

Revealing the Hidden Pathways: Does the Process Innovation Link the Knowledge Management-Performance Relationship in MSMEs?

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in driving the national economy, yet many struggle with significant performance challenges and declining revenues. Recent studies on knowledge management (KM) often focus on large enterprises, neglecting the specific difficulties faced by MSMEs and limiting the applicability of findings across various industries. This study seeks to fill this gap by exploring how KM and process innovation can enhance the operational performance of MSMEs, with a particular focus on investigating the mediating mechanism of process innovation linking the KM-operational performance relationship. A survey of 100 MSMEs in Yogyakarta, Indonesia, was conducted to gather data. The findings reveal the essential impact of KM and process innovation on improving MSME performance, highlighting the importance of these elements in overcoming operational challenges. The result of the mediation mechanism of process innovation within the KM-operational performance relationship is also comprehensively revealed in this study. This study offers new insights into leveraging KM practices and process innovation to boost MSMEs' operational performance, making it a valuable resource for scholars and practitioners alike.

Keywords: Operational performance, knowledge management, process innovation, MSMEs.

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are critical in driving the national economy. According to the Ministry of Cooperatives and SMEs of the Republic of Indonesia, MSMEs contribute up to 61% of the Gross Domestic Product (GDP) and provide employment for 90% of the Indonesian workforce (CNBC Indonesia, 2024). Despite their significant contributions, the performance of MSMEs in Indonesia is far from perfect. The Financial Services Authority (OJK) reports that 84% of Indonesia's MSMEs have experienced a revenue decline (Sidik, 2022). This decline in revenue is also evident in the food and beverage industry, which is a fundamental necessity for society (Ramli & Djumena, 2023). These challenges underscore the need for effective strategies to enhance the operational performance of MSMEs.

Recent studies have identified knowledge management (KM) as a crucial factor in enhancing firm performance (Permatasari et al., 2023; Zia et al., 2023; Chawla et al., 2022; Migdadi, 2022). However, previous studies have shortcomings in providing a better understanding of the mechanisms linking KM to performance, particularly in the context of micro, small, and medium enterprises (MSMEs). First, several previous studies have focused on large enterprises and have given less attention to MSMEs (Chawla et al., 2022; Nazari et al., 2021; Zhang et al., 2020; Shahzad et al., 2020). SMEs in developing countries face significant operational challenges not encountered by large companies (Child et al., 2017). This is due to the substantial differences between SMEs and large companies in terms of resource limitations and strategic priorities (Hock-Doepgen et al., 2021).

Second, previous studies also have been industry-specific. For instance, some previous studies have investigated the role of KM on performance with a focus on the manufacturing industry (Zia et al., 2023; Migdadi, 2022; Al-Sa'di et al., 2017). Furthermore, Permatasari et al. (2023) examined the impact of KM on the performance and competitiveness of SMEs in the woven craft industry. Similarly, Hoang et al. (2023) focused on the hospitality industry to test the influence of KM on performance. Iqbal (2021) explored the role of KM on innovation outcomes in the context of higher education institutions. Additionally, previous studies have explored the impact of KM on performance and innovation outcomes in the technology industry (Nazari et al., 2021; Hock-Doepgen et al., 2021). However, studies that focus on specific industries often face limitations regarding the generalizability of their findings to other sectors (Miller et al., 2021). This is because the operational dynamics, resource capabilities, and market conditions can significantly differ across industries (Miller et al., 2021).

Although KM practices have been widely acknowledged for their role in enhancing organizational performance, the mechanisms through which KM translates into performance outcomes are still not fully understood, suggesting the need for examining potential mediating variables (Child et al., 2017). The complexity of the KM-performance relationship necessitates a deeper exploration of intermediary factors that could provide insights into how KM practices impact performance (Child et al., 2017). This indicates that the direct impact of KM on performance may be contingent upon several mediating factors, underscoring the importance of identifying and analyzing these variables to gain a comprehensive understanding of the KM-performance relationship (Miller et al., 2021).

In the context of the KM-performance relationship, several researchers have found that factors related to innovation act as mediating variables (Zia et al., 2023; Chawla et al., 2022; Migdadi, 2022; Zhang et al., 2020; Shahzad et al., 2020). Zia et al. (2023) tested and confirmed that two types of innovation, namely product innovation and service innovation, mediate the relationship between KM and operational performance in manufacturing companies. Additionally, Migdadi (2022) found that innovation capability also plays a mediating role in the KM-performance relationship in manufacturing companies. Using the landscape of large enterprises, Chawla et al. (2022) found that administrative innovation and technical innovation can also explain the mechanisms in the KM-performance relationship. Other factors in the context of large enterprises identified as mediating variables in the KM-performance relationship include innovation speed (Zhang et al., 2020) and green innovation (Shahzad et al., 2020).

The literature mapping above highlights the third shortcoming in previous research related to the KM-performance relationship, namely, the lack of attention to process innovation as a mediating variable. Several previous studies have indicated the need to examine process innovation as a mechanism to gain a better understanding of the KM-performance relationship. For example, Chawla et al. (2022) suggest process innovation as a critical mediating variable that can elucidate the mechanisms through which KM influences performance, highlighting its importance in the research context. Additionally, Permatasari et al. (2023) argue that investigating the mediating effect of process innovation can uncover the pathways through which KM practices lead to enhanced performance, providing a comprehensive view of this relationship. In their review of future directions for SME

research, Miller et al. (2021) argue that the role of process innovation as a mediator in the KM-performance relationship is critical to understanding how firms can leverage KM practices to achieve superior performance outcomes. Hence, exploring the mediating role of process innovation can provide valuable insights into how KM practices translate into improved performance, offering a clearer understanding of this dynamic relationship (Child et al., 2017).

To address this gap, this study aims to investigate the impact of KM on SMEs' operational performance with process innovation as a mediating variable. The results of this study are expected to serve as a reference for MSME owners and managers in improving operational performance to tackle the dynamic challenges they face. Based on this outline, this study poses two research questions: First, does KM and process innovation positively affect the operational performance of MSMEs? Second, does process innovation mediate the relationship between KM and operational performance in the context of MSMEs?.

LITERATURE REVIEW

Operational Performance

As defined by Tan et al. (2007), operational performance refers to the output or result achieved due to unique operational capabilities. Al-Sa'di et al. (2017) argued that operational performance encompasses both internal and process performance, as proposed by Manikas and Terry (2010). Flynn et al. (2010) emphasized that operational performance signifies the enhancements in an organization's responsiveness to a dynamic competitive environment. Consequently, operational performance is typically assessed across various dimensions (Ketokivi and Schroeder, 2004), reflecting internal operations, including product and process quality, efficiency, and productivity (Naser et al., 2004). Some studies have gauged operational performance through metrics such as quality, cost, flexibility, and delivery (Abdallah et al., 2016; Ortega et al., 2012; Al-Abdallah et al., 2014; Phan et al., 2011; Abdallah and Matsui, 2009; Flynn et al., 2010). Hence, this study evaluates the operational performance based on cost, quality, delivery, and flexibility.

Knowledge Management and Operational Performance

KM can be perceived through various lenses: as a work process, an activity, a technological infrastructure, or an operational culture dedicated to managing valuable corporate knowledge and assets (Chong et al., 2000; Pauleen et al., 2007). KM is also described as a business process focused on generating new knowledge and guaranteeing its use in the organization at any time it is needed (Kör and Maden, 2013). The growing significance of KM stems from its ability to reduce production cycle times and boost operational efficiency (Mishra & Bhaskar, 2011; Abdallah, 2013). Additionally, KM helps organizations to reengineer business processes, enhance employee productivity and performance, improve product quality and customer service, accelerate product development, offer innovative products and services, and boost organizational flexibility (Slavković & Babić, 2013; Dahiyat & Al-Zu'bi, 2012; Abdallah et al., 2009).

Moreover, the crucial role of KM lies in its ability to facilitate both explicit and implicit knowledge sharing (Al-Sa'di et al., 2017). The sharing of intellectual assets is a valuable resource for enhancing organizational performance and competitive advantage (Ndlela & du Toit, 2001). Therefore, organizations with robust KM practices are typically more adept at learning ways to enhance their capabilities in adapting to changes, reducing redundancy, fostering creative ideas, and enhancing overall performance (Lee et al., 2005).

Recent studies underscore the significant role of KM in enhancing organizational performance. Permatasari et al. (2023) identified KM as a pivotal variable that directly influences the performance of SMEs. In the context of large corporations, Chawla et al. (2022) similarly found that KM is a crucial

factor in boosting performance. Other research corroborates the influence of KM towards the manufacturing firms' performance (Zia et al., 2023; Migdadi, 2022). Specifically, Al-Sa'di et al. (2017) highlighted that improved KM practices can significantly enhance operational performance in manufacturing companies.

H1: KM positively affect the MSMEs' operational performance.

Knowledge Management and Process Innovation

According to OECD (2005), process innovation refers to the implementation of new or significantly improved production or delivery methods. These methods encompass substantial changes in techniques, equipment, and software (OECD, 2005). Process innovation can involve enhancements in production and logistics or improvements across various activities, for instance purchasing, computing, accounting, and maintenance (Polder et al., 2010). Often, these improvements necessitate the adoption of novel methods previously unused within the organization (Polder et al., 2010).

KM is widely recognized as a critical precursor to innovation within organizations (Dahiyat, 2015). In this context, KM fosters innovation by nurturing new ideas and leveraging an organization's intellectual assets (Huang & Li, 2009). The effective management of newly acquired knowledge maximizes existing knowledge resources and reduces uncertainty (Al-Sa'di et al., 2017). This, in turn, creates opportunities for fostering an innovative environment and mindset, leading to enhanced innovation outcomes (Dahiyat & Al-Zu'bi, 2012). The growing emphasis on KM within organizations is driven by its potential to boost employee creativity, generate innovative ideas, and enhance process innovations (Borghini, 2005). Therefore, the application of knowledge plays a crucial role in amplifying process innovations within organizations (Sarin & McDermott, 2003).

Numerous recent empirical studies have delved into the influence of KM processes on innovation. Zia et al. (2023) highlighted KM as a crucial element in enhancing innovations within manufacturing companies. Similarly, Migdadi et al. (2022) demonstrated that KM practices significantly impact the innovation capabilities of manufacturing companies. The study conducted by Zhang et al. (2020) underscored the essential role of KM in accelerating innovation within large organizations. Furthermore, studies focusing on manufacturing firms have consistently provided robust evidence supporting the positive and significant effects of KM practices on process innovations (Lee et al., 2013; Al-Sa'di et al., 2017).

H2: KM positively affects the process innovation of MSMEs.

Process Innovation and Operational Performance

Innovation is widely recognized as a key driver of superior performance (Love & Roper, 2015). It plays a crucial role in enhancing performance and increasing organizational value (Bowen et al., 2010). Organizations that focus their resources and efforts on process improvements and innovations achieve excellence in operational performance dimensions such as delivery, quality, cost, and flexibility (Tan et al., 2007). Particularly in the context of SMEs, innovation serves as the driving force behind their growth in many OECD economies (Coltorti & Venanzi, 2017).

Recent studies highlight the pivotal role of innovation in enhancing organizational performance. Chawla et al. (2022) demonstrated that both administrative and technical innovations significantly improve the performance of large firms. Similarly, Shahzad et al. (2020) investigated the impact of green innovation on corporate sustainable performance, confirming that innovation serves as a driving force for superior performance. Zia et al. (2023) also emphasized the importance of product innovation in boosting the performance of manufacturing companies. Furthermore, Al-Sa'di et al. (2017) explored the influence of process innovation on the operational performance of manufacturing firms, validating that process innovation is crucial for improving company performance.

H3: Process innovation positively impacts the operational performance of MSMEs.

Knowledge Management, Process Innovation, and Operational Performance

The well-documented link between knowledge management (KM) and firm performance remains complex, with the precise mechanisms of this relationship still not fully understood (Chawla et al., 2022). Nielsen et al. (2011) suggest that the connection between KM and firm performance involves multiple intricate processes. Schiuma and Carlucci (2008) argue that KM empowers firms to develop innovation capabilities, which subsequently enhance operational and organizational performance.

According to Shujahat et al. (2018), a core proposition of the knowledge-based view is that effective KM practices enhance innovation, thereby improving organizational performance. This theoretical perspective implies that innovation mediates the relationship between KM and organizational performance (Migdadi, 2022). Al-Sa'di et al. (2017) have provided empirical evidence that process innovations serve as mediating factors between KM and the performance of manufacturing firms.

H4: Process innovation mediates the KM-operational performance relationship in MSMEs.

METHODS

Sample

This study focuses on MSMEs in Yogyakarta, Indonesia, that prioritize KM in their business operations. The sample was selected using a non-probability approach and convenience sampling technique. Owners or managers represent MSMEs in this research, given their involvement in strategic processes, including KM practices and process innovation. The sample size adheres to the minimum requirements needed to achieve the desired statistical power, with a range of 0.21 - 0.3 at a 5% significance level using Partial Least Square Structural Equation Modeling (PLS-SEM), which requires at least 69 respondents (Hair et al., 2022).

Table 1. Respondents Profile

Categories	Frequencies (N=100)
<i>Position</i>	
Owner	52
Manager	48
<i>Revenue (per year)</i>	
< IDR300 million	72
IDR300 million-IDR2.5 billion	17
>IDR2.5 billion	11

Table 1 presents the respondents' profiles for this study. This study involved 100 MSMEs as respondents, surpassing the minimum requirement of 69 samples based on the targeted statistical power. Based on the roles within these MSMEs, owners constitute 52% of the sample, and managers make up the remaining 48%. This distribution indicates a balanced representation of key decision-makers within the organizations. In addition, the annual revenue of these MSMEs, a significant majority, 72%, report yearly earnings of less than IDR 300 million, reflecting the typical revenue range for many small enterprises in developing economies. Additionally, 17% of the surveyed businesses generate annual revenues between IDR 300 million and IDR 2.5 billion, while the remaining 11% earn more than IDR 2.5 billion annually. This variation in revenue not only underscores the economic diversity within the sample but also reflects the distribution of micro (72%), small (17%), and medium (11%) enterprises involved in this study.

Measurement

The measurement scales for this study were adapted from instruments utilized in previous research, employing a 5-point Likert scale where 1 represents “strongly disagree” and 5 represents “strongly agree.” Knowledge management (KM) was assessed using 12 items adapted from Pérez-López and Alegre (2012). Process innovation was measured using 5 items adapted from Gunday et al. (2011), and operational performance was evaluated using 4 items adapted from Flynn et al. (2010). These established scales ensure the reliability and validity of the measurements, providing a robust foundation for analyzing the constructs in this study.

Table 2 summarizes the results of the validity and reliability tests for the instruments used to measure the latent variables in this study. The measurement model was evaluated twice. During the first evaluation, items with outer loadings less than 0.5, including KM2, KM5, KM6, KM7, KM8, and KM9, were removed due to not meeting convergent validity. In the second evaluation, as shown in Table 2, most items had outer loadings above 0.7, although some items, specifically KM10 (0.693), PSI3 (0.681), and PSI4 (0.620), had outer loadings below 0.7. According to Hair et al. (2022), an indicator is considered reliable if its outer loading is at least 0.7. However, indicators with outer loadings between 0.40 and 0.70 are acceptable if discriminant validity is achieved with an AVE (Average Variance Extracted) value greater than 0.5 (Hair et al., 2022). Based on Table 2, all variables in this study have AVE coefficients greater than 0.5, thus fulfilling discriminant validity, which justifies retaining the items with outer loadings below 0.7.

Table 2. Measurement Model Evaluation

Items	Outer Loadings	AVE	Fornell-Larcker	Composite Reliability
KM1	0.742			
KM3	0.740			
KM4	0.762			
KM10	0.693			
KM11	0.740			
KM12	0.778	0.552	0.743	0.881
PSI1	0.767			
PSI2	0.754			
PSI3	0.681			
PSI4	0.620			
PSI5	0.812	0.533	0.730	0.850
OP1	0.758			
OP2	0.731			
OP3	0.785			
OP4	0.717	0.560	0.748	0.836

Moreover, Table 2 presents the Fornell-Larcker criterion values for each latent variable, indicating the highest correlation coefficient values in measuring each variable compared to the coefficients measuring other latent variables. This confirms that the measurements in this research model meet discriminant validity, reflecting the ability of the measurement tool to distinguish between different latent variables (Hair et al., 2022). The Fornell-Larcker criterion values are 0.743 for KM, 0.730 for PSI, and 0.748 for OP. Additionally, Table 2 provides the Composite Reliability values used to assess the internal consistency of the measurement tools employed in this study. Composite reliability is regarded as more suitable for assessing internal consistency compared to other measures (Hair et al., 2022). A measurement tool is considered to have internal consistency if it has a composite reliability coefficient between 0.7 and 0.9. The composite reliability coefficients for each latent variable in this study, as presented in Table 2, are 0.881 for KM, 0.850 for PSI, and 0.836 for OP, indicating that the measurement tools used in this study possess satisfactory levels of consistency (Hair et al., 2022).

RESULTS

In the evaluation of the structural model, the study analyzed the path coefficients, t-statistics, p-values, and adjusted R^2 values to assess the proposed hypotheses using the PLS-SEM approach as suggested by Hair et al. (2022). The results, as presented in Table 3, indicate significant relationships across all paths at the 1% significance level, denoted by the asterisk. The H1 (KM $\rightarrow$ OP) was supported with a path coefficient of 0.499, a t-statistic of 5.364, and a p-value of 0.000. This outcome underscores the direct impact of knowledge management on the operational performance of MSMEs, highlighting the importance of KM in enhancing overall operational efficiency and effectiveness.

Table 3. Structural Model Evaluation

Hypotheses	Path Coeff.	t-stat	P-Value	Results	Adj. R^2
KM $\rightarrow$ PSI	0.560*	7.043	0.000	Supported	0.307
KM $\rightarrow$ OP	0.499*	5.364	0.000	Supported	
PSI $\rightarrow$ OP	0.298*	3.316	0.001	Supported	
KM $\rightarrow$ PSI $\rightarrow$ OP	0.167*	3.783	0.000	Supported	0.495

*) indicates significance at the 1% significance level

For the KM-PSI relationship (H2), the path coefficient is 0.560, with a t-statistic of 7.043 and a p-value of 0.000, affirming a significant positive influence of knowledge management on process innovation within MSMEs. This suggests that effective KM practices are crucial in fostering innovation processes. The adjusted R^2 value for this relationship is 0.307, indicating that KM accounts for 30.7% of the variance in process innovation. In the H3 testing (PSI $\rightarrow$ OP), the path coefficient was 0.298, with a t-statistic of 3.316 and a p-value of 0.001, indicating that process innovation has a significant positive effect on operational performance. This finding emphasizes the role of continuous innovation in improving the operational capabilities of MSMEs.

Lastly, the mediation analysis tested the H4, namely the indirect effect of process innovation on the relationship between knowledge management and operational performance (KM $\rightarrow$ PSI $\rightarrow$ OP). The path coefficient for this mediation effect was 0.167, with a t-statistic of 3.783 and a p-value of 0.000, confirming a significant partial mediating role of process innovation. The adjusted R^2 for this model was 0.495, showing that knowledge management and process innovation together explain nearly 50% of the variance in operational performance.

These results highlight the critical roles of both knowledge management and process innovation in enhancing the operational performance of MSMEs. The findings suggest that knowledge management practices not only directly impact operational performance but also enhance process innovation, which further contributes to improved performance outcomes. The partial mediating effect of process innovation underscores the importance of fostering innovative processes as a pathway to operational excellence.

DISCUSSION

The findings from the study highlight the significant impact of KM on the operational performance of MSMEs, as well as the mediating role of process innovation in this relationship. Specifically, the positive and significant path coefficients for KM towards MSMEs' operational performance and KM towards process innovation suggest that effective knowledge management practices are crucial for enhancing both, innovation processes and overall operational performance in MSMEs. These results align with existing literature, which emphasizes the role of KM in driving innovation and improving firm performance (Zia et al., 2023; Migdadi, 2022; Chawla et al., 2022; Iqbal, 2021; Hock-Doepgen et al., 2021; Zhang et al., 2020; Shahzad et al., 2020; Al-Sa'di et al., 2017).

The study's findings corroborate the work of Chawla et al. (2022), which identified that innovations facilitated by KM can significantly improve organizational outcomes. This study extends

those findings by demonstrating that process innovation acts as a partial mediator between KM and MSMEs' operational performance, indicating that KM's benefits are partly realized through fostering innovative processes within MSMEs. This mediating role of process innovation is consistent with previous studies that highlighted the importance of innovation in translating KM into tangible performance improvements (Zia et al., 2023; Chawla et al., 2022; Shahzad et al., 2020; Migdadi, 2022; Zhang et al., 2020; Al-Sa'di et al., 2017).

The results also support the broader theoretical framework suggesting that the strategic management of knowledge resources leads to enhanced innovation capabilities and, consequently, better organizational performance (Nonaka & Takeuchi, 1995). This is particularly pertinent in the context of MSMEs, which often face resource constraints and can benefit significantly from effective KM practices. Additionally, this study demonstrates that organizations cannot solely rely on product and service innovations as the primary means of leveraging knowledge management (KM) practices to enhance performance, as highlighted by recent studies (Zia et al., 2023; Bhat & Sharma, 2022; Darmawan, 2022; Skordoulis et al., 2020). Instead, they can also rely on process innovation as a key strategy to facilitate the impact of KM practices in achieving superior performance. Notably, this study provides evidence that the mediating role of process innovation in the KM-operational performance relationship is crucial not only for manufacturing companies, as indicated by Al-Sa'di et al. (2017), but also in the context of MSMEs.

CONCLUSION

This study emphasizes the crucial role of KM and process innovation in enhancing the operational performance of MSMEs. The findings reveal that effective KM practices significantly contribute to both direct improvements in operational performance and the facilitation of process innovation, which further enhances performance. This study also underscores the mediating effect of process innovation in the KM-operational performance relationship, demonstrating that innovation processes are essential pathways through which KM exerts its influence. These insights highlight the importance of not only fostering a strong KM practice, but also actively pursuing process innovations to achieve superior organizational outcomes.

Managerial Implications

For practitioners, the study underscores the importance of implementing robust KM practices to enhance both innovation and operational performance. MSME managers are encouraged to prioritize the development and dissemination of knowledge within their organizations as a means of fostering innovation. Specifically, this involves creating systems and structures that facilitate the sharing and application of knowledge, such as through training programs, collaborative platforms, and incentives for knowledge-sharing behaviors (Al Saifi, 2015). Moreover, the findings suggest that process innovations are a critical component of achieving superior operational performance. MSME managers should, therefore, focus not only on product and service innovations, but also on innovating their internal processes. This can be achieved by adopting new technologies, refining operational workflows, and continuously seeking new ways to enhance efficiency.

Limitations and Future Studies

Despite its contributions, this study has several limitations. First, the cross-sectional nature of the research design limits the ability to draw causal inferences about the relationships between KM, process innovation, and MSMEs' operational performance. Future studies could employ longitudinal designs to better capture the temporal dynamics of these relationships. The second limitation is related

to the study's focus on MSMEs in Yogyakarta, Indonesia, which may affect the generalizability of the findings. Future studies could explore these relationships in different contexts, involving larger samples from various location settings, to validate the applicability of the findings.

Third, while this study focused on the mediating role of process innovation, other potential mediators, such as technological capabilities or organizational culture, could be explored to provide a more holistic understanding of the KM-performance relationship. Fourth, the study did not control for potential moderating variables such as industry type or market conditions, which could influence the observed relationships. Future studies could incorporate these factors to refine the understanding of the conditions under which KM and process innovation most effectively contribute to MSMEs' performance. These insights provide valuable directions for both future studies and practical applications, emphasizing the critical role of KM and innovation in enhancing organizational outcomes.

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