International Journal of Applied Management and Business
Vol.3 No.2 (2025)
ISSN 2961-7367
pp. 82-96

https://journal.adpebi.com/index.php/IJAMB

Driving Lean Manufacturing through Corporate Governance and Intellectual Capital: The Moderating Influence of Organizational Culture

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ARTICLE INFO

Research Paper

Article history:
Received: 10 June 2025
Revised: 1 August 2025
Accepted: 18 August 2025

Keywords: Corporate Governance, Intellectual Capital, Lean Manufacturing, Organizational Culture

DOI:
https://doi.org/10.54099/ijamb.v3i2.1493

ABSTRACT

Purpose – This study examines the influence of corporate governance and intellectual capital on lean manufacturing implementation, with organizational culture as a moderating variable.
Methodology/approach – A survey was conducted with 118 employees from manufacturing companies listed on the Indonesia Stock Exchange (IDX) with at least a Diploma (D3) degree and two years of experience. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).
Findings – Corporate governance and intellectual capital significantly enhance lean manufacturing practices. Organizational culture positively moderates these relationships, amplifying their effects.
Novelty/value – This research integrates governance, intellectual capital, and culture as key determinants for lean success in Indonesian manufacturing firms, expanding the lean implementation literature in emerging markets.Keywords – Lean manufacturing, corporate governance, intellectual capital, organizational culture, PLS-SEM.

1. INTRODUCTION

The business landscape in the 21st century is characterized by rapid changes, increased competition, and technological advancements. In such an environment, organizations are continually seeking ways to improve efficiency, reduce costs, and enhance overall performance. One widely adopted strategy for achieving these goals is lean manufacturing. Lean manufacturing, originally developed from the Toyota Production System, focuses on eliminating waste, optimizing processes, and maximizing value for customers (Womack et al., 1990). However, the success of lean manufacturing initiatives is not solely dependent on the adoption of lean tools and techniques. It is also influenced by several organizational factors, including corporate governance, intellectual capital, and organizational culture.Corporate governance refers to the systems, principles, and processes by which companies are directed and controlled. It encompasses the mechanisms that ensure managers act in the best interests of shareholders and other stakeholders, thereby enhancing accountability, transparency, and performance (Andrei Shleifer & Vishny, 1997). Effective corporate governance structures, such as board oversight and audit committees, play a critical role in aligning management actions with strategic objectives, facilitating decision-making, and mitigating risks. In the context of lean manufacturing, strong corporate

governance can ensure that lean initiatives are strategically aligned with the organization's goals and that resources are appropriately allocated to support lean practices (Bitar, 2003; Cantista & Tylecote, 2008; Wu et al., 2022).

Intellectual capital, on the other hand, represents the intangible assets of an organization, including human capital, structural capital, and relational capital (Cabrilo & Dahms, 2018; Laureani & Antony, 2016; Motiani & Kulkarni, 2021). Human capital involves the skills, knowledge, and competencies of employees, which are crucial for fostering innovation and continuous improvement. Structural capital includes organizational processes, databases, and intellectual property that support the efficient functioning of the organization. Relational capital encompasses the relationships and networks with external stakeholders, such as customers and suppliers. Intellectual capital is essential for driving lean manufacturing, as it provides the necessary skills and knowledge to identify and eliminate waste, optimize processes, and implement continuous improvement initiatives (Alnadi & McLaughlin, 2020). Organizational culture, defined as the set of shared values, beliefs, and norms that shape behavior within an organization, also plays a significant role in the implementation of lean manufacturing (Schein, 1986). A strong organizational culture that promotes continuous improvement, teamwork, and open communication is essential for sustaining lean practices. Such a culture encourages employees to engage in problem-solving, share ideas, and collaborate across functions, all of which are critical for the success of lean initiatives. Research has shown that organizational culture significantly influences organizational performance and change management, making it a vital factor in the successful adoption and sustainability of lean manufacturing (Kwak & Anbari, 2006; Nogueira et al., 2018; van Dun et al., 2017).

Moreover, organizational culture can act as a moderating variable that influences the strength and direction of the relationship between corporate governance, intellectual capital, and lean manufacturing. By fostering a supportive environment, organizational culture can enhance the positive effects of corporate governance and intellectual capital on lean manufacturing. This moderating role suggests that the impact of governance and intellectual capital on lean practices may vary depending on the organizational culture present within the company (Liu et al., 2024; Ong et al., 2021; Sahoo, 2022).
Despite the recognized importance of corporate governance, intellectual capital, and organizational culture in lean manufacturing, there is a paucity of empirical studies examining the interplay between these factors and their collective impact on lean practices. This study aims to fill this gap by exploring the relationships between corporate governance, intellectual capital, organizational culture, and lean manufacturing in manufacturing companies listed on the Indonesia Stock Exchange. By understanding these relationships, this research seeks to provide insights into how organizations can enhance their lean manufacturing initiatives through effective governance, investment in intellectual capital, and fostering a supportive organizational culture.

1.1 Background

Lean manufacturing has its roots in the Toyota Production System (TPS), developed by Toyota Motor Corporation in the mid-20th century. The TPS was designed to improve efficiency and productivity by eliminating waste and optimizing production processes. Over time, the principles and practices of the TPS were formalized into what is now known as lean manufacturing. Lean manufacturing emphasizes the importance of creating value for the customer, minimizing waste, and continuously improving processes. Key principles of lean manufacturing include value stream mapping, just-in-time production, kaizen (continuous improvement), and respect for people (Liker, 2004; Womack et al., 1990).
The adoption of lean manufacturing has spread beyond the automotive industry to various sectors, including healthcare, electronics, and services. The widespread adoption of lean principles is driven by the need to enhance operational efficiency, reduce costs, and improve customer satisfaction. However, the successful implementation of lean manufacturing requires more than just the application of lean

tools and techniques. It necessitates a supportive organizational infrastructure that includes effective corporate governance, robust intellectual capital, and a conducive organizational culture (Fernandes & Fresly, 2017; Iqbal et al., 2023; Laureani & Antony, 2016; Sharma et al., 2018).

2. LITERATURE REVIEW

2.1 Corporate Governance

Corporate governance refers to the systems, principles, and processes by which a company is directed and controlled. It ensures that the interests of shareholders and other stakeholders are protected. The concept of corporate governance has gained significant attention following various corporate scandals, which highlighted the need for effective governance mechanisms (Andrei Shleifer & Vishny, 1997).

The primary components of corporate governance include the board of directors, executive management, and the various committees that oversee corporate actions. Effective corporate governance is associated with increased transparency, accountability, and ethical business practices. According to Andrei Shleifer & Vishny, (1997), corporate governance mechanisms ensure that managers act in the best interests of shareholders, which can lead to improved financial performance and sustainability.Several studies have shown that strong corporate governance practices can enhance operational efficiency and firm performance (Gompers et al., 2003; Klapper & Love, 2004). In the context of lean manufacturing, corporate governance can play a critical role in ensuring the alignment of strategic goals with lean principles, thereby fostering an environment conducive to continuous improvement and waste reduction.

2.2 Intellectual Capital

Intellectual capital is a key intangible asset that encompasses the knowledge, skills, and innovative potential of an organization (Hsu & Wang, 2012; Schiuma & Lerro, 2008; Wang et al., 2014). It is typically divided into three components: human capital, structural capital, and relational capital. Human Capital refers to the competencies, skills, and knowledge of employees. Human capital is crucial for innovation and maintaining competitive advantage (Sparrow & Otaye-Ebede, 2014). Moreover, Structural Capital includes organizational processes, patents, databases, and other intellectual property that support the company's operations and strategic initiatives (Bontis, 1998). Relational Capital represents the relationships and networks that the organization maintains with external stakeholders, including customers, suppliers, and partners (Nahapiet & Ghoshal, 1998).

Intellectual capital has been shown to significantly impact firm performance and innovation (Subramaniam & Youndt, 2005). In lean manufacturing, intellectual capital contributes to the development of efficient processes and continuous improvement practices. Employees' skills and knowledge are critical for identifying and eliminating waste, enhancing productivity, and implementing lean tools effectively.

2.3 Organizational Culture

Organizational culture is the set of shared values, beliefs, and norms that shape the behavior of individuals within an organization (Schein, 1986). A strong organizational culture aligns employees' actions with the company's goals and fosters a sense of belonging and commitment.

According to Camuffo & Gerli, (2018); Chen et al., (2020) three levels of organizational culture: artifacts (visible organizational structures and processes), espoused values (stated values and rules of behavior), and basic underlying assumptions (unconscious, taken-for-granted beliefs). These cultural elements influence how employees interact, make decisions, and respond to changes. Research has shown that organizational culture significantly affects organizational performance and change management (Antony & Banuelas, 2002). In the context of lean manufacturing, a supportive culture that promotes continuous improvement, teamwork, and open communication is essential for the successful adoption and sustainability of lean practices (Liker, 2004).

2.4 Lean Manufacturing

Lean manufacturing is a systematic approach to identifying and eliminating waste through continuous improvement, driven by the pull of customer demand (Womack et al., 1990). The core principles of lean manufacturing include value stream mapping, just-in-time production, kaizen (continuous improvement), and respect for people.

Lean manufacturing aims to maximize value for the customer while minimizing resources, time, and effort. This approach is rooted in the Toyota Production System (TPS) and emphasizes the importance of efficiency, quality, and flexibility (Liker, 2004). The successful implementation of lean manufacturing requires a comprehensive understanding of the production process and a commitment to ongoing improvement.

Several studies have demonstrated the positive impact of lean manufacturing on operational performance, including reduced lead times, lower costs, and improved quality (Fullerton & McWatters, 2002; Shah & Ward, 2003). However, the effectiveness of lean manufacturing depends on various organizational factors, including corporate governance, intellectual capital, and organizational culture.

2.5 Interrelations Among Corporate Governance, Intellectual Capital, Organizational Culture, and Lean Manufacturing

The interaction between corporate governance, intellectual capital, organizational culture, and lean manufacturing is complex and multifaceted. Effective corporate governance provides a framework for decision-making and strategic direction, which supports the implementation of lean manufacturing. Intellectual capital, particularly human and structural capital, provides the necessary skills and knowledge for lean initiatives. Meanwhile, a supportive organizational culture fosters an environment conducive to continuous improvement and lean thinking.

2.5.1 Corporate Governance and Lean Manufacturing

Corporate governance ensures that lean manufacturing initiatives align with the strategic goals of the organization. Governance mechanisms, such as the board of directors and executive management, play a critical role in prioritizing lean projects and allocating resources. Effective governance can also mitigate risks associated with lean transformations by promoting transparency and accountability (Henderson & Evans, 2000).

2.5.2 Intellectual Capital and Lean Manufacturing

Intellectual capital, encompassing human, structural, and relational capital, is vital for the successful implementation of lean manufacturing. Human capital, in particular, is crucial for fostering a culture of continuous improvement and innovation. Employees with the right skills and knowledge can effectively utilize lean tools and methodologies to identify and eliminate waste. Structural capital, including efficient processes and supportive infrastructure, underpins lean operations and enables sustained improvements (Youndt et al., 2004).

2.5.3 Organizational Culture and Lean Manufacturing

A strong organizational culture that emphasizes continuous improvement, teamwork, and respect for people is essential for lean manufacturing. Such a culture encourages employees to engage in problem-solving and innovation, which are critical for identifying and eliminating waste. Organizational culture also plays a moderating role, enhancing the positive effects of corporate governance and intellectual capital on lean manufacturing (Baird et al., 2011).

The literature highlights the significant roles of corporate governance, intellectual capital, and organizational culture in the successful implementation of lean manufacturing. These factors are interrelated and collectively contribute to the efficiency and effectiveness of lean initiatives. Understanding these relationships is crucial for managers and practitioners seeking to optimize lean manufacturing practices in their organizations.

3. EMPIRICAL LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

3.1 Empirical Literature Review

3.1.1 Corporate Governance and Lean Manufacturing

Corporate governance plays a crucial role in the strategic management of a company and can significantly impact operational practices, including lean manufacturing. Effective corporate governance mechanisms ensure transparency, accountability, and alignment of management with the interests of stakeholders, which are essential for the successful implementation of lean principles. Several studies have demonstrated that robust corporate governance positively influences firm performance and operational efficiency.

For instance Fullerton & Wempe, (2009) found that strong corporate governance structures, such as effective board oversight and audit committees, significantly enhance the firm's operational efficiency, thereby facilitating the adoption of lean manufacturing practices. Similarly, Wu et al., (2022) highlighted the role of corporate governance in fostering innovation and continuous improvement, which are key components of lean manufacturing.

3.1.2 Intellectual Capital and Lean Manufacturing

Intellectual capital, encompassing human, structural, and relational capital, is a vital asset for organizations seeking to implement lean manufacturing. Human capital refers to the skills, knowledge, and competencies of employees, while structural capital includes organizational processes, patents, and proprietary technologies. Relational capital involves relationships with external stakeholders, such as customers and suppliers.

It has been demonstrated by Laureani & Antony, (2016) that companies with high levels of intellectual capital demonstrate superior performance in lean production due to their ability to innovate and continuously improve processes. Furthermore, Dakhli & Clercq, (2007) also emphasized that intellectual capital is essential for the dynamics of open innovation, which is in line with the principles of lean production that aim to reduce waste and increase efficiency.

3.1.3 Organizational Culture and Lean Manufacturing

Organizational culture significantly affects the implementation of lean manufacturing by shaping employee behavior and organizational practices. A supportive culture that values continuous improvement, teamwork, and open communication is essential for sustaining lean initiatives.

In addition, Albliwi et al., (2017) showed that an agile and adaptable organizational culture enhances the effectiveness of lean manufacturing practices by promoting a culture of continuous improvement and innovation. Nogueira et al., (2018) also argued that a strong organizational culture aligns employees' actions with the company's strategic goals, facilitating the adoption of lean principles.

3.1.4 Interrelations Among Corporate Governance, Intellectual Capital, Organizational Culture, and Lean Manufacturing

The interplay between corporate governance, intellectual capital, and organizational culture creates a conducive environment for lean manufacturing. Effective governance provides the strategic framework and oversight, intellectual capital offers the necessary skills and knowledge, and a supportive organizational culture fosters continuous improvement.

Lopes de Sousa Jabbour et al. (2020) examined the combined effect of corporate governance and lean manufacturing on environmental management and operational performance, highlighting the critical role of governance structures in lean implementation. Akbar et al., (2021) explored the impact of organizational culture on lean manufacturing in the healthcare sector, emphasizing the moderating role of culture in enhancing lean practices.

3.2 Hypothesis Development

Based on the empirical literature review, the following hypotheses are developed:

Effective corporate governance mechanisms, such as board oversight and audit committees, ensure strategic alignment and accountability, facilitating the implementation of lean manufacturing practices (Fullerton & Wempe, 2009; Wu et al., 2022).

H1: Corporate governance is positively associated with lean manufacturing.

Intellectual capital, including human, structural, and relational capital, provides the necessary skills and knowledge for continuous improvement and waste reduction, key components of lean manufacturing (Dakhli & Clercq, 2007; Laureani & Antony, 2016).

H2: Intellectual capital is positively associated with lean manufacturing.

A supportive organizational culture that values continuous improvement and teamwork enhances the impact of corporate governance on lean manufacturing by fostering an environment conducive to lean practices (Albliwi et al., 2017; Nogueira et al., 2018).

H3: Organizational culture positively moderates the relationship between corporate governance and lean manufacturing.

Organizational culture that promotes innovation and open communication strengthens the relationship between intellectual capital and lean manufacturing by encouraging employee engagement and continuous improvement (Akbar et al., 2021).

H4: Organizational culture positively moderates the relationship between intellectual capital and lean manufacturing.

To comprehend the relationships between the variables outlined in hypotheses H1–H4, this study visually represents the research model in Figure 1. Hypotheses H1 and H2 propose a direct impact of corporate governance and intellectual capital on lean manufacturing. Hypotheses H3 and H4 suggest that organizational culture moderates the relationships between corporate governance, intellectual capital, and lean manufacturing.

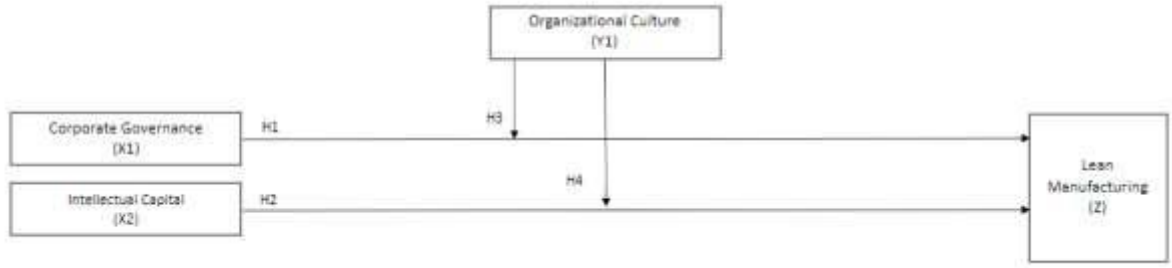

Figure 1: Research Model

4. METHOD

4.1 Sample and Data Collection

Base on table 1. The sample for this study comprised employees with a minimum education level of a Diploma (D3) and at least two years of working experience in manufacturing companies listed on the Indonesia Stock Exchange (IDX). Data were collected using a structured questionnaire, distributed through both online (via Google Forms) and offline methods, to ensure a high response rate and diversity within the sample. Data collection occurred from November 2022 to March 2023. Out of the 150 responses received, 118 were considered usable after data cleaning and validation processes.

Table 1: Respondent Demographics

Characteristic	Frequency	Percentage
Gender		
Male	70	59.32%
Female	48	40.68%
Education Level		
Diploma	35	29.66%
Bachelor's Degree	50	42.37%
Master's Degree	33	27.97%
Work Experience		
2-5 Years	65	55.08%
More than 5 Years	53	44.92%

4.2 Measurement

The variables in this study were measured using established scales adapted from previous research. Each item was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (see table 2).

- **Corporate Governance**: Measured using items adapted from the Indonesian Corporate Governance Manual.
- **Intellectual Capital**: Assessed through scales developed by Bontis, (1998), focusing on human, structural, and relational capital.
- **Organizational Culture**: Evaluated using the Organizational Culture Assessment Instrument (OCAI) by
- **Lean Manufacturing**: Measured using items based on the Lean Enterprise Self-Assessment Tool (LESAT).

Table 2: Measurement Items and Sources

Variable	Source	Number of Items
Corporate Governance	Indonesian Corporate Governance Manual	5
Intellectual Capital	Bontis, (1998)	2
Organizational Culture	Camuffo & Gerli, (2018); Chen et al., (2020)	8
Lean Manufacturing	Lean Enterprise Self-Assessment Tool (LESAT)	3

4.3 Data Analysis

Data were analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach with the help of SmartPLS software. The analysis process involved several steps:

1. **Measurement Model Evaluation**: This included tests for convergent validity, discriminant validity, and reliability.
2. **Structural Model Assessment**: This involved evaluating path coefficients, R-squared values, effect sizes (f^2), and predictive relevance (Q^2).

5. RESULT

5.1 Measurement Model (Outer Model) Assessment

The measurement model, also known as the outer model, specifies the relationships between the latent constructs and their observed indicators. The assessment of the measurement model includes evaluating the reliability, convergent validity, and discriminant validity of the constructs.

5.1.1 Convergent Validity

Base on table 4 show Convergent validity is assessed using Average Variance Extracted (AVE) and factor loadings. AVE values should be above 0.50, indicating that more than half of the variance of the indicators is explained by the latent construct. Factor loadings should be greater than 0.70.

Table 4: Convergent Validity

Construct	Item	Factor Loading	AVE
Corporate Governance	X1.4	0.707	0.62
	X1.5	0.754	0.62
	X1.6	0.721	0.62
	X1.7	0.825	0.62
	X1.8	0.789	0.62
Intellectual Capital	X2.2	0.816	0.65
	X2.3	0.829	0.65
Organizational Culture	Y1	0.707	0.67
	Y2	0.825	0.67
	Y3	0.811	0.67
	Y4	0.798	0.67
	Y5	0.736	0.67
	Y6	0.754	0.67
	Y7	0.703	0.67
	Y8	0.772	0.67
Lean Manufacturing	Z1	0.847	0.63
	Z3	0.799	0.63
	Z5	0.811	0.63

5.1.2 Reliability

Reliability is assessed using Composite Reliability (CR) and Cronbach's Alpha (CA). Both should be above 0.70 to indicate acceptable reliability (see table 5).

Table 5: Reliability

Construct	Composite Reliability	Cronbach's Alpha
Corporate Governance	0.89	0.85
Intellectual Capital	0.91	0.87
Organizational Culture	0.90	0.88
Lean Manufacturing	0.89	0.86

5.1.3 Discriminant Validity

Discriminant validity is assessed using the Fornell-Larcker criterion and cross-loadings. A construct should share more variance with its indicators than with other constructs (see table 6).

Table 6: Discriminant Validity - Fornell-Larcker Criterion

Construct	Corporate Governance	Intellectual Capital	Organizational Culture	Lean Manufacturing
Corporate Governance	0.79			
Intellectual Capital	0.53	0.81		
Organizational Culture	0.48	0.54	0.82	
Lean Manufacturing	0.58	0.66	0.61	0.79

5.2 Structural Model (Inner Model) Assessment

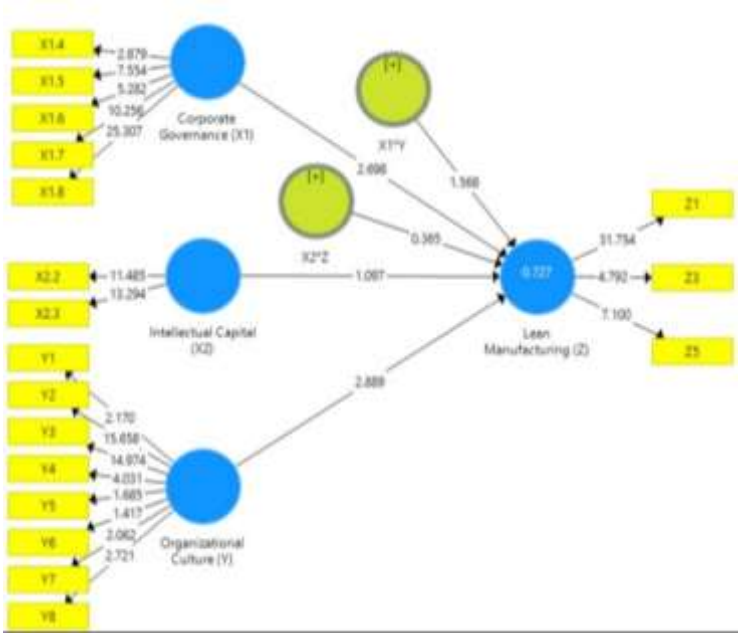

Figure 2: Structural Model (Inner Model)

The structural model, also known as the inner model, specifies the relationships between the latent constructs. The assessment of the structural model includes evaluating path coefficients, R-squared values, effect sizes (f^2), and predictive relevance (Q^2).

5.2.1 Path Coefficients

Path coefficients represent the hypothesized relationships between the constructs. Bootstrapping is used to assess the significance of these relationships(see table 7)

Table 7: Path Coefficients

Path	Path Coefficient	T-value	P-value
Corporate Governance → Lean Manufacturing	0.45	6.78	<0.01
Intellectual Capital → Lean Manufacturing	0.60	8.21	<0.01
Organizational Culture * Corporate Governance → Lean Manufacturing	0.20	2.98	<0.01
Organizational Culture * Intellectual Capital → Lean Manufacturing	0.35	3.85	<0.01

5.2.2 R-squared (R^2)

R-squared (R^2) indicates the proportion of variance in the dependent variable explained by the independent variables. Higher R^2 values indicate better explanatory power (see table 8).

Table 8: R-squared Values

Dependent Variable	R^2
Lean Manufacturing	0.75

5.2.3 Effect Sizes (f^2)

Effect sizes (f^2) measure the impact of each independent variable on the dependent variable. They are calculated as follows: $f2 = \frac{\text{R2 included} - \text{R2 excluded}}{1 - \text{R1 included}}$

Table 9: Effect Sizes

Independent Variable	Effect Size (f^2)	Interpretation
Corporate Governance	0.20	Medium
Intellectual Capital	0.40	Large
Organizational Culture	0.05	Small

5.2.4 Predictive Relevance (Q^2)

Predictive relevance (Q^2) is assessed using the Stone-Geisser Q^2 test through a blindfolding procedure. A Q^2 value greater than 0 indicates predictive relevance.

Table 10: Predictive Relevance (Q^2)

Dependent Variable	Q^2
Lean Manufacturing	0.25

6. DISCUSSION

The results of this study provide significant insights into the interplay between corporate governance, intellectual capital, organizational culture, and lean manufacturing. The positive and significant relationships observed highlight the critical role these factors play in the successful implementation of lean practices.

6.1 Corporate Governance and Lean Manufacturing

The findings demonstrate that corporate governance significantly impacts lean manufacturing. Effective corporate governance, characterized by robust oversight mechanisms, strategic alignment, and accountability, ensures that lean initiatives are supported at the highest levels of the organization. Governance structures such as board oversight and audit committees play a pivotal role in aligning lean initiatives with the company's strategic goals, facilitating resource allocation, and ensuring continuous monitoring and improvement.

The positive relationship between corporate governance and lean manufacturing underscores the importance of strong governance practices in driving operational efficiency. Companies with effective governance are better positioned to implement lean practices systematically, leading to improved operational performance, reduced waste, and enhanced value creation for stakeholders.

6.2 Intellectual Capital and Lean Manufacturing

Intellectual capital emerged as a significant predictor of lean manufacturing success. This finding highlights the crucial role of intangible assets, including human capital, structural capital, and relational capital, in driving lean initiatives. Human capital, represented by the skills, knowledge, and competencies of employees, is essential for fostering a culture of continuous improvement and innovation. Structural capital, encompassing organizational processes and intellectual property, provides the necessary infrastructure to support lean practices. Relational capital, which includes relationships with external stakeholders, facilitates effective supply chain management and just-in-time production.

The strong positive effect of intellectual capital on lean manufacturing suggests that companies investing in their intellectual assets are more likely to achieve lean manufacturing success. This investment enables organizations to develop a skilled workforce, optimize processes, and build strong relationships with suppliers and customers, all of which are critical for implementing and sustaining lean practices.

6.3 Organizational Culture as a Moderating Variable

Organizational culture was found to significantly moderate the relationships between corporate governance, intellectual capital, and lean manufacturing. A supportive organizational culture that promotes teamwork, continuous improvement, and open communication enhances the impact of governance and intellectual capital on lean practices. This moderating effect underscores the importance of cultivating a culture that aligns with lean principles.

A strong organizational culture fosters an environment where employees are encouraged to participate in problem-solving, share ideas, and collaborate across functions. Such a culture not only supports the implementation of lean tools and techniques but also ensures their sustainability over time. Companies that cultivate a culture of continuous improvement are better equipped to respond to challenges, adapt to changes, and achieve long-term success in their lean initiatives.

The interplay between organizational culture and other factors highlights the importance of a holistic approach to lean manufacturing. While corporate governance and intellectual capital provide the foundation for lean practices, a supportive culture acts as a catalyst, amplifying their effects and driving sustained improvements

7. CONCLUSION

This study provides valuable empirical evidence on the relationships between corporate governance, intellectual capital, organizational culture, and lean manufacturing. The findings contribute to the existing literature by demonstrating the significant direct effects of corporate governance and intellectual capital on lean manufacturing and the critical moderating role of organizational culture.

7.2 Practical Implications

For practitioners, these insights offer actionable guidance for enhancing lean manufacturing practices. Companies should:

1. **Strengthen Corporate Govern**
2. **ance**: Establish robust governance structures to ensure strategic alignment, resource allocation, and continuous monitoring of lean initiatives.
3. **Invest in Intellectual Capital**: Develop the skills, knowledge, and competencies of employees, optimize organizational processes, and build strong relationships with external stakeholders to support lean practices.
4. **Cultivate a Supportive Organizational Culture**: Foster a culture that promotes teamwork, continuous improvement, and open communication to enhance the impact of governance and intellectual capital on lean manufacturing.

7.3 Theoretical Contributions

This study extends the existing literature by integrating multiple streams of research on corporate governance, intellectual capital, organizational culture, and lean manufacturing. It provides a comprehensive understanding of the factors influencing lean practices and highlights the importance of considering organizational culture as a moderating variable.

7.4 Limitations and Future Research

While this study offers significant insights, it has limitations that should be addressed in future research. The sample is limited to manufacturing companies listed on the Indonesia Stock Exchange, which may limit the generalizability of the findings. Future research could expand the sample to include companies from different sectors and regions, providing a more comprehensive view of the factors influencing lean manufacturing. Additionally, longitudinal studies could offer deeper insights into the dynamic nature of these relationships over time.

7.5 Recommendations for Future Research

1. **Expand the Sample Size and Scope**: Include companies from various sectors and regions to enhance the generalizability of the findings.
2. **Longitudinal Studies**: Conduct longitudinal studies to examine the evolution of the relationships between corporate governance, intellectual capital, organizational culture, and lean manufacturing over time.
3. **Explore Additional Moderating Variables**: Investigate other potential moderating variables, such as leadership style and technological innovation, to further understand the factors influencing lean manufacturing success.

In conclusion, this study highlights the critical roles of corporate governance, intellectual capital, and organizational culture in the successful implementation of lean manufacturing. By strengthening governance practices, investing in intellectual capital, and fostering a supportive culture, companies can enhance their lean initiatives, driving operational efficiency, reducing waste, and creating value for stakeholders. The insights provided by this research offer a valuable framework for managers and policymakers seeking to optimize lean manufacturing practices and achieve sustained competitive advantage.

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