) and risk management within the construction sector highlights a growing recognition of the interconnectedness between these two domains. However, while numerous studies have explored PMOs and risk management separately, research specifically examining the risk management of PMO transformation within the construction industry remains limited.

Previous studies have established the importance of PMOs in facilitating effective risk management at the project level. PMOs have been shown to play a crucial role in implementing standardized risk management processes, providing training and support to project teams, and monitoring risk-related data [6]. Some research suggests there is a relationship between management of technology and performance. Many large construction firms use the advanced tech to manage projects [1]. However, in several industry the effective usage of such knowledge must first have some clear processes [35]. By effectively managing and mitigating risks within individual projects, PMOs contribute to improved project outcomes, reduced costs, and enhanced stakeholder satisfaction [20].

However, a critical gap exists in understanding the specific risks that arise during the transformation of a PMO itself, and how these risks can be effectively managed. The process of transforming a PMO often involves significant organizational changes, including the implementation of new processes, technologies, and governance structures. These changes can introduce new risks, such as resistance from stakeholders, lack of buy-in from project teams, and difficulties in adapting to the new PMO model [36].

Moreover, the construction industry presents unique challenges that can further complicate PMO transformation and risk management. The industry is characterized by its project-based nature, its reliance on external stakeholders, and its exposure to various environmental and economic uncertainties. These factors can increase the likelihood of risks arising during PMO transformation and can make it more difficult to manage these risks effectively [37].

While limited, some studies have examined specific aspects of PMO transformation and risk management in related contexts. Some qualitative studies explore the problems [8] that PMO transformation face.

A synthesis of the existing research reveals several key areas that warrant further investigation:

- **Identification of PMO Implementation Risks**: There is a need for more comprehensive research to identify the specific risks that arise during PMO implementation, particularly in the context of the construction industry.
- **Development of Risk Management Strategies**: Research is needed to develop and evaluate strategies for effectively managing the risks associated with PMO implementation for PMO transformation to enhance PMO roles and functions.
- **Contextual Factors**: There is a need to consider the unique contextual factors that may influence PMO transformation and risk management in the construction industry, such as organizational culture, project complexity, and regulatory environment.

This study aims to address these gaps by providing a comprehensive investigation of the risk management of PMO implementation in the Indonesian construction industry for PMO transformation. By identifying key risks, evaluating risk management strategies, and considering contextual factors, this research will contribute to both theory and practice and inform the development of more effective PMO models that can drive improved project outcomes.

2.5 Risk Management Theories and Frameworks in Project Management

Effective risk management is a cornerstone of successful project delivery, especially in dynamic environments such as the construction industry, which is often laden with uncertainties [11]. Various risk management theories and frameworks can be adapted and applied within the context of PMO transformation, providing a structure for identifying, assessing, and mitigating potential threats to project success. Several theoretical perspectives enhance this process:

- **Decision Theory:** Explores how individuals and organizations make decisions under conditions of uncertainty. Concepts such as expected value, risk aversion, and probability assessment are relevant to PMO transformation, helping stakeholders make informed decisions about risk mitigation strategies [38].
- **Contingency Theory:** Emphasizes that there is no "one-size-fits-all" approach to management and that the most effective organizational structure and practices are contingent upon the specific context and environment [39]. In the context of PMO transformation, contingency theory suggests that risk management strategies should be tailored to the unique characteristics of the construction company, the project portfolio, and the external environment [8], [40].
- **Systems Thinking:** Acknowledges the interconnectedness and interdependence of various elements within a project or organization. In the context of risk management, systems thinking promotes a holistic approach, recognizing that risks can cascade through the system and have unforeseen consequences [41]. This reinforces the importance of considering risks at all levels of the PMO.

- **Prospect Theory:** Examines how individuals make decisions under conditions of risk and uncertainty, highlighting the psychological biases that can influence risk perceptions and choices. According to prospect theory, framing and loss aversion, this theory will be able to predict various reactions to threat and opportunities [42]. Prospect theory offers insights into how to communicate risks effectively and design incentive structures that encourage risk mitigation behaviours.

In addition to these theoretical perspectives, several established risk management frameworks can be applied to PMO transformation:

- **PMBOK® Guide** [11]: Provides a structured and comprehensive process for risk management, encompassing risk identification, qualitative and quantitative risk analysis, risk response planning, and risk monitoring and control. The PMBOK® Guide offers a widely recognized set of best practices for managing project risks.
- **ISO 31000** [43]: Offers principles and guidelines for risk management, applicable to a wide range of organizations and contexts. ISO 31000 emphasizes the importance of establishing a risk management framework, integrating risk management into organizational processes, and continuously monitoring and improving risk management practices.
- **COSO** Enterprise Risk Management Framework: Provides a framework for managing risks across the entire organization, encompassing strategy, operations, reporting, and compliance. The COSO framework can be used to identify and assess risks related to PMO transformation and to develop control activities to mitigate these risks [44]. This strategic model will help determine what is the best way to manage a company risk.

By drawing upon these theories and frameworks, organizations can develop robust and effective risk management strategies to support PMO transformation in the construction industry.

3. METHODOLOGY

This study employs a quantitative research approach to provide a clear understanding of risk management in PMO transformation within the Indonesian construction industry. A quantitative approach is more feasible and scalable for this research given limited time.

3.1 Research Design

In the design of this research, a quantitative methodology was applied. In the first phase (quantitative), a large-scale survey will be conducted to collect data on PMO capabilities, transformation strategies, and risk management practices. The quantitative data will be analysed statistically to identify key relationships and patterns.

3.2 Data Collection Methods

- **Surveys:** A structured questionnaire will be administered to a sample of construction professionals in Indonesia. The questionnaire will gather quantitative data on identified risks associated with PMO implementation.
- **Delphi Technique:** The experts for determining mitigation strategies (experience minimal 15 years) and validate that strategy for PMO transformation.
- **Expert Validation:** Prior to quantitative analysis, it will also check instrument validity.

3.3 Sample Selection

The target population of this study comprises the seven State-Owned Enterprise (SOE) construction companies in Indonesia, along with other SOEs that are engaged in construction-related activities. Within these organizations, the following groups of individuals will be targeted:

- Project managers
- PMO staff
- PMO experts (individuals with 15+ years of experience in PMO and risk management).

Respondents will be selected based on the following criteria:

- Minimum education level: Bachelor's degree.
- Minimum years of experience in the project management and construction industry: 3 years.

Given the specificity of the target population and the limited number of SOE construction companies with established PMOs, a minimum of 30 respondents is considered sufficient to represent the diversity of professional perspectives within this niche group. This sample size aligns with recommendations for exploratory and descriptive studies, where 30 or more responses are generally regarded as adequate to identify meaningful patterns and relationships [62].

3.4 Data Analysis Techniques

The collected data will be analysed using a combination of statistical techniques:

- **Statistical Analysis:** Quantitative data from the surveys will be analysed using descriptive and inferential statistics. Descriptive statistics will be used to summarize the characteristics of the sample and the distribution of variables. Inferential statistics, such as correlation and factor analysis, will be used to test the relationships between variables and test research hypotheses.
- **Risk Matrix Application:** The identified risks will be analysed and prioritized using a risk matrix approach [11]. A probability-impact matrix will be constructed to visually represent the likelihood and potential impact of each risk.

This streamlined, quantitatively focused approach will provide a robust understanding of risk management in PMO transformation within the Indonesian construction industry.

4. RESULTS & DISCUSSION

This section presents the findings of the research, focusing on the key risks identified in PMO implementation within Indonesian construction companies and the mitigation strategies recommended by PMO experts

4.1 Responses Rates

A total of 52 respondents participated in this study, all of whom were professionals from state-owned construction enterprises (SOEs) in Indonesia with established Project Management Office (PMO) departments. All respondents had completed at least a bachelor's degree (S1), ensuring an adequate academic foundation to comprehend the study's context. In terms of professional roles, 4% were PMO Experts, 32% were Project Managers (PMs), 38% were PMO Staff, and the remaining respondents were PMO Stakeholders who contribute to supporting project management functions within their organizations.

Based on years of experience, 23% of respondents had less than 10 years of experience, 16.31% had between 10 and 15 years, and 46% had more than 15 years of experience in the project management and construction industry. This composition reflects a diverse range of expertise and perspectives, providing a comprehensive understanding of risk management practices and PMO transformation in Indonesia's state-owned construction sector.

4.2 Identification of Top Risks in PMO Implementation

Analysis of the survey data, gathered from Indonesian construction companies with established PMO departments, revealed a set of key challenges that impede the smooth operation and effectiveness of Project Management Offices. To properly deal with the results and have the best analysis possible, a well-defined risk matrix based on PMBOK was used. The factors that will have great impact are as follows:

Table 2. Top Ten Risks in PMO Implementation

Risk Ranking	Variable	Risk Category	Risk Factor	Risk Level
1	R29	Operational	Frequent and uncontrolled changes in project design	High
2	R08	Policy	Inefficient and unclear procurement processes	High
3	R17	Operational	Incomplete or ambiguous functional and technical specifications	High
4	R35	Organizational Culture	Slow and inefficient decision-making processes	High
5	R21	Operational	Inaccurate time estimates for completing project tasks	High
6	R23	Operational	Untimely identification and management of risks	High
7	R06	Policy	Differences in contract interpretation among involved parties	High
8	R09	Policy	Failure in contract negotiation and contractual risk evaluation	High
9	R37	Organizational Culture	Lack of coordination and communication	High
10	R05	Policy	Lack of clear definitions regarding project inclusions and exclusions	High

The findings reveal that within State-Owned Enterprise (SOE) PMOs, the most significant risks arise from operational and policy-related aspects, with the highest being *frequent and uncontrolled changes in project design*. This pattern reflects the broader characteristics of Indonesia's SOE construction industry which are large-scale, government-led projects that is often influenced by shifting public priorities, multiple stakeholder interests, and bureaucratic decision structures. These inherent conditions make project execution highly complex and risk prone.

1. **Frequent and Uncontrolled Changes in Project Design (Operational):** This risk, ranked highest, highlights the instability that can plague construction projects. This issue is common in SOE projects because many are strategic national projects (PSN) funded by the government. Project scopes often change due to policy revisions, political directives, or funding reallocations, resulting in frequent design modifications. These changes disrupt schedules and increase costs, reflecting the challenge of balancing technical execution with national development goals.
2. **Lack of clear and concise technical specifications**: Design and construction are often handled by different internal divisions or subcontractors under tight timelines. This separation, combined with pressures to start construction before detailed design completion, leads to insufficient technical documentation. As a result, the project teams

face ambiguities that cause design errors, delays, and rework. Technical specs must always be thorough and complete. All needs of the project must be well described to handle errors [49].

3. **Slow and inefficient Decision Making**: SOEs operate under multi-layered bureaucratic hierarchies, requiring approval from various managerial and governmental levels. Slow decision will make it difficult to proceed and may waste materials that the project may have. This comes with high costs [49].
4. **Poor Time estimation**: Many SOE projects are politically time-bound with tight deadlines. Poor estimation may lead to major costs and make stakeholders lack the support from the other parts of the companies. The process needs to be planned out accordingly [50].
5. **Problems in the details and interpretation in the contract**: Issues in the contract, whether it is with how someone understands the contract, or with the content of the contract, is a risk to the companies [51].
6. **Scope are not clearly identified** : This causes misunderstanding between the stakeholders and also cost a lot of money, thus PM must be placed in charge of that [32].
7. **Problems with inefficient and complex procurements**: The strict procurement regulations governing SOEs, designed to ensure transparency and accountability, also make the process lengthy and rigid. As found by Ershadi [52], this can make the process inefficient [53]and can result in the project coming short.
8. **Communications and Lack of Coordination.** Large SOE projects typically involve numerous stakeholders, creating communication gaps. Hierarchical reporting systems slow the exchange of information, while overlapping responsibilities between the PMO and project teams reduce coordination efficiency. Communication needs to be taken more care of, as a response [26] to bad implementation or not giving proper feedback.

Overall, these findings indicate that operational risks in Indonesian SOEs are not merely technical but are deeply rooted in institutional structures, governance systems, and regulatory obligations. Addressing these risks requires not only improved project management practices but also transformative changes in PMO governance, decision-making efficiency, and interdepartmental collaboration.

4.3 Recommended PMO Transformation Strategies for Risk Mitigation

Drawing upon the research findings and the established literature, this section proposes targeted strategies for PMO transformation aimed at mitigating the identified risks and fostering greater resilience within Indonesian SOE construction companies. These strategies are presented as evidence-based recommendations for practitioners seeking to enhance PMO effectiveness in managing project risks.

1. Strategic Alignment and Change Management

    - Establish a Robust Change Management Process: To counter resistance to change (Risk R29, "Frequent and uncontrolled changes in project design"), construction companies should establish a comprehensive change management process based on established frameworks (e.g., Kotter's 8-Step Model, Lewin's Change Management Model) [54], [55]. This process should include: clear communication, stakeholder engagement, and a defined escalation path for resolving conflicts. Stakeholders should understand every need for change.

- Develop Clearly Defined Change Control Procedures: Clear written protocols are key for success in implementing the right changes [22]. These should give a defined methodology to handle proposed changes to the work design [56].
- Conduct Proactive Risk Assessment and Mitigation: Early and repeated identification of prospective problems and how to deal with it. A thorough examination needs to be done before start of processes and more [48].
- Ensure Thorough Documentation of Changes: An ongoing maintenance and a clearly defined review operation can help in handling the problems with documentation [57]

2. Enhanced Stakeholder Collaboration and Communication

- Foster Effective Collaboration Among Stakeholders: To address risks stemming from differing interpretations of contracts (Risk R06), construction companies should foster effective collaboration among all project stakeholders, including owners, contractors, subcontractors, and designers [24].
- Establish Clear Communication Channels and Protocols: To facilitate collaboration and ensure alignment, establish clear communication channels and protocols among stakeholders. Protocols should define communication frequency, reporting requirements, and escalation procedures for addressing concerns [36].
- Implement Rigorous Review and Approval Processes: Before the design implementation, all issues in the process needs to be clearly defined and carefully go through [24].

3. Improved Scope Definition and Management

- Develop Clear and Comprehensive Project Scope Definition: To mitigate risks arising from a lack of clear project scope definition (Risk R05), construction companies should invest time and effort in developing a detailed and comprehensive project scope statement [11]. That statement should define, with all specificity, all goals, boundaries, deliverables, etc.
- Secure Documented Agreements Among Stakeholders: This must involve having a session with the personnel, key people and leaders from top down and all around [3].
- Create Detailed Work Breakdown Structure (WBS): A thorough and detailed structure can be a huge help in making sure everything is done in time (and that it goes smooth) [11].
- Establish robust change management framework that can solve or remove the source of problems that comes up in a smooth and easy way.

4. Optimizing Procurement Processes and Contract Management

- Streamline Procurement Processes: Ineffective procurement processes (Risk R08) can lead to delays, cost overruns, and quality issues. Optimizing procurement processes involves streamlining procedures, reducing bureaucratic hurdles, and leveraging technology to improve efficiency [58].
- Implement Clear and Consistent Procurement Standards and Procedures: Having clear standard makes implementation faster as well as efficient, something to improve as part of the PMO [59]. There must also be a solid and effective training programme available within the team.

- Skill Improvements with Negotiations There must also be an improvement to the negotiation skills needed in the organization [22]. PMO will then have support from senior levels to carry this out [31].
- Ensure Proper Training: Training is needed to make the skills better, (skills and training need to be part of the transformation [56].

5. Effective Time Management

- Detailed time analysis needs to be implemented. Detail analysis of time needs to be implemented for high quality success. This includes proper estimation, proper assessment and proper plans for contingencies with time frames that are appropriate [11].

4.4 Key Findings and Their Implications

The cornerstone of this study is its identification of key risks within PMO implementation, revealing a critical need to bridge strategy and project execution. The prominence of operational and policy risks underscores the importance of focusing on process optimization, effective communication, and well-defined governance structures [6], [11]. However, the continued presence of these risks suggests current efforts in this area are falling short [9] and that an investigation on the operationality of the project is critical

These varying dimensions and strategy of implementation are based and need to also focus on the different risks [22], [23] while also making sure the correct data and method are used [48]. It is important to note that all the companies need to focus on one goal. This study then will help other and show where these organizations are lacking in their ability to handle risk, and to see what must be done to enhance them.

The recommended mitigation strategies, as derived from the Delphi technique, emphasize the need for: (1) strong change management processes, (2) enhanced stakeholder collaboration and communication, (3) improved scope definition and management, (4) optimized procurement processes and contract management and (5) effective time management. These strategies emphasize what should be planned in order to save project to allow it to run in the vision of the PMO [8]. Implementation-wise, it is vital to know a way to help and handle, it is important to look at those with great communication (what is told and what is understood), both from and outside side (senior and operational), before starting

4.5 Comparison with Existing Literature

The findings of this study generally support the existing literature on PMOs and risk management. They reinforce the notion that PMOs can play a significant role in improving project outcomes by standardizing processes, enhancing communication, and mitigating risks [6], [20]. They also confirm the importance of contextual factors, such as organizational culture and management commitment, in shaping PMO effectiveness [22], [26].

However, this study extends the existing literature by specifically examining the risk management of PMO transformation in the Indonesian construction industry. By focusing on this specific context, the research provides insights into the unique challenges and opportunities associated with transforming PMOs in a developing country setting. These findings can inform the development of more context-specific and effective PMO models.

5. CONCLUSION AND RECOMMENDATIONS

This research investigated the critical issue of risk management in PMO transformation within Indonesia's construction industry. Through a quantitative research approach, this study identified

key risk factors that impede PMO implementation and proposed effective mitigation strategies. These findings offer practical guidance for construction companies seeking to enhance the performance of their PMOs and improve project outcomes.

5.1 Conclusions

The research findings highlight the following key conclusions:

1. Operational and Policy Risks are Paramount: The top-ranked risks identified in this study primarily fall within the operational and policy categories, underscoring the importance of focusing on process optimization, effective communication, and well-defined governance structures.
2. Proactive Risk Management is Critical: The best strategy for effective PMO is not enough and can only be insured with a proactive control in the long run.
3. Effective Communication and Stakeholder Engagement are Vital: Open communication and good interaction skills needs to be there for it to take place.

5.2 Recommendations

Based on these conclusions, the following recommendations are offered to guide PMO transformation and risk management in the Indonesian construction industry:

- Prioritize Standardization and Process Optimization: Construction companies should focus on streamlining operational processes, implementing standardized methodologies, and improving knowledge management practices within their PMOs [2]. These strategies are essential for addressing the most prevalent risks related to frequent design changes, ambiguous specifications, and inaccurate time estimates.
- Develop Customized Risk Response: For each category, a certain step needs to be in place to make sure that risks that have to do with the group's performance is well thought out. A thorough assessment needs to be done on the budget [32].
- Foster a Collaborative and Transparent Organizational Culture: There is a need for a strong culture of communication so to handle the transformation effectively.
- Empower Senior Management: High managerial influence (from senior) can go a long way and help PMO be able to achieve its function [22]. With high support, things will be set up as needed and PMO will thus improve productivity [31].

5.3 Limitations and Future Research

This study has certain limitations that should be acknowledged. First, the quantitative research approach may not capture the nuances and complexities of risk management in PMO transformation as fully as a qualitative study. Second, the sample is not randomly selected but specific company, which means there would be some potential for bias.

Future research should focus on:

- Conducting risk identification on other type of companies such as private owned companies or exploring to other industries not limited to construction.
- Conducting in-depth case studies to provide a richer understanding of the challenges and successes of PMO transformation in Indonesian construction companies.
- Developing and testing specific risk management interventions to assess their effectiveness in mitigating PMO transformation risks.

- Exploring the role of leadership, organizational culture, and other contextual factors in shaping PMO transformation outcomes.

By addressing these limitations and pursuing further research, the Indonesian construction industry can continue to advance its PMO practices and improve project outcomes.

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