

Barriers to Lean Construction Implementation in Indonesia: A Systematic Literature Review

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ABSTRACT	ARTICLE DETAILS
<p>Despite its potential to eliminate high material waste and improve productivity, Lean Construction (LC) adoption in Indonesia remains stagnant. This study identifies the primary barriers to LC implementation through a Systematic Literature Review of publications from 2016–2026. Using thematic analysis, the research categorizes inhibitors into four dimensions: Cultural/HR, Technical/Managerial, Financial, and Structural/Contractual. The results indicate that cultural resistance and low Lean literacy are the most significant hurdles, followed by fragmented procurement models. This paper proposes a sociotechnical transition that integrates BIM with local cooperative values (<i>Gotong Royong</i>). The findings provide a strategic foundation for policymakers to develop standardized Lean procurement regulations and curriculum reforms to enhance the sustainability of the Indonesian construction industry.</p>	<p>Published On: 28 April</p>
<p>KEYWORDS: Lean Construction, Barriers, Indonesia, Systematic Literature Review, Policy.</p>	<p>Available on: https://ijmir.com</p>

INTRODUCTION

The construction industry is a cornerstone of Indonesia's national economic development, particularly as the government continues to accelerate strategic infrastructure and high-rise building projects (Candraningtyas & Wiguna, 2026). However, this sector remains plagued by persistent inefficiencies. Recent data indicates that construction waste in Indonesia can reach as high as 57% (Irfandi et al., 2023), driven by design changes, low worker skill levels, and poor coordination among stakeholders. Putra & Machfudiyanto, (2025) stated that traditional project management approaches, which are often reactive and fragmented, struggle to mitigate these losses, leading to frequent schedule delays and cost overruns.

To address these chronic issues, Lean Construction (LC) has been introduced as a management philosophy focused on maximizing value while minimizing waste through continuous improvement (Al Fahmi, 2022). By redefining construction as a production system, LC aims to synchronize material and information flows to ensure project reliability (UI Scholars Hub, 2025). Despite its theoretical benefits, the adoption of LC in Indonesia is still in its early stages and faces a steep upward climb. Irfandi et al., (2023) & Candraningtyas and Wiguna, (2026) explained that while some large-scale mega-projects have begun to experiment with Lean tools, the broader industry continues to rely on conventional methods that often ignore the interconnectedness of project activities.

The slow pace of adoption suggests a complex array of barriers unique to the Indonesian context. Current research highlights that resistance to changing established work methods and a deeply ingrained conventional work culture are primary inhibitors (Sinergi, 2026 & Irfandi, 2023). Furthermore, a lack of top management commitment and insufficient training programs have created a significant knowledge gap among practitioners (Subekti, et al, 2025). Without a clear understanding of Lean principles, many firms perceive the initial implementation costs as a financial burden rather than a long-term investment (Al Fahmi, 2022 & Putra, 2025).

Given these challenges, there is an urgent need to systematically map the barriers that prevent the Indonesian construction industry from evolving. This study employs a Systematic Literature Review (SLR) to consolidate findings from the last decade (2016–2026). By identifying and categorizing these inhibitors—ranging from managerial and technical to social and economic factors—this paper aims to provide a comprehensive framework for stakeholders to develop effective mitigation strategies. Ultimately, this research contributes to the discourse on how Indonesia can transition toward a more efficient, competitive, and sustainable construction industry.

METHODOLOGY

This study employs a Systematic Literature Review (SLR) to identify and analyze the barriers to Lean Construction (LC) implementation in Indonesia. This qualitative approach allows for a comprehensive synthesis of existing research without the requirement of primary field data.

The research was conducted through the following stages:

1. **Data Acquisition** A systematic search was performed across academic databases, including Google Scholar, ResearchGate, and Indonesian University Repositories (UI, ITB, ITS). The search focused on publications from the last decade (2016–2026) to ensure contemporary relevance. Key search terms included "*Lean Construction Indonesia*," "*Hambatan Konstruksi Ramping*," and "*Construction Waste Management*."
2. **Screening and Selection** From the initial pool of identified papers, articles were selected based on three criteria:
 - Focus specifically on the Indonesian construction industry.
 - Explicitly discuss challenges or barriers to implementation.
 - Peer-reviewed journal articles or formal academic theses.
3. **Thematic Analysis** The selected literature was analyzed using Thematic Synthesis. Identified barriers were extracted and categorized into four thematic clusters: Cultural/HR, Technical/Managerial, Financial, and Structural. These categories were chosen to match the multidisciplinary nature of the industry and to provide a structured framework for the subsequent discussion.

RESULTS AND DISCUSSION

Based on the systematic analysis of the selected literature, the identified barriers were synthesized and categorized into four thematic clusters. Table 1 provides a summary of these barriers along with their perceived impact levels on the Indonesian construction industry.

Table 1: Categorization and Impact Level of Barriers to Lean Construction in Indonesia.

Theme	Key Barriers	Impact Level
Cultural/HR	Resistance to change, Lack of Lean literacy	Very High
Managerial	Low top-management support, Lack of training	High
Financial	Perceived high costs, Low profit margins	Medium
Structural	Fragmented contracts, Subcontractor silos	Medium

The results of this systematic review indicate a clear hierarchy of barriers, with Cultural/HR and Managerial factors exerting the most significant influence on Lean Construction (LC) adoption in Indonesia. The following discussion interprets these findings in the context of the Indonesian construction landscape.

1. The Dominance of Cultural and Human Behavior

As indicated in Table 1, cultural barriers carry a "Very High" impact. This suggests that the primary challenge is not a lack of technology, but a deep-seated organizational inertia. The "Resistance to Change" identified in the literature (Putra & Machfudiyanto, 2025) is often rooted in the traditional Indonesian construction culture, where seniority and "tried-and-tested" methods are prioritized over innovative efficiency.

Furthermore, the "Lack of Lean Literacy" (Al Fahmi, 2022) acts as a bottleneck. When workers and middle management view Lean simply as a tool to "work faster" rather than a philosophy to "eliminate waste," the implementation becomes superficial. Without a fundamental shift in mindset, tools like the Last Planner System (LPS) are often abandoned the moment a project faces a crisis, as practitioners revert to the traditional "push" methods they trust.

2. The Critical Role of Top Management and Training

Managerial barriers are rated as "High" impact because they serve as the bridge between theory and practice. The literature emphasizes that without a "top-down" mandate, Lean initiatives remain isolated (Manurung, et al, 2026). In many Indonesian firms, there is a disconnect where executive boards demand efficiency but fail to provide the necessary "Shortage of Training" resources to achieve it. This creates a cycle where Lean is expected to yield immediate results without the required investment in human capital development (Candraningtyas & Wiguna, 2026).

3. Economic Perception vs. Reality

While Financial barriers are rated as "Medium" impact, they play a crucial psychological role. In the highly competitive bidding environment of Indonesia, contractors operate with thin profit margins (Irfandi et al., 2023). This leads to a "Short-termism" trap: firms are so focused on immediate direct-cost savings that they ignore the long-term ROI of Lean practices. The "Perceived High Initial Cost" is often an exaggerated barrier; literature suggests that the cost of *not* implementing Lean (in the form of material waste and delays) far exceeds the cost of training and consultancy (Putra & Machfudiyanto, 2025).

4. Structural Fragmentation and Contractual Limitations

Structural barriers, though rated "Medium," represent the systemic environment that prevents Lean from thriving. The traditional "Design-Bid-Build" procurement model creates silos that contradict Lean's requirement for Early Contractor Involvement (ECI) (Nwaki, et al, 2025). When designers, contractors, and subcontractors have conflicting financial incentives, collaboration—the heart of Lean—becomes difficult to enforce contractually.

5. Synthesizing a Solution: The "Lean-BIM" and "Gotong Royong" Synergy

A recurring theme in recent literature (2024–2026) is the potential for Building Information Modeling (BIM) to overcome technical barriers. BIM provides the visual clarity that manual reporting lacks, making "waste" visible to all stakeholders (Subekti, et al, 2025).

However, the most unique finding for the Indonesian context is the potential to leverage the local value of "Gotong Royong" (mutual cooperation). While cultural barriers are high, the inherent communal spirit in Indonesian society can be harnessed to facilitate "Collaborative Planning." By rebranding Lean Construction not as a Western import but as a modern, structured version of *Gotong Royong*, contractors can reduce social resistance and build a more inclusive, Lean-compliant work environment (Manurung, et al, 2026).

In summary, the implementation of Lean Construction in Indonesia is hindered by a complex interdependence of factors that must be addressed simultaneously rather than in isolation. The cultural and human resource barriers act as the foundational challenge, where the lack of Lean literacy and deep-seated resistance to change create a barrier for even the most well-intended top management mandates. This situation is further exacerbated by financial perceptions, where the short-term focus on thin profit margins overshadows the long-term economic benefits of waste reduction. Furthermore, the structural fragmentation of the industry provides little contractual incentive for stakeholders to break their silos and collaborate.

However, the path forward lies in a synergistic approach: by utilizing BIM as a technical catalyst and "Gotong Royong" as a cultural anchor, the Indonesian construction industry can transform these barriers into opportunities for modernization. To achieve this, a transition from "fragmented competition" to "integrated collaboration" is essential. Policy interventions that encourage Early Contractor Involvement (ECI) and the inclusion of Lean education in academic curricula will be the deciding factors in whether Lean Construction becomes a standard industry practice or remains a marginalized concept in the Indonesian landscape.

CONCLUSION

This study has systematically reviewed and synthesized the existing literature from the past decade (2016–2026) to identify the critical barriers to Lean Construction (LC) implementation in Indonesia. The findings demonstrate that while LC offers a robust solution to the chronic issues of productivity and waste in the national construction sector, its adoption is hindered by a complex interplay of internal and external factors.

The primary conclusion of this research is that cultural and human resource barriers constitute the most significant hurdle. The deeply ingrained conventional mindset, coupled with a lack of fundamental Lean literacy among practitioners, creates a substantial gap between theoretical potential and site-level execution. These challenges are compounded by a lack of consistent top-management commitment and a shortage of specialized training, which prevent Lean from becoming a core organizational strategy. Furthermore, the prevailing "Design-Bid-Build" procurement model in Indonesia fosters a fragmented environment that is structurally at odds with Lean's requirement for integrated collaboration.

Based on the synthesis of findings, this study proposes several critical recommendations for stakeholders:

1. For Policy Makers: There is a need for standardized Lean education in engineering curricula and the development of government incentives for contractors who successfully reduce construction waste.
2. For Industry Practitioners: Firms should shift their perception of Lean from an "overhead cost" to a strategic investment, utilizing digital tools like BIM as a technical entry point to facilitate Lean processes.
3. For Academic Researchers: Future studies should focus on developing a localized "Lean-Indonesian Framework" that integrates universal Lean principles with indigenous collaborative values such as *Gotong Royong*.

PRACTICAL IMPLICATIONS

The findings of this study offer several critical implications for stakeholders within the Indonesian construction industry:

1. For Construction Firms and Project Managers: Management should prioritize a "People-First" transition strategy. Instead of focusing solely on technical tools, firms must invest in comprehensive Lean certification and training programs to bridge the literacy gap and reduce psychological resistance to change among field staff.

2. For Top Management: Leaders must move beyond treating Lean as a pilot project and integrate it into the corporate strategic vision. Providing clear incentives and fostering an organizational culture that rewards transparency and waste identification is essential for long-term sustainability.
3. For Project Owners and Government Bodies: There is a practical need to reform procurement strategies. Shifting from traditional fragmented contracts to more collaborative models, such as Integrated Project Delivery (IPD), will provide the legal and structural foundation necessary for Lean principles to thrive.
4. For Technology Integration: Practitioners should leverage Building Information Modeling (BIM) as a "visual vehicle" for Lean. Implementing BIM-Lean integration can practically reduce technical barriers by making workflow bottlenecks and material waste visible to all stakeholders in real-time.

POLICY IMPLICATIONS

The synthesis of barriers identified in this study highlights the need for systemic policy interventions to foster a more conducive environment for Lean Construction in Indonesia. The following policy implications are proposed:

1. Standardization of Lean in Public Procurement: The Indonesian government, through the Ministry of Public Works and Housing (PUPR), should consider integrating Lean performance metrics into the procurement criteria for strategic national projects. By requiring contractors to demonstrate "Waste Management Plans" or the use of "Collaborative Planning" tools during the bidding stage, the state can drive industry-wide adoption from the top down.
2. Reform of Contractual Frameworks: To overcome structural fragmentation, policymakers should develop and legalize standardized collaborative contract templates, such as Integrated Project Delivery (IPD) or Early Contractor Involvement (ECI) models. These frameworks provide the legal security necessary for designers and contractors to share risks and rewards, which is the operational backbone of Lean Construction.
3. Educational Curriculum Integration: The Ministry of Education and professional certification bodies (such as LPJK) should collaborate to standardize Lean Construction as a mandatory component of civil engineering and project management curricula. Institutionalizing Lean literacy at the academic level ensures that the next generation of engineers enters the workforce with a "Lean-first" mindset, addressing the human resource gap at its source.
4. Development of National Benchmarking Systems: Policymakers should establish a national database or benchmarking system for construction productivity and waste. By providing transparent industry standards, the government can create a competitive atmosphere where firms are incentivized to adopt Lean practices to maintain their "efficiency rating" and eligibility for large-scale public tenders.
5. Fiscal Incentives for Lean-BIM Adoption: To mitigate financial barriers, the government could offer tax incentives or subsidies for firms investing in digital transformation technologies (such as BIM) that are integrated with Lean processes. This would lower the entry barrier for Small and Medium Enterprises (SMEs) to modernize their management systems.

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