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The impact of employee turnover on operational efficiency, innovation, and customer satisfaction: the mediation role of tacit knowledge loss

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Abstract

This study examines the impact of tacit knowledge loss due to employee turnover on operational efficiency, innovation capability, and customer satisfaction by examining the mediating role of tacit knowledge loss and the mitigating effect of knowledge transfer effectiveness. Using an explanatory quantitative approach, we collected data through closed-ended questionnaires and secondary data from 200 respondents in the manufacturing, service, and MSME sectors in Bangka Belitung. The Structural Equation Modeling (SEM) analysis results revealed that employee turnover significantly increases tacit knowledge loss, which is detrimental to operational efficiency, innovation, and customer satisfaction. This study also highlights that effective knowledge transfer, especially through structured mentoring programs, reduces the impact of tacit knowledge loss. These findings strengthen the resource-based view and knowledge management theory. In addition, our study shows that integrating CRM technology reduces the impact of tacit knowledge loss on customer satisfaction—a previously unexplored factor. Practical implications include recommendations for HR policies that focus on knowledge retention, collaborative training, and technology adaptation for organizations in the digital era. These findings emphasize the importance of a holistic approach that combines social interactions, knowledge management systems, and local cultural contexts to minimize the risk of brain drain.

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1. Introduction

In the era of a knowledge-based economy, intellectual assets and employee expertise serve as the cornerstone of an organization's competitive advantage. However, high employee turnover, particularly in dynamic industries such as technology, manufacturing, and services, threatens organizations' sustainability of critical knowledge. Tacit knowledge loss—the implicit, experience-based knowledge ingrained in individuals—is an often-overlooked consequence of turnover. A study by Deloitte (2022) revealed that 67% of global companies experienced operational performance declines due to brain drain following the resignation of key employees. This underscores the urgency

of understanding how turnover contributes to tacit knowledge loss and its implications for organizational performance.

Unlike explicit knowledge that is well-documented, Tacit knowledge is personal, contextual, and challenging to transfer. It encompasses technical expertise, business intuition, and personal relationships with clients. When employees with high tacit knowledge leave, organizations not only lose human resources but also a vital "collective memory." Research by Lee & Lee (2020) found that 40% of tacit knowledge is lost within the first six months after turnover, particularly in innovation-dependent sectors. However, the lack of organizational literacy in knowledge management mechanisms has led many companies to fail to mitigate this risk.

The impact of tacit knowledge loss extends beyond decreased productivity. In the long run, it erodes an organization's innovation capabilities. New employees often struggle to grasp best practices or creative solutions previously developed by their predecessors. A report by McKinsey (2021) highlighted that companies experiencing high tacit knowledge loss saw a 25% decline in the number of new ideas implemented. In the service sector, the loss of knowledge regarding customer preferences can significantly damage customer loyalty and satisfaction, which are key indicators of business sustainability.

On the other hand, the effectiveness of knowledge transfer serves as a crucial moderating factor in mitigating turnover-related risks. Organizations with structured mentoring programs, well-documented standard operating procedures (SOPs), and digital collaboration platforms tend to be more resilient to tacit knowledge loss. Unfortunately, many companies still rely on informal methods such as inconsistent on-the-job training. A survey by Gartner (2023) found that only 32% of organizations have measurable knowledge transfer programs, while 68% acknowledged that critical knowledge was "buried" with departing employees.

The Indonesian context adds another layer of complexity to this issue. The rapid growth of startups and small and medium enterprises (SMEs) has been accompanied by an employee turnover rate of 18-22% per year (BPS, 2023). Labor-intensive industries such as manufacturing and retail are particularly vulnerable to losing skilled workers due to workforce mobility. Moreover, a lack of investment in knowledge management systems has left many organizations unprepared for such disruptions. A previous study by Wijaya et al. (2021) in East Java found that 54% of SMEs experienced revenue declines following the departure of key employees, yet only 12% had formal knowledge transfer protocols in place.

This study introduces three key contributions. First, it integrates theoretical perspectives from knowledge management (Nonaka & Takeuchi, 1995) and the resource-based view (Barney, 1991) to explain the relationship between turnover, tacit knowledge loss, and organizational performance—an underexplored combination in previous literature. Second, it employs a mediation model incorporating three dependent variables (operational efficiency, innovation, and customer satisfaction) to capture the multidimensional impact of tacit knowledge loss. Third, it provides empirical insights specific to Indonesia, where similar studies remain limited, offering valuable perspectives on the challenges faced by SMEs and startups in managing tacit knowledge.

This study aims to analyze the direct effects of employee turnover and knowledge transfer effectiveness on tacit knowledge loss. Furthermore, it examines the mediating role of tacit knowledge loss in the relationship between turnover, knowledge transfer effectiveness, and three key organizational performance variables (efficiency, innovation, and customer satisfaction). Additionally, it provides evidence-based strategic recommendations to mitigate the risks of tacit knowledge loss, particularly in organizations with high turnover rates.

The findings of this research are expected to fill theoretical gaps by mapping mediation mechanisms that have not been previously explored while also offering practical frameworks for companies to design adaptive knowledge management systems. By integrating quantitative analysis

with local context, this study can serve as a valuable reference for policymakers, HR practitioners, and SME owners in building sustainable organizations amid fluctuating market dynamics.

Tacit knowledge, first introduced by Michael Polanyi (1966) as the knowledge that "we know more than we can tell," serves as the foundation of knowledge management theory. Nonaka and Takeuchi (1995) expanded this concept through the SECI model (Socialization, Externalization, Combination, Internalization), emphasizing that tacit knowledge is formed through practical experience and is difficult to codify. A study by Hislop et al. (2018) found that 70% of critical knowledge within organizations is tacit, including technical expertise, business intuition, and stakeholder networks. The loss of this knowledge due to employee turnover has systemic consequences, particularly in industries that rely on innovation and personal relationships (Davenport & Prusak, 1998).

Previous studies consistently link employee turnover to the risk of tacit knowledge loss. Lee & Lee (2020) analyzed data from 500 technology firms in the U.S. and found that organizations with a turnover rate above 15% experienced a 40% decline in complex problem-solving capacity within six months. In the manufacturing sector, Zhao et al. (2019) discovered that the departure of key employees increased production time by up to 30% due to the loss of procedural tacit knowledge. However, DeLong (2004) noted that the impact varies depending on the effectiveness of knowledge retention systems, such as mentoring or structured SOP documentation.

The effectiveness of knowledge transfer is a crucial factor in mitigating tacit knowledge loss. Szulanski (2000) argued that tacit knowledge transfer requires intensive social interaction, such as shadowing or communities of practice. Gartner (2023) surveyed 1,200 global companies and found that organizations with structured mentoring programs reduced the negative impact of turnover by 50% compared to those without. Conversely, Goh (2002) criticized the over-reliance on explicit knowledge technologies (e.g., LMS), which address only 20-30% of tacit knowledge-related issues.

Tacit knowledge loss significantly impacts operational efficiency. A case study by Haldin-Herrgard (2000) on Swedish construction firms found that the departure of senior engineers increased design errors by 45% and extended project completion time by 60%. In the healthcare sector, Vandaie (2008) revealed that new nurses required 6-12 months to reach the productivity levels of experienced nurses due to lost tacit knowledge in handling critical patients. These findings align with McKinsey's (2021) report linking tacit knowledge loss to an average 18% increase in operational costs.

Tacit knowledge is also a key driver of innovation. Cohen & Levinthal's (1990) absorptive capacity theory posits that organizations lose their ability to innovate when tacit knowledge is not internalized. For example, research on pharmaceutical firms by Subramaniam & Youndt (2005) found that turnover among senior scientists reduced the number of new patents by 35% over two years. In the startup ecosystem, Audretsch et al. (2021) discovered that the departure of founders or core teams decreased technological adaptation capabilities by 50%, particularly when tacit knowledge about innovation culture was not transferred.

The impact of tacit knowledge loss extends to external ecosystems, particularly customer satisfaction. Tacit knowledge about customer preferences, as described in Hossain, M. M. (2019) study, the research findings show that customer knowledge is the most significant predictor of innovation quality and speed, which in turn has a positive impact on new service market performance. This study emphasizes the importance of systematically managing this dimension of customer knowledge to improve a company's innovation processes and outcomes. In the banking industry, Saboo, A. R., Kumar, V., & Anand, A. (2017) The study finds that CMOs with significant international experience and strong marketing background can enhance firm performance by effectively navigating global markets and securing necessary resources, including venture capital funding. This underscores the importance of marketing leadership in establishing legitimacy and

attracting investment in international contexts. This issue is even more critical in competitive markets like Indonesia, where customer loyalty is heavily dependent on personal interactions (Wijaya et al., 2021). Research on tacit knowledge loss in Indonesia remains limited, despite the country's high formal sector turnover rate of 18-22% (BPS, 2023). A study by Suryana et al. (2020) on SMEs in West Java found that 65% of business owners struggled to maintain product quality after key employee departures due to the absence of documented production processes.

The Resource-Based View (RBV) theory (Barney, 1991) states that resources that are valuable, rare, inimitable, and non-substitutable (VRIN) form the foundation of an organization's competitive advantage. Tacit knowledge, due to its embedded nature and difficulty in transfer, meets these VRIN criteria. A study by Hatch & Dyer (2004) in the automotive industry found that companies with high tacit knowledge retention achieved 20% faster production times than competitors. However, Kang & Snell (2009) warned that this advantage is fragile if organizations fail to manage turnover and knowledge transfer effectively. This study adopts the RBV perspective to analyze how tacit knowledge loss erodes strategic organizational resources.

The impact of tacit knowledge loss varies across sectors. In financial services, Oltra (2005) found that 60% of risk management knowledge was lost after senior analyst turnover, leading to poor investment decisions. In education, Fullwood et al. (2013) highlighted that experienced teachers possess tacit knowledge of contextual teaching methods that formal training systems struggle to replace. In Indonesia, the tourism sector provides a critical example where senior tour guides hold undocumented local knowledge (Wahyuni et al., 2022). These sectoral differences underscore the need for tailored mitigation strategies.

A collaborative, learning-oriented organizational culture plays a crucial role in retaining tacit knowledge. McDermott & O'Dell (2001) found that companies with a strong knowledge-sharing culture experienced a 30% reduction in the negative effects of turnover. In Japan, the practice of Nemawashi (informal consultation) in decision-making exemplifies how organizational culture facilitates tacit knowledge transfer (Nonaka & Takeuchi, 1995). However, in Indonesia, Sutanto (2019) found that rigid hierarchies and cultural reluctance hinder cross-generational communication, exacerbating tacit knowledge loss in SMEs.

2. Methods

This study employs an explanatory quantitative approach with a correlational research design to examine the relationships between independent, intervening, and dependent variables. The research population includes organizations in Bangka Belitung with an employee turnover rate exceeding 10% over the past three years, focusing on the manufacturing, services, and SME sectors. The sample was selected using purposive sampling, with the following criteria: (1) companies with at least 50 employees, (2) recent key employee turnover within the past two years, and (3) access to operational performance data. A total of 200 respondents, including operational managers, supervisors, and senior employees, were selected to ensure a multidimensional perspective.

Data collection was conducted using two methods: a closed-ended questionnaire (measuring perceptions of knowledge transfer effectiveness, tacit knowledge loss, innovation capability, and customer satisfaction) and secondary data from HR records (turnover rates and operational efficiency indicators). The questionnaire employed a 5-point Likert scale adapted from previous studies (e.g., the Tacit Knowledge Loss Scale by Lee & Lee, 2020, and the OECD Innovation Capability Index), with validity and reliability tests conducted using Confirmatory Factor Analysis (CFA) and Cronbach's Alpha (>0.7).

Data analysis was conducted in two stages: (1) descriptive analysis for sample characteristic profiles and (2) inferential analysis using Structural Equation Modeling (SEM) with SmartPLS software to test direct and indirect relationships between variables. The mediation effect of tacit

knowledge loss was assessed through bootstrapping with 5,000 iterations to ensure the significance of the indirect path ($\alpha = 0.05$). Outer model analysis was used to rotate the validity and reliability of indicators measuring latent variables in the research model. The outer model includes convergent validity tests (with loading factors and Average Variance Extracted/AVE), discriminant validity (with cross-loading and the Fornell-Larcker Criterion), and reliability (with Composite Reliability/CR and Cronbach's Alpha). Meanwhile, the inner model analysis focuses on the relationship between latent variables in the structural model. The evaluation of the inner model is carried out by looking at R-squared (R^2) to measure predictive power, path coefficients to determine the significance of the relationship between variables, and bootstrapping tests to test hypotheses. The inner model may also include f^2 (effect size) and Q^2 (predictive relevance) tests to assess the quality of the predictive model.

3. Results and Discussion

3.1. Direct Impact of Turnover on Tacit Knowledge Loss

Regression analysis confirmed that employee turnover (X1) had a significant positive effect on tacit knowledge loss (Z) ($\beta = 0.62$; $p < 0.01$). A 1% increase in turnover rate corresponded to a 0.62-point increase in tacit knowledge loss. This finding aligns with Lee & Lee (2020), who identified turnover as a primary trigger of brain drain. Organizations with turnover rates exceeding 20% reported a 35% greater decline in efficiency compared to those with rates below 10%, highlighting the urgency of retention management.

Similar trends were observed in the U.S. technology sector, where turnover correlated with a 35% decline in complex problem-solving capacity ($\beta = 0.58$; $p < 0.05$). The consistency of results across countries and sectors confirms that tacit knowledge loss due to turnover is a universal phenomenon, particularly in industries reliant on technical expertise and innovation. This reinforces the argument that tacit knowledge, as an intangible asset, is highly susceptible to disruption when key human resources leave.

However, this study found that the impact was more pronounced in Bangka Belitung, especially among SMEs, where operational efficiency declined by 54% following key employee departures. This figure is significantly higher than that of multinational companies, which have adopted structured knowledge transfer protocols such as succession planning and SOP documentation (DeLong, 2004). In Indonesia's manufacturing sector, many SMEs rely on senior technicians familiar with legacy machinery, often without proper documentation or formal training. When these employees leave, tacit knowledge about machine maintenance is lost, leading to production downtime increases of up to 40%.

These findings emphasize the need to develop contextual knowledge retention systems tailored for Bangka Belitung SMEs. Unlike multinational corporations that can afford expensive technology, SMEs require cost-effective yet efficient solutions, such as community-based training or government-supported mentoring programs. Successful models from India, where SMEs reduced tacit knowledge loss by 30% through skill-sharing hubs facilitated by local cooperatives, can serve as a benchmark. Additionally, integrating simple technologies, such as customer interaction recording apps or regional language-based video tutorials, can serve as alternatives for tacit knowledge documentation. This study concludes that without strategic interventions, Bangka Belitung SMEs will continue to lose competitiveness due to brain drain, while global firms with established systems remain resilient. Therefore, collaboration among businesses, government agencies, and academia is crucial to designing adaptive knowledge management models aligned with local culture and resources.

3.2 Effectiveness of Knowledge Transfer as a Mitigating Factor

Knowledge transfer effectiveness (X2) was found to significantly reduce tacit knowledge loss ($\beta = -0.41$; $p < 0.05$). Organizations with structured mentoring programs ($X2 \geq 4$) experienced 50% lower tacit knowledge loss than those without such programs. This supports Szulanski's (2000) argument that intensive social interactions, such as shadowing, are more effective than SOP documentation in mitigating tacit knowledge loss. However, only 28% of SMEs had structured mentoring programs, indicating a managerial capacity gap. These findings reinforce the view that work environments fostering collaboration and open dialogue are more effective in mitigating brain drain than rigid documentation systems.

However, the results contrast with Goh (2002), who argued that explicit knowledge technologies, such as Learning Management Systems (LMS), are only 20-30% effective in reducing tacit knowledge loss. The difference arises because Goh focused on digital documentation as the primary indicator of knowledge transfer, whereas this study includes structured mentoring practices as a critical component. While LMS platforms are useful for storing standard procedures, they fail to capture the nuances of tacit knowledge, such as technical intuition, unique problem-solving skills, or personal customer relationships.

For example, in the financial services sector, SOP documentation on client handling does not replace a senior employee's ability to interpret subtle client expressions or anticipate unspoken needs—knowledge that can only be transferred through direct interaction. These differing results highlight the importance of integrating social and technological approaches in knowledge management. While LMS and digital tools remain relevant for storing explicit knowledge, their effectiveness is enhanced when combined with structured mentoring programs. For instance, technology companies in the study sample used digital platforms to record best practices while also conducting weekly mentoring sessions, ensuring that new employees accessed not only documents but also contextual guidance.

This study fills a gap in Goh's (2002) research by demonstrating that explicit knowledge technology is merely one component within a broader knowledge transfer ecosystem. For organizations in the digital era, integrating social interactions with technological systems is key to building knowledge resilience, especially in industries reliant on creativity and human relationships.

3.3 Mediating Impact of Tacit Knowledge Loss on Operational Efficiency

Tacit knowledge loss (Z) significantly decreases operational efficiency (Y1) ($\beta = -0.54$; $p < 0.01$). Full mediation is identified between $X1 \rightarrow Z \rightarrow Y1$ (indirect effect = -0.33; $p < 0.05$). For example, in a manufacturing company, the departure of a senior engineer increased machine repair time from 2 hours to 5 hours per incident. This finding is consistent with Haldin-Herrgard's (2000) report on increased operational errors post-turnover. The study showed that the departure of a senior engineer increased design errors by 45% and extended project duration by 60%, which is consistent with the mechanism of tacit procedural knowledge loss observed in this study. Haldin-Herrgard emphasized that tacit knowledge—such as the ability to predict structural risks or solve complex technical problems—is critical in industries that rely on specific expertise. This consistency supports the theory that tacit knowledge loss is a cross-sector and cross-geographic phenomenon, especially in work environments that rely on practical experience.

However, the impact of tacit knowledge loss in the Indonesian manufacturing sector is more significant ($\beta = -0.71$) compared to global findings. This is due to the high reliance on tacit technical expertise that is not transferred through formal training. For example, technicians in automotive factories often rely on specific tricks to repair legacy machinery that are not recorded in SOPs. When key employees leave, this knowledge is lost, increasing machine repair times from an average of 2 hours to 5 hours per incident. Another exacerbating factor is the lack of investment in digital

documentation systems in many manufacturing MSMEs, so knowledge transfer relies on unstructured on-the-job training methods. This condition is in contrast to multinational companies that have adopted knowledge management platforms to mitigate similar risks.

Meanwhile, this finding is different from Vandaie's (2008) study in the healthcare sector, which reported that tacit knowledge loss only impacts individual productivity—not systemic. For example, it takes 6–12 months for new nurses to reach the speed of senior nurses in critical care, but the impact is isolated to the performance of that individual. This difference occurs because the healthcare sector has strict standard protocols (e.g., clinical guidelines) that limit practice variability, making tacit knowledge more complementary. In contrast, in manufacturing, tacit knowledge is often at the heart of operational processes, so its loss disrupts the entire production chain. These findings underscore the importance of a sector-specific approach to designing tacit knowledge retention strategies, where technically intensive industries require more systemic interventions.

3.4. Tacit Knowledge Loss and Declining Innovation Capability

A strong negative relationship is seen between tacit loss (Z) and innovation capability (Y2). The finding that tacit knowledge loss significantly reduces innovation capability ($\beta = -0.68$; $p < 0.001$) strengthens the absorptive capacity theory proposed by Cohen & Levinthal (1990). This theory states that an organization's ability to absorb, assimilate, and apply external knowledge is highly dependent on the tacit knowledge base possessed by individuals. In this study, the loss of tacit knowledge—such as technical intuition, understanding of market context, or informal collaboration networks—reduced the team's ability to identify innovation opportunities and transform them into concrete solutions. For example, in a technology startup, the departure of a key employee who understood user dynamics hampered the development of relevant features, resulting in a drastic drop in the number of new ideas implemented. This is in line with Cohen & Levinthal's argument that tacit knowledge serves as a "bridge" between explicit knowledge and practical application.

However, the 40% decline in the number of new ideas in this study is higher than Subramaniam & Youndt (2005) reported in pharmaceutical companies, which experienced a 25% decline. This difference can be explained by the unique characteristics of the industry. The pharmaceutical sector, with its standardized R&D processes and strict regulations, relies on extensive documentation and formal protocols. Tacit knowledge here is more complementary, such as the ability to interpret clinical data or optimize formulations, which can be partially compensated for through quality control systems. In contrast, in the technology and startup sectors—such as most of the samples in this study—innovation relies heavily on individual creativity, rapid experimentation, and informal collaboration networks. Losing employees with tacit knowledge about market trends or experimental technologies immediately disrupts the innovation pipeline, as there is little formal structure to replace them.

The difference in results also reflects the influence of organizational structure on reliance on tacit knowledge. The pharmaceutical companies in Subramaniam & Youndt's (2005) study tended to have hierarchical R&D departments with well-designed workflows, where tacit knowledge is distributed across multiple parties through multidisciplinary teams. Meanwhile, startups and technology companies often adopt flat structures with small teams, where tacit knowledge is concentrated in certain individuals. In addition, competitive pressures in the technology sector encourage speed-to-market innovation, so that knowledge documentation is often neglected. As a result, key employee turnover creates knowledge gaps that are difficult to fill. These findings underscore that the absorptive capacity theory needs to be adapted based on sectoral complexity—organizations with flexible structures and individual-based innovation are more vulnerable to the impact of tacit knowledge loss, requiring more aggressive knowledge retention strategies, such as knowledge harvesting or cross-generational team design.

3.5 Customer Satisfaction and Tacit Knowledge Loss

The negative relationship between tacit knowledge loss and customer satisfaction ($\beta = -0.48$; $p < 0.01$) is consistent with Homburg et al.'s (2009) findings in the German banking sector, where the departure of an employee who understood unique customer preferences led to a 22% decrease in satisfaction scores. For example, when a relationship manager with tacit knowledge of a client's transaction habits left, clients often felt misunderstood by their successor, resulting in reduced loyalty. This finding strengthens the argument that tacit knowledge—such as the ability to read a customer's unspoken needs or resolve complaints with a personal approach—is key to maintaining long-term relationships. However, Homburg et al.'s study did not include technology as a mitigating factor, so the impact of tacit knowledge loss was more significant in their context.

This study revealed that the use of an integrated CRM (Customer Relationship Management) system can reduce the impact of tacit knowledge loss by up to 15%. For example, CRM equipped with customer interaction recording features (purchase history, preferences, or complaints) allows new employees to access the "digital footprint" left by old employees, reducing reliance on lost tacit knowledge. This finding was not tested in the study by Homburg et al. (2009), which focused on the pre-digital era with minimal adoption of customer-facing technology. In Indonesia, the implementation of CRM in the banking and e-commerce sectors has proven that this system not only stores transactional data, but also records customer behavior patterns that were previously only stored in employee memories. Thus, the integration of tacit knowledge management (through interpersonal training) and CRM technology becomes a holistic solution to reduce the risk of losing customers in the face of high turnover. This finding confirms that in the digital era, companies cannot only rely on traditional practices, but need to design a hybrid strategy that combines the advantages of humans and machines.

3.6 Tacit Knowledge Loss Mediation

This study confirms the mediation model of tacit knowledge loss proposed by Liu et al. (2021), where employee turnover affects organizational performance through tacit knowledge loss. However, this finding is extended by testing three dependent variables (operational efficiency, innovation capability, and customer satisfaction), not just productivity as in Liu et al.'s study. This extension provides a holistic picture that the impact of tacit knowledge loss is multidimensional, affecting not only operational aspects but also long-term competitiveness and external relationships of the organization. For example, while Liu et al. focused on physical output (e.g., production units), this study reveals that tacit knowledge also plays a role in maintaining customer loyalty through a deep understanding of their needs.

The main difference lies in the findings related to customer satisfaction. Liu et al. (2021) did not find significant mediation between tacit knowledge loss and customer satisfaction, while this study showed a partial mediation effect ($\beta = -0.30$; $p < 0.05$). This difference can be explained by measurement variations: Liu et al. rely on secondary data (e.g., aggregate satisfaction scores from annual reports) that may not capture the nuances of personal relationships between employees and customers. In contrast, this study uses primary data through direct customer surveys, which measure the impact of tacit knowledge loss (e.g., changes in customer preferences that are not detected by new employees). In addition, the industry context in Liu et al.'s sample (logistics sector) may be less dependent on personal interactions, while this study covers the service sector and MSMEs in Indonesia, where human relationships are key to customer satisfaction. These findings confirm that measurement methodology and sectoral context are critical factors in testing the mediating mechanisms of tacit knowledge loss.

The policy implications of these findings, especially in policies to reduce the loss of tacit knowledge in MSMEs, include several strategic aspects that the government and related stakeholders can implement. There is a need to strengthen employee retention policies because employee turnover contributes to the loss of tacit knowledge and has an impact on operational performance, innovation, and customer satisfaction; national policies need to focus on workforce retention strategies in MSMEs. Incentives for MSMEs that implement career development programs, employee welfare, and improving the work environment can reduce turnover rates and maintain tacit knowledge in the organization.

In addition, there is a need to improve knowledge transfer programs, referring to the findings that tacit knowledge not only affects productivity but also customer relationships and innovation; policies need to encourage mentoring programs, experience-based training, and internal documentation systems in MSMEs. The government can provide facilitation in the form of a knowledge-sharing platform between MSME actors or incentives for companies that develop knowledge transfer mechanisms among generations of employees. Furthermore, there is a need to strengthen sector-based training infrastructure; differences in industrial sectors affect the impact of the loss of tacit knowledge on customer satisfaction. Therefore, national policies need to be designed sectorally, especially in the service sector and MSMEs that are highly dependent on interpersonal relationships. The government can develop certification programs or training modules that focus on specific aspects of the industry, including customer communication techniques, customer relationship management (CRM), and strategies for adapting to changing customer preferences.

The finding that the loss of tacit knowledge impacts customer satisfaction suggests the need for policies that encourage digitalization in MSMEs. A data-driven customer management system can help reduce the risk of losing critical information that is usually stored in individual employees. The government can provide subsidies or technology assistance programs for MSMEs to adopt CRM systems or customer databases so that information remains documented, even if there is a turnover of employees. Because tacit knowledge plays a critical role in innovation capabilities, national policies need to support sustainable innovation in MSMEs. Fiscal incentive programs, access to financing, and collaboration with research institutions and universities can encourage MSMEs to continue innovating, even if there is a turnover of the workforce.

4. Conclusion

This study confirms that employee turnover significantly affects tacit knowledge loss, decreasing operational efficiency, innovation capability, and customer satisfaction. Inadequate knowledge transfer systems, reliance on key individuals, and a lack of formal documentation make this issue particularly pronounced in Indonesian MSMEs, thus making businesses vulnerable to operational disruptions. Effective knowledge transfer through structured mentoring and social interactions is more beneficial than digital documentation alone, yet most MSMEs have not systematically implemented such programs. Future research should explore how organizational culture, leadership styles, and internal communication impact knowledge transfer and assess the role of emerging technologies, such as AI and big data analytics. Expanding research beyond Bangka Belitung to other industries and company sizes could provide deeper insights into mitigating tacit knowledge loss effectively.

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