Journal of STI Policy and Management, Volume 10(2), 2025, pp. 1-15

STI POLICY AND MANAGEMENT

Journal homepage: http://www.stipmjournal.org

The Role of Knowledge and Innovation Management in MSMEs' Performance: The Moderating Effect of Firm Size

Hardi Hardi[1], Afred Suci[1*], Abu Amar Fauzi[2]

[1] *Department of Management, Universitas Lancang Kuning, Pekanbaru, Indonesia*

[2] *National Research and Innovation Agency, Jakarta, Indonesia*

ARTICLE INFO

Article History:
Received : 24 April 2025
Revised : 10 June 2025
Accepted : 24 June 2025
Available online : 15 December 2025

Authorship Contribution:
All authors have equal contribution as the main authors.

Keywords:
Resource-Based Theory;
Knowledge-Management;
Innovation Performance;
Firm Size;
MSME.

ABSTRACT

While the effect of knowledge management (KM) on innovation and performance is well documented in large enterprises, its dynamics within micro, small, and medium-sized enterprises (MSMEs) remain relatively underexplored. Therefore, this study aims to examine the pathways linking KM, innovation, and performance among MSMEs. Additionally, it investigates the moderating role of firm size in these relationships. Data from 174 MSMEs in Riau Province, Indonesia, were collected via purposive sampling, and analyzed using the Hayes PROCESS Macro. Results show medium-sized firms had the highest KM practices, innovation, and performance. KM significantly enhanced innovation and performance, whereas innovation had no significant impact on performance. Firm size positively moderated the relationship among KM, innovation, and performance. Although the mediating role of innovation in the KM–performance relationship, as well as the conditional effects of firm size on this mediation, were positive, the results were only marginally insignificant. Theoretical and practical contributions are discussed, and recommendations for future studies are also proposed.

* Corresponding Author.
E-mail: afredsuci@unilak.ac.id

DOI: 10.14203/STIPM.2025.421

I. INTRODUCTION

Numerous business organizations recognize knowledge as a vital intangible resource, prompting the implementation of knowledge management (KM) strategies in business process (Nowacki and Bachnik, 2016; Ha et al., 2016; Edwards and Lönnqvist, 2023). KM is a structured approach to creating, capturing, refining, storing, managing, and disseminating organizational "know-how" (Wooi, 2024). It drives firm performance—defined as outcomes measuring how effectively a firm achieves its objectives (Ha et al., 2016)—as well as organizational effectiveness, growth, process improvement, efficiency, decision-making (Valeri, 2024), and innovation (Chaithanapat et al., 2022; Erena et al., 2023). However, most KM research focuses on medium and large enterprises (e.g., Moffet and McAdam, 2006; Massaro et al., 2016; Anand et al., 2021; Xingyu et al., 2022). These enterprises are generally better resourced, more resilient, and have more established business process (e.g., Roxas et al., 2014; Xingyu et al., 2022; Chaithanapat et al., 2022), enabling them to implement complex KM strategies that improve innovation and performance by leveraging internal knowledge (e.g., Roxas et al., 2014; Erena et al., 2023). Nevertheless, applying similar KM strategies to micro, small, and medium-sized enterprises (MSMEs) is more challenging, as MSMEs are not scaled-down versions of large firms (Cerchione and Esposito, 2017). For example, larger firms have more resources to invest in KM, innovation, and performance strategies, whereas smaller firms do not (Al Yami et al., 2022). Larger firms are more formalized and structured, making communication and coordination more complex (Darnall et al., 2010; Hartono et al., 2019). Additionally, infrastructure and motivational aids are more critical for KM implementation in larger firms, while training, human resource management, and resources availability are more important for KM implementation in MSMEs (Xingyu et al., 2022).

Table 1 shows that despite a growing literature demonstrating the impact of firm size—defined as organizational classification by comparative size (Al Yami et al., 2022)—on KM, firm innovation which is defined as the development and application of new ideas into products, processes, and methods (Erena et al., 2023), and firm performance globally, two critical gaps remain. First, existing studies barely disaggregate the MSME sector to examine whether micro, small, and medium-sized firms experience distinct moderating effects of firm size on the relationship between KM, firm innovation, and performance within an integrated model. Specifically, few international publications focus on Southeast Asian MSMEs, including those in Indonesia. Second, although numerous local studies in Indonesia have examined the effect of KM on innovation and performance in the MSMEs context (e.g., Utami and Ferdiansah, 2017; Yuningsih et al., 2023; Sunaryudanto and Rofiaty, 2024), the moderating effect of firm size remains largely unaddressed. According to Resource-Based Theory (RBT) (Barney, 1991), which underpins this study, resource use is shaped by firm-specific contexts, particularly its size (Hartono et al., 2019; Muniz-Rodriguez et al., 2024), leading to different KM, innovation, and performance dynamics. Therefore, it is crucial to consider these dynamics within MSMEs, as such differences may result in distinct outcomes. These gaps raise a key question: *How does the size of Indonesian MSMEs influence their implementation of KM, and how does this affect their innovativeness and performance?* Thus, by explicitly applying firm size as a moderator in the Indonesian MSME context, this study examines the dynamics of KM and its direct and indirect effects—mediated by innovation—on performance. This aligns with Science, Technology, and Innovation (STI) policy goals to enhance innovation and competitiveness among MSMEs. By firm size affects the impact of KM innovation and performance, the study provides empirical evidence to inform targeted STI policy interventions. Specifically, the findings are expected to offer insights into tailoring STI policies to address firm-size constraints, thereby optimizing KM outcomes. Consequently, this research not only addresses existing geographic and methodological gaps but also offers practical guidance for MSME managers and policymakers aiming to leverage STI frameworks to promote sustainable growth and innovation in developing markets.

Table 1. Previous studies discussing the role of firm size on KM, firm innovation, and performance

Authors & Year	Locus	Context	Main Findings
Al Yami et al. (2022)	Uni Arab Emirate	SME, and very large firms	KM implementation and its impact on operational efficiency were highest in larger organizations, followed by SMEs with very large organizations exhibiting the lowest effect.
Alabdullah and Mohamed (2023)	Bahrain	Industrial machinery firms	Larger-sized firms enabled better implementation of KM.
Chaithanapat et al. (2022)	Thailand	SMEs	Firm size influenced firm marketing and operational performance.
Franco et al. (2011)	Portugal	SMEs	Information scanning, as part of knowledge acquisition, was less prevalent in smaller firms than their larger counterparts.
Gong et al. (2013)	China	High-technology firms	Knowledge creativity had a stronger effect on performance in small firms.
Hock-Doepgen et al. (2021)	Germany	Small and medium-sized technological firms	External knowledge drove innovation more in larger, risk-taking firms, while internal knowledge was more practical for smaller, lower-risk firms.
Kruger and Johnson (2013)	South Africa	Small, medium, large, and extra-large organizations	Larger organizations prefer knowledge transfer through technology, whilst smaller ones favor personal approach.
Nowacki and Bachnik (2016)	Poland	Micro, small, medium, and large companies	Micro firms did not see innovativeness as a key driver for KM adoption. Small firms prioritized employee development, whereas medium and large firms highlighted strengthening their competitive position.
Wang et al. (2014)	China	High-technology firms	Larger firms improved financial but reduced operational performance.
Muniz-Rodriguez et al. (2024)	Spain	SMEs	Organizational size is a key moderator in the relationship between knowledge and innovation management.

II. ANALYTICAL FRAMEWORK

A. Resource-Based Theory (RBT)

The resource-based theory (RBT) originated from Penrose's seminal work (1959), which viewed the firm as a bundle of resources used for growth and competitive advantage. This laid the foundation for subsequent developments by Wernerfelt (1984), who formally introduced the term resource-based view (RBV), and Barney (1991), who refined RBV into RBT by identifying the VRIN characteristics—valuable, rare, inimitable, and non-substitutable—as the basis for of sustained competitive advantage. At its core, RBT posits that firms obtain and sustain competitive advantage through the possession and effective utilization of tangible and intangible resources (Miles, 2012). Grounded in RBT, this study conceptualizes knowledge and innovation as intangible resources essential for enhancing performance. Compared to alternative theoretical frameworks—such as Dynamic Capabilities (Teece et al., 1997), Absorptive Capacity (Cohen and Levinthal, 1990), and Economies of Scale (Chandler Jr., 1990)—RBT is particularly suitable for this study for several reasons. First, RBT highlights the strategic importance of intangible resources, including knowledge and innovation capabilities, in achieving sustained competitive advantage (Barney, 1991; Grant, 1996). As this study specifically examines knowledge and innovation management as intangible resources, RBT provides a clear foundation. Second, RBT inherently considers firm size as a contextual factor influencing resource availability and utilization. Therefore, RBT is especially relevant for analyzing how firm size moderates the relationship between knowledge management, innovation, and performance (Hartono et al., 2019; Muniz-Rodriguez et al., 2024). Third, Dynamic Capabilities theory focuses on adapting competencies in rapidly changing environments (Teece et al., 1997). However, it does not explicitly emphasize the moderating role of firm size. Similarly, Absorptive Capacity theory focuses on firms' abilities to recognize, assimilate, and apply external knowledge (Cohen & Levinthal, 1990) but overlooks size-based variation. Economies of Scale theory mainly examines cost advantages from increased production scale (Chandler Jr., 1990), emphasizing tangible resources and operational efficiencies rather than intangible resources such as knowledge and innovation capabilities.

B. Hypotheses Development

The RBT acknowledges that resource utilization is context-dependent, leading to varying dynamics in KM implementation and impact. Smaller firms typically rely on informal processes and the tacit knowledge of key individuals with limited resources (Kruger and Johnson, 2013; Wang et al., 2014; Chaithanapat et al., 2022; Wooi, 2024). Conversely, larger firms often possess structured KM systems and substantial resources, enabling them to effectively leverage KM for innovation and performance enhancement (Wang et al., 2014; Roxas et al., 2014; Al Yami et al., 2022; Xingyu et al., 2022).

Medium-sized firms occupy a distinct position between these extremes. They have formal structures and greater resources than smaller firms but remain more flexible and adaptive than larger firms (Franco et al., 2011; Gong et al., 2013). This balance enables them to combine formal KM processes, allowing medium-sized firms to effectively leverage KM for significant innovation and performance gains. Their scale permits structured KM without the bureaucracy of larger firms with sufficient resources for effective KM implementation.

Therefore, while RBT principles apply across firm sizes, the mechanisms and outcomes of KM implementation likely differ. Medium-sized firms, due to their balance of resources and flexibility, are expected to benefit most from KM initiatives. This aligns with research highlighting firm size as a KM-performance moderator (Hartono et al., 2019; Muniz-Rodriguez et al., 2024). Thus, we hypothesize:

H1 Distinct firm sizes generate different levels of KM (a), firm innovation (b), and performance (c), with medium-sized firms showing the highest levels.

H2 Firm size moderates the impact of KM on innovation (a), with the strongest effect in medium-sized firms compared to micro and small firms (b).

H3 Firm size moderates the impact of KM on firm performance (a), with the strongest effect in medium-sized firms compared to micro and small firms (b).

H4 Firm size moderates the impact of innovation on performance (a), with the strongest effect in medium-sized firms compared to micro and small firms (b).

Torabi et al. (2016) argue that KM is fundamentally rooted in RBT. According to RBT, knowledge is a strategically valuable asset that enhances both financial and non-financial firm performance (Ha et al., 2016; Azyabi, 2018; Kusa et al., 2024). KM improves firm performance directly and indirectly by fostering other organizational capabilities, particularly innovation. Effective KM practices strengthen MSMEs' innovation capabilities by promoting a learning culture, encouraging collaboration and knowledge sharing, and developing new competencies (Kardoyo et al., 2018; Hassan and Raziq, 2019; Chaithanapat et al., 2022; Erena et al., 2023). This alignment between KM and innovation reflects RBT's focus on strategically bundling resources and developing capabilities. Such bundling allows firms to convert knowledge into innovative methods, products, services, or processes (Nowacki and Bachnik, 2016; Chaithanapat et al., 2022). Consequently, innovation driven by effective KM can significantly enhance MSMEs' performance (Roxas et al., 2014; Arsawan et al., 2022). Innovation's mediating role underscores the indirect but critical influence of KM strategies on firm performance (Byukusenge and Munene, 2017; Albassami et al., 2019; Arsawan et al., 2022). Based on RBT, we propose the following hypothesis:

H5 KM directly and significantly influences MSMEs' performance.

H6 KM significantly influences MSMEs' innovation.

H7 Firm innovation significantly influences MSMEs' performance.

H8 KM, mediated by firm innovation, significantly influences MSMEs' performance.

Additionally, considering the moderating role of firm size:

H9 Firm size moderates the indirect impact of KM, mediated by innovation, on MSMEs' performance.

All hypotheses forming this study's conceptual framework are exhibited in Figure 1.

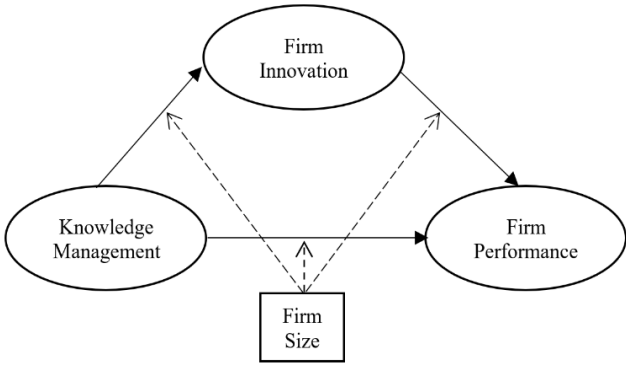


Figure 1. Conceptual framework

III. METHODOLOGY

A. Samples

The study's population included MSMEs officially registered in Riau Province, Indonesia, under the Department of Industry, Trade, Cooperative, and SME. Using G*Power analysis (Faul et al., 2007), (f^2 = 0.15; α = 0.05; power = 0.95) for three predictors (KM, innovation, firm size), the minimum required sample was 119 MSMEs. A total of 174 MSMEs—comprising business owners or top-level managers—voluntarily participated, exceeding the minimum requirement. Respondents were selected through purposive sampling, focusing solely on active businesses.

Data were collected (January to February 2025) via structured questionnaires at offices or business events held by government or private institutions across Riau Province as its Riau's diverse MSME landscape provided a representative developing economy context.

As shown in Table 2, most firms were relatively young, with 78.2% operating for only 2-7 years and 82.2% functioning as self-owned ventures. In terms of scale, most firms were micro-sizes (47.7%), followed by small-sizes (31.6%) and medium-size firms (20.7%), with 69% employing fewer than ten people. Culinary was the largest sector (24.7%), followed by trading, retail, and wholesales (19%), and agro, forestry, and marine sectors (10.9%), while others each <10%.

B. Measurement

The data are primary and quantitative, employing a five-point Likert scale. Although self-reported and subjective, Likert scales are commonly treated as continuous data in quantitative analyses of large samples (Wu and Leung, 2017).

KM (α = .91), the independent variable, was measured by eight items from Petrov et al. (2020). Firm innovation (α = .89), the mediator, was measured by four items from Beltramino et al. (2020). Firm performance (α = .81) was the dependent variable, also measured using four continuous items developed by Beltramino et al. (2020).

Table 2. Respondents' characteristics

Criteria	Freq. (*n*=174)	Percentage (%)	χ^2
Business Tenure			.00***
2-7 years	136	78.2	
8-12 years	33	19.0	
13-20 years	5	2.9	
Business Ownership			.00***
Self-owned	143	82.2	
Family business	22	12.6	
Partnership	9	5.2	
Employee Number			.00***
None	3	1.7	
Less than 10	120	69.0	
> 10 to ≤ 25	31	17.8	
> 25 to ≤ 50	9	5.2	
> 50 to ≤ 100	4	2.3	
> 100 to ≤ 200	6	3.4	
> 200 to ≤ 300	1	0.6	
Annual Sales			.00***
≤ IDR 300 million (micro-size)	83	47.7	
> IDR 300 million - ≤ IDR 2.5 billion (small-size)	55	31.6	
> IDR 2.5 billion - ≤ IDR 50 billion (medium-size)	36	20.7	
Core Business Type			.00***
Product manufacturing	12	6.9	
Culinary			
Hospitality and tourism	43	24.7	
Information, communication, and technology	6	3.4	
Automotive, transportation, machinery, heavy equipment	5	2.9	
Education	11	6.3	
Agro, forestry, and marine sectors	7	4.0	
Trading, retail, and wholesales	19	10.9	
Amusements and entertainments	33	19.0	
Security and labor services	6	3.4	
Vendors and consultant services	6	3.4	
Building, housing, and material products and services	9	5.2	
Sports and health	13	7.5	
	4	2.3	

[a] one sample binominal test
***$p < .01$

Firm size, the moderator, was classified per Indonesian Law No. 20/2008 into micro (≤ IDR 300 million), small (> IDR 300 million to ≤ IDR 2.5 billion), and medium (> IDR 2.5 billion to ≤ IDR 50 billion) firms. Although previous studies often measured firm size by employee count (e.g., Kruger and Johnson, 2013; Hock-Doepgen et al., 2021; Al Yami et al., 2022), it was unsuitable in this study. Table 2 shows 69% employed fewer than ten people, with fewer over twenty-five, indicating limited employment-based variation. Annual sales provided a more balanced and reliable basis for classification. Each group (micro 47.7%, small 31.6%, medium 20.7%) had over 30 respondents, meeting Roscoe's (1975) guideline for sufficient sample size.

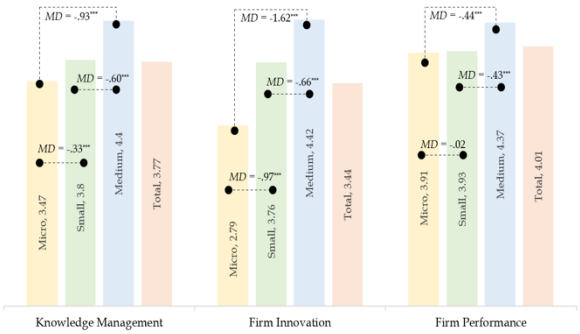
C. Data Analysis

H1 was tested using mean analysis and One-way ANOVA comparing KM, innovation, and performance across MSME sizes. H2–H4 were tested with Model 1 for conditional effects with a categorical moderator (Hayes, 2022). H5–H8 were tested with Model 4 for simple mediation (Hayes, 2022). H9 was assessed using Model 8 for moderated mediation effects.

IV. RESULTS AND DISCUSSION

A. Descriptive and ANOVA Testing Results

Figure 2 strongly supports H1, indicating that firm size significantly affects KM, innovation, and performance.



***$p < .01$

MD = Mean Difference

Figure 2. Mean analysis and post-hoc test results of Oneway ANOVA

Medium-sized MSMEs demonstrate the most effective implementation across all variables compared to micro- and small-sized firms. KM in medium-size MSMEs (M = 4.40) was significantly higher than the small (M = 3.80; MD = -.60***) and micro firms (M = 3.47; MD = -.93***). Small MSMEs also applied KM more than micro (MD = -.33***).

These findings align with RBT, stating that to gain competitive advantage, firm resources—including knowledge—must be rare, valuable, non-substitutable, and inimitable (Barney, 1991). RBV (Wernerfelt, 1984) states that a firm's capacity to manage knowledge relies on its internal resources. Indonesian medium-sized firms, compared to micro and small ones, typically have more developed structure, technology readiness, and managerial capacity, enabling more effective KM implementation (e.g., Hartono et al., 2019; Masbullah, 2023; Hermawati et al., 2024). Micro and small companies, despite agility, often lack the infrastructure and capabilities for strategic KM application (Wang and Yang, 2016; Durst et al., 2023). These findings highlight size-based differences in firms' abilities to acquire, utilize, store, and formalize knowledge (e.g., Cerchione & Esposito, 2017; Xingyu et al., 2022).

Medium-sized firms demonstrated highest innovation (M = 4.42), significantly exceeding the small (M = 3.76; MD = -.66***) and micro firms (M = 2.79; MD = -.97***). Small-sized firms also showed greater innovation than micro firms (MD = -.97***). H1b is supported, confirming innovation varies by firm size.

Consistent with the RBT (Barney, 1991), firm innovation is both an outcome a capacity arising from effective resource use, especially knowledge (Hassan and Raziq, 2019; Chaithanapat et al., 2022). Innovation differences across firm sizes reflect varying abilities to transform knowledge into value. Vepo do Nascimento Welter et al. (2020) state that innovation capacity is a strategic resource developed through learning, adaptive routines, and knowledge governance. Medium-sized firms likely possess these structures, facilitating knowledge integration into new products and processes (e.g., Nowacki and Bachnik, 2016; Arsawan et al., 2022). Micro and small firms often lack the routines and absorptive capacity to sustain innovation. Thus, innovation depends on resource access and mobilization, making capacity a key MSME performance differentiator.

Medium-sized firms (M = 4.37) outperformed small (M = 3.93; MD = -.43***) and micro firms (M = 3.91; MD = -.44***). However, the difference between micro and small firms was minimal (MD = -.02), indicating firm size alone does not predict performance linearly. This aligns with RBT, asserting that performance depends on possession and strategic application of resources (Barney,

1991; Miles, 2012). Hermawati et al. (2024) found KM and entrepreneurial capability reciprocally foster innovation and performance, highlighting entrepreneurship's role in converting innovation to performance. Wang et al. (2014) reported larger firms might face operational performance declines despite positive financial outcomes. Similarly, Roxas et al. (2014) observed innovation increases with firm size, but performance may not due to reduced flexibility and greater complexity. Hence, our findings align with the dynamic capability (DC) perspective, emphasizing performance depends on resource possession and the firm's ability to learn, integrate, and reconfigure resources to meet environmental demands (Mehralian et al., 2023).

Conversely, despite limited resources, micro and small firms sustain performance through flexibility, close customer relationships, and entrepreneurial leadership (Franco et al., 2011; Durst and Edvardsson, 2012; Hartono et al., 2019). Kruger and Johnson (2013) and Hock-Doepgen et al. (2021) highlight that effective KM and innovation—rather than firm size alone—accurately predict performance. Hence, while medium-sized firms leverage size alongside KM and innovation, micro and small firms can achieve satisfactory performance by optimizing strategic focus and niche specialization.

B. Moderating Testing Results

Table 3 shows that the interaction of firm size with KM in affecting firm innovation was statistically negative and significant (*coeff.* = -.26; *SE* = .10; *t* = -2.71; *p* = .01***), with a 95% bootstrapped confidence interval excluding zero (*CI* [*LL* = -.45; *UL* = -.07]). It indicates that the strength of KM's positive effect on innovation varied by firm size.

As shown in Figure 3, although all firm sizes benefited from KM, medium-sized firms exhibited the most pronounced conditional effect of KM on firm innovation, followed by small and micro-sized firms. Practically, robust KM enhanced innovation across all firms, with medium-sized firms gaining the greatest benefits. Hence, H2a and H2b were fully supported.

This finding—that firm size significantly conditioned the KM-firm innovation—aligns with both RBT and emerging empirical evidence. Referring to the RBT (Wernerfelt, 1984; Barney, 1991), medium-sized firms can transform KM into innovation by leveraging more balanced resource endowments than smaller firms. Muniz-Rodriguez et al. (2024) similarly found that organizational size influenced the KM-innovation relationship in Spanish SMEs. Similarly, Hock-Doepgen et al. (2021) demonstrated that KM practices yielded greater innovation in firms with higher risk tolerance, typically larger firms—highlighting the contingent nature of knowledge exploitation based on firm size. Therefore, this finding may complement RBT with innovation capacity theory by emphasizing a firm's ability to transform knowledge into innovation through structured routines and adaptive capabilities (Vepo do Nascimento Welter et al., 2020). While RBT emphasizes resource possession, innovation capacity highlights effective resource mobilization. Medium-sized firms tend to have both resources and mechanisms—such as formalized knowledge-sharing and cross-functional collaboration—that enable KM to generate greater innovation outcomes compared to smaller firms.

Table 3. Moderation effects

Model	*Coeff.*	*SE*	*t*	*p*	[a]*CI*	
					LL	*UL*
KM*FS→FI	-.26	.10	-2.71	.01***	-.45	-.07
KM*FS→FP	.13	.08	1.71	.09	-.02	.29
FI*FS→FP	.31	.07	4.64	.00***	.18	.44

****p* < .01*

KM = Knowledge Management; FS = Firm Size; FI = Firm Innovation; FP = Firm Performance

[a] LLCI | ULCI; at the 95% of CI, the range between LLCI and ULCI must not include zero (both must exhibit either a positive or negative slope) to be significant (Hayes, 2022).

[b] Effect

[c] BootSE

[d] BootLLCI

[e] BootULCI

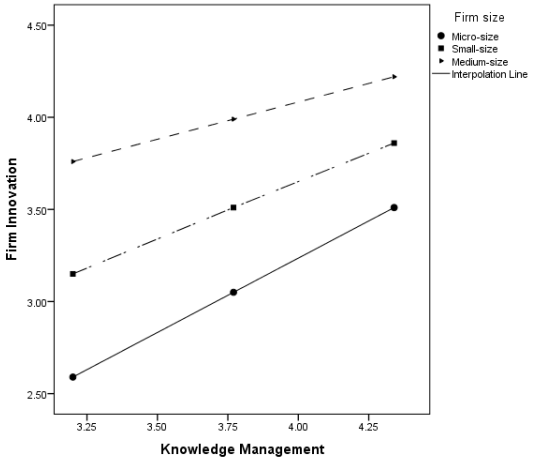


Figure 3. Conditional moderation effects of FS on the relationship of KM with FI

Conversely, firm size did not significantly moderate KM's effect on performance (*coeff.* = .13; *SE* = .08; *t* = 1.71; *p* = .09), with a 95% bootstrapped confidence interval marginally excluding zero (*CI* [*LL* = -.02; *UL* = .29]). As shown in Figure 4, the effect of KM on

performance was somewhat size-contingent. Medium-sized firms demonstrated the highest gains, while small and micro firms showed more modest results. However, the p-value indicated only marginal significance, and the bootstrapped interval provided limited evidence that firm size meaningfully altered the KM–performance relationship. In this case, medium-sized firms saw the greatest benefit, followed by small and micro firms. Hence, H3a was not entirely supported, while H3b was confirmed.

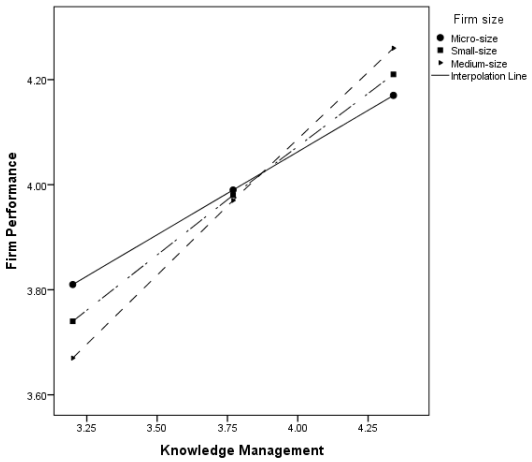


Figure 4. Conditional moderation effects of FS on the relationship of KM with FP

These findings support Kruger and Johnson (2013), who found no systematic difference in KM's effect on performance between South African's SMEs and large firms. Firm performance may rely more on KM practices than firm size. Similarly, Roxas et al. (2014) observed that bureaucratic complexity may diminish performance returns, despite larger firms having more resources to implement KM. From the RBT perspective, this underlines that performance relies not only on resource possession but also on their strategic integration and deployment (e.g., Hock-Doepgen et al., 2021).

The interaction between firm innovation and firm size in predicting firm performance was significant (*coeff.* = .31; *SE* = .07; *t* = 4.64; *p* = .00***), with a 95% confidence interval excluding zero (*CI* [*LL* = .18; *UL* = .44]). Figure 5 illustrates that this interaction was more pronounced in medium-sized firms compared to their small and micro counterparts. While innovation improves performance across all firms, medium-sized firms saw the most performance gains, underscoring firm size's role in amplifying innovation outcomes. Hence, H4a and H4b were fully supported.

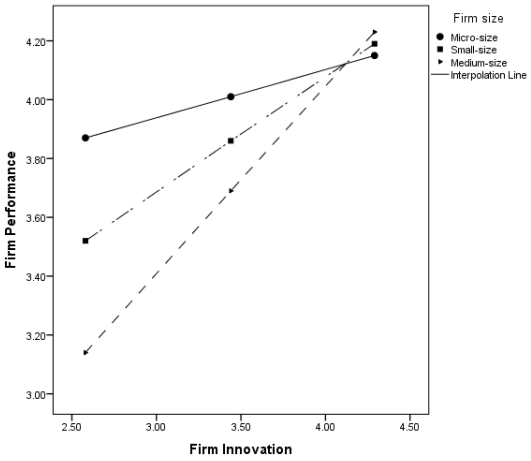


Figure 5. Conditional moderation effects of FS on the relationship of FI with FP

The solid moderation of the innovation-performance relationship by firm size aligns with prior research extends a well-established stream of studies suggesting that innovation generates higher performance gains in richer contextual environments. Roxas et al. (2014) indicate that innovation's positive impacts on performance increase with firm size, as larger firms have more resources (Gong et al., 2013) to transform into new products or processes (Wang et al., 2014). Consistent with RBT, medium-sized firms strike an optimal balance—large enough to exploit economic of scales in innovation support systems yet sufficiently agile to avoid the inertia common in larger bureaucracies (e.g., Franco et al., 2011; Roxas et al., 2014; Hartono et al., 2019). Dynamic capability (DC) theory supports this finding. Teece et al. (1997) underscores a firm's capability to adapt and reconfigure resources to explore opportunities and maintain performance amid change. Indonesian medium-sized firms often demonstrate stronger dynamic capabilities than smaller ones, allowing them to align innovation with shifting market demands effectively. Their ability to embed innovation into strategic routines—without the rigidity of larger firms—improves innovation's impact on performance, reinforcing adaptability's critical role alongside resource availability.

C. Mediation and Moderated Mediation Testing Results

Table 4 demonstrates a robust, positive direct effect of KM on MSMEs' performance (*coeff.* = .33; *SE* = .08; *t* = 4.43; *p* = .00***; 95% *CI* [.18,.48]), thereby supporting H5.

Table 4. Mediation and moderated mediation effects

Model	*Coeff.*	*SE*	*t*	*p*	[a]*CI* *LL*	*UL*
KM→FI	1.09	.08	13.85	.00***	.93	1.24
KM→FP	.33	.08	4.43	.00***	.18	.48
FI→FP	.08	.05	1.52	.13	-.02	.18
KM→FI→FP	[b].08	[c].06	-	-	[d]-.03	[e].22
Micro-size	[b].10	[c].06	-	-	[d].00	[e].24
Small-size	[b].08	[c].05	-	-	[d].00	[e].18
Medium-size	[b].05	[c].03	-	-	[d].00	[e].12
KM*FS→FI→FP	[b]-.03	[c].03	-	-	[d]-.10	[e].00

****p* < .01

KM = Knowledge Management; FS = Firm Size; FI = Firm Innovation; FP = Firm Performance

[a] LLCI | ULCI; at the 95% of CI, the range between LLCI and ULCI must not include zero (both must exhibit either a positive or negative slope) to be significant (Hayes, 2022).

[b] Effect

[c] BootSE

[d] BootLLCI

[e] BootULCI

This finding aligns with empirical evidence demonstrating KM's significant impact on SMEs' performance in Malaysia (Ha et al., 2016), Saudi Arabia (Azyabi, 2018), and Poland (Kusa et al., 2024). Similarly, the path from KM to firm innovation was highly significant and substantial (*coeff.* = 1.09; *SE* = .08; *t* = 13.85; *p* = .00***; 95% *CI* [.93, 1.24]), strengthening RBT's claims that knowledge is a pivotal intangible resource to generate novel ideas, products, or processes (Torabi et al., 2016; Wang et al., 2024). This finding concurs with Erena et al. (2023) in Ethiopia, who found a similarly strong effect of KM practices on innovation, and with Papa et al.'s (2020) evidence of KM's positive influence on Italian firm innovation. Hence, H6 is supported.

Furthermore, complementing the RBT, these findings align with Grant's Knowledge-Based View (KBV), which underscores knowledge as a pivotal intangible resource and asserts that a firm's ability to create, integrate, and apply it is fundamental to generate novel ideas, processes, and superior performance (Grant, 1996). For Indonesian MSMEs, pro-active KM practices—encompassing knowledge sharing and absorptive capacity, as explored by Nasution et al. (2025)—are beneficial and critical drivers of innovation and business success. While consistent with international evidence, this study specifically reinforces the importance of cultivating an effective knowledge-sharing culture, as emphasized by Rochma et al. (2025) in the Indonesian SME context, to enhance firm capabilities and performance.

However, the direct effect of firm innovation on firm performance was not significant (*coeff.* = .08; *SE* = .05; *t* = 1.52; *p* = .13; 95% *CI* [-.02, .18]); thus, H7 was not supported. This finding aligns with theoretical and empirical precedent. According to the RBT, innovation's impact on performance often relies on complementary resources and enabling environments such as infrastructure, commercialization strategy, and market readiness (e.g., Bi et al., 2013; Jiang et al., 2017). As shown in Table 2, many micro and small—with fewer than ten employees and limited business tenure—likely lack these support systems, weakening the transformation of innovation into performance outcomes. Previous studies support this argument. For example, Byukunsenge and Munene (2017) found that innovation significantly influences performance in Rwandan SMEs only when mediated by strong KM application, suggesting that innovation alone is insufficient without strategic alignment and support. Similary, Durst et al. (2023) contend that many SMEs, particularly smaller ones, exhibit short-term focus and limited strategic capacity, which may reduce the performance benefits of innovation.

The general indirect impact of KM on firm performance through firm innovation was positive but statistically insignificant (*effect* = .08; *bootSE* = .06; 95% *CI* [-.03,.22]). Insignificances also observed across micro (*effect* = .10; *bootSE* = .06; 95% *CI* [.00,.24]), small (*effect* = .08; *bootSE* = .05; 95% *CI* [.00,.18]), and medium-sized firms (*effect* = .05; *bootSE* = .03; 95% *CI* [.00,.12]). Thus, H8 was unsupported, and the moderated mediation hypothesis (H9) was also rejected (*effect* = .08; *bootSE* = .06; 95% *CI* [-.03,.22]).

These insignificant findings may stem from MSMEs' structural characteristics that hinder the translation of innovation into performance. This study aligns with Byukusenge and Munene's finding (2017) in Rwandan SMEs, positing that firm innovation did not significantly affect performance. Durst and Edvardsson (2012) also observed that many SMEs implement KM and innovation in an ad hoc, operational manner, lacking formal processes and HR infrastructure necessary for commercialization. Moreover, Xingyu et al. (2022) highlighted pervasive constraints in SMEs, such as limited expertise, informal structures, and resource gaps, that weaken the KM → innovation → performance pathway. The broader innovation literature underscores that innovation alone is insufficient to enhance performance; it must be coupled with innovation speed and scale, market readiness, infrastructure, and commercialization strategies (Liao et al., 2010; Bi et al., 2013; Jiang et al., 2017). Without these conditions, the KM-innovation link may not transform into effective performance gains.

The statistically insignificant mediation effect of innovation on the KM–performance relationship likely reflects key challenges faced by Indonesian MSMEs. As Masbullah (2023) highlighted, limited digital literacy, inadequate technological infrastructure, and low KM awareness hinder innovation. Hermawati et al. (2024) further noted that innovation often relies on owners' digital and strategic competencies, which vary considerably. Kardoyo et al. (2018) found that innovation in SMES creative industries tends to arise from personal creativity rather than structured KM practices. These findings suggest that, despite KM presence, many Indonesian MSMEs lack the capacity to transform KM into practical innovation. This supports our finding that innovation does not significantly impact firm performance, underscoring the weak innovation–performance relationship.

Another explanation relates to the confidence interval results, which may be influenced by sample size. As shown in Table 4, the 95% bootstrapped *CIs* for all indirect effect estimates had a lower bound of exactly zero (micro = [.00, .24]; small = [.00, .18]; medium = [.00, .12]). According to Hayes's (2022), an effect is statistically significant when its 95% *CI* excludes zero. Here, zero implies that the mediation effect could be nonexistent, rendering these findings marginal. In other words, a *CI's* zero indicates a borderline or underpowered result. It suggests that although KM → innovation → performance pathway consistently points positive, the sampling variability may be too large to confirm significance at the conventional $\alpha = .05$ level. This may reflect, first, small effect sizes—the indirect effects themselves were modest (*effect* ≈ .05 – .10). Second, statistical power may be limited given subgroup *Ns* of 83 (micro-sized), 55 (small-sized), and 36 (medium-sized). Although these meet Roscoe's (1975) minimal cell size ($N = 30$), they remain low for detecting subtle mediation effects. Consequently, even true but small mediated effects may require larger samples to achieve narrow *CIs* excluding zero. These marginal *CIs* should thus be interpreted as suggestive rather than conclusive, indicating that further data are needed before firm innovation can be confidently said to mediate the KM–performance relationship

V. CONCLUSION

In general, this study underscores KM as a pivotal intangible resource for Indonesian MSMEs. Nevertheless, its translation into innovation and performance relies on firm size. The findings offer two important theoretical implications. First, the study extends the Resource-Based Theory (RBT) by revealing that for Indonesian MSMEs, mere possession of knowledge, though highlighted by the Knowledge-Based View (KBV), is insufficient for driving innovation and performance. The critical factor lies in the firm's capacity to effectively deploy and transform this knowledge. This novel insight bridges RBT, KBV, and Dynamic Capabilities theory, suggesting that MSMEs must develop effective innovation capabilities. This dynamic aspect is crucial for resource-constrained Indonesian MSMEs, where actively managing and leveraging knowledge rather than merely possess it becomes the true source of sustainable competitive advantage. This nuanced understanding offers a complete theoretical lens on how intangible resources drive value creation in emerging-markets MSMEs.

Second, while numerous empirical studies have discussed the direct and indirect relationship among KM, firm innovation, and firm performance (e.g., Ha et al., 2016; Byukusenge and Munene, 2017; Azyabi, 2018; Albassami et al., 2019; Arsawan et al., 2022; Wang et al., 2024; Kusa et al., 2024), our study refines this well-established model by involving firm size. Medium-sized firms are better equipped to invest in teamwork, formal structures, and financing, enabling them to more effectively transform innovations into performance gains. Conversely, micro and small-sized firms often lack these "privileges," resulting in ineffective KM → innovation to gain the optimum performance.

From a methodological approach, this study diverges from previous studies in two keyways. First, while most previous studies treated SMEs as a uniform group (e.g., Hock-Doepgen et al., 2021; Chaithanapat et al., 2022) versus larger firms (e.g., Moffett and McAdam, 2006; Kruger and Johnson, 2013; Nowacki and Bachnik, 2016; Al Yami et al., 2022), often neglecting the micro sector, our study disaggregates MSMEs into micro, small, and medium-sized categories. This disaggregation enhances understanding of the unique characteristics and behaviors across different MSMEs sizes in practicing KM to improve firm innovation and performance. Second, by employing annual sales as the categorical indicator of firm size instead of employee count (e.g., Moffett and McAdam, 2006; Kruger and Jhonson, 2013; Gong et al., 2013; Hock-Doepgen et al., 2021; Al Yami et al., 2022), total assets (e.g., Alabdullah and Mohamed, 2023), or financial capability (e.g., Hartono et al., 2019), our study

introduces a more nuanced contextual-objective measurement.

From a practical standpoint, the findings offer strategic guidance for Indonesian MSME owners and top-level managers, particularly through the lens of Science, Technology, and Innovation (STI) policy. Given that knowledge-based business strategies vary by firm sizes, STI policies should reflect this heterogeneity. For medium-sized MSMEs, such policies should prioritize their formalization and integration of KM and innovation systems, for example, by providing subsidies for adopting advanced digital knowledge-sharing platforms or offering incentives for establishing in-house R&D units or collaborative projects with research institutions. This relates to their greater structural and managerial capacity to absorb and leverage technology-driven knowledge. Conversely, for micro and small-sized MSMEs, STI policies should prioritize foundational capacity-building, including government-backed programs for enhancing commercialization skills, fostering market readiness through incubation and mentorship, and facilitating access to crucial professional networks and digital literacy training. Thus, Indonesian MSMEs could help enhance innovation and business performance.

This study has several limitations. First, prior studies recommended combining firm size and business type when discussing KM practices (e.g., Moffett and McAdam, 2006; Kruger and Johnson, 2013; Nowacki and Bachnik, 2016). However, as shown in Table 2, the 174 MSME participants represent thirteen distinct core business types, but only the culinary (43) and trading, retail, and wholesales (33) sectors have over 30 firms each. This results in uneven representation limits, industry-specific comparisons and may inflate the influence of dominant sectors. Future studies should ensure balanced representation across industries. Nevertheless, unlike many previous studies that use employee numbers as a proxy for firm size (e.g., Kruger and Johnson, 2013; Hock-Doepgen et al., 2021; Al Yami et al., 2022), this study adopts the Indonesian government's annual revenue classification (Law No. 20 of 2008). While this standardizes and aligns with policy, it may not fully reflect internal capacities like managerial complexity or operational scalability, often better captured by headcount (Durst & Edvardsson, 2012). Firm size is a multidimensional construct that can include age, asset base, and structural complexity (Massaro et al., 2016; Cerchione and Esposito, 2017); thus, relying solely on revenue may oversimplify sectoral differences in absorptive capacity. Moreover, treating firm size as a static categorical moderator may overlook potential nonlinear and stage-dependent effects within the KM–innovation–performance nexus. For instance, smaller firms may benefit from agility and informal knowledge flows, while larger firms leverage structured KM systems—though both can experience diminishing returns beyond certain thresholds (Gong et al., 2013; Wang et al., 2014; Roxas et al., 2014). Firm size effects vary by industry and region (Durst et al., 2023), thus, future studies should consider multi-indicator or latent constructs of firm size and adopt longitudinal designs to capture better how growth trajectories shape KM effectiveness (Massaro et al., 2016; Muniz-Rodriguez et al., 2024).

Second, reliance on self-reported performance metrics may trigger bias. Future studies should incorporate objective financial indicators (e.g., sales growth, ROI) to strengthen validity. Third, as data were collected exclusively from Riau Province, the findings may have limited generalizability. Subsequent studies should cover multiple regions to better understand MSMEs in diverse contexts.

Fourth, a limitation of the proposed framework is the non-significant mediating role of innovation in the KM–performance relationship. Although prior studies support the KM–innovation–performance pathway (e.g., Byukusenge and Munene, 2017; Arsawan et al., 2022; Erena et al., 2023), our findings suggest that innovation alone may not effectively translate KM into performance without supportive conditions such as digital readiness, strategic capacity, or dynamic capabilities. This structural gap implies that additional mediators or moderators may be needed to better capture conditional mechanisms in MSME contexts (Liao et al., 2010; Jiang et al., 2017; Durst et al., 2023).

REFERENCES

Alabdullah, T. T. Y., & Mohamed, Z. K. (2023). Exploring the impact CEO Duality, firm size, and board size on capital structure based on the knowledge management during the Covid-19 pandemic. *International Journal of Accounting, Management, Economics and Social Sciences (IJAMESC)*, *1*(4), 266-280. https://doi.org/10.61990/ijamesc.v1i4.49

Albassami, A. M., Hameed, W. U., Rana, T. N., & Moshfegyan, M. (2019). Does knowledge management expedite SMEs

performance through organizational innovation? Empirical evidence from small and medium-sized enterprises (SMEs). *Pacific Business Review International*, *12*(1), 11-22.

Al Yami, M., Ajmal, M. M., & Balasubramanian, S. (2022). Does size matter? The effects of public sector organizational size' on knowledge management processes and operational efficiency. *VINE Journal of Information and Knowledge Management Systems*, *52*(5), 670-700. https://doi.org/10.1108/VJIKMS-07-2020-0123

Anand, A., Muskat, B., Creed, A., Zutshi, A., & Csepregi, A. (2021). Knowledge sharing, knowledge transfer, and SMEs: evolution, antecedents, outcomes and directions. *Personnel Review*, *50*(9), 1873-1893. https://doi.org/10.1108/PR-05-2020-0372

Arsawan, I. W. E., Koval, V., Rajiani, I., Rustiarini, N. W., Supartha, W. G., & Suryantini, N. P. S. (2022). Leveraging knowledge sharing and innovation culture into SMEs sustainable competitive advantage. *International Journal of Productivity and Performance Management*, *71*(2), 405-428. https://doi.org/10.1108/IJPPM-04-2020-0192

Azyabi, N. G. (2018). The impact of knowledge management capabilities and processes on SME performance. *Бизнес-информатика* (Business Informatics): *3*(45), 39-52. https://doi.org/10.17323/1998-0663.2018.3.39.52

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99-120. https://doi.org/10.1177/014920639101700108

Beltramino, N. S., García-Perez-de-Lema, D., & Valdez-Juárez, L. E. (2020). The structural capital, the innovation and the performance of the industrial SMES. *Journal of Intellectual Capital*, *21*(6), 913-945. https://doi.org/10.1108/JIC-01-2019-0020

Bi, R., Davison, R. M., & Smyrnios, K. X. (2013, June). Effect of IT Complementary Resources on Fast Growth Small-to-Medium Enterprise Performance: A Resource-based View. In *17th Pacific Asia Conference on Information Systems (PACIS 2013): Smart, Open and Social Information Systems*.

Byukusenge, E., & Munene, J. C. (2017). Knowledge management and business performance: Does innovation matter? *Cogent Business & Management*, *4*(1), 1368434. https://doi.org/10.1080/23311975.2017.1368434

Cerchione, R., & Esposito, E. (2017). Using knowledge management systems: A taxonomy of SME strategies. *International Journal of Information Management*, *37*(1), 1551-1562. https://doi.org/10.1016/j.ijinfomgt.2016.10.007

Cerchione, R., & Esposito, E. (2017). Using knowledge management systems: A taxonomy of SME strategies. *International Journal of Information Management*, *37*(1), 1551-1562.

Chaithanapat, P., Punnakitikashem, P., Oo, N. C. K. K., & Rakthin, S. (2022). Relationships among knowledge-oriented leadership, customer knowledge management, innovation quality, and firm performance in SMEs. *Journal of Innovation & Knowledge*, *7*(1), 100162. https://doi.org/10.1016/j.jik.2022.100162

Chandler Jr, A. D. (1990). Scale and Scope: A Review Colloquium-Scale and Scope: The Dynamics of Industrial Capitalism. *Business History Review*, *64*(4), 690-735. https://doi.org/10.2307/3115503

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128-152. https://doi.org/10.4324/9780080517889

Darnall, N., Henriques, I., & Sadorsky, P. (2010). Adopting proactive environmental strategy: The influence of stakeholders and firm size. *Journal of Management Studies*, *47*(6), 1072-1094. https://doi.org/10.1111/j.1467-6486.2009.00873.x

Durst, S., Edvardsson, I. R., & Foli, S. (2023). Knowledge management in SMEs: a follow-up literature review. *Journal of Knowledge Management*, *27*(11), 25-58. https://doi.org/10.1108/JKM-04-2022-0325

Durst, S., & Runar Edvardsson, I. (2012). Knowledge management in SMEs: a literature review. *Journal of Knowledge Management*, *16*(6), 879-903. https://doi.org/10.1108/13673271211276173

Edwards, J., & Lönnqvist, A. (2023). The future of knowledge management: An agenda for

research and practice. *Knowledge Management Research & Practice*, *21*(5), 909-916. https://doi.org/10.1080/14778238.2023.2202509

Erena, O. T., Kalko, M. M., & Debele, S. A. (2023). Organizational factors, knowledge management and innovation: empirical evidence from medium-and large-scale manufacturing firms in Ethiopia. *Journal of Knowledge Management*, *27*(4), 1165-1207. https://doi.org/10.1108/JKM-11-2021-0861

Faul, F., Erdfelder, E., Buchner, A., & Georg Lang, A. (2007). Statistical power analysis using G*power 3.1: Test for correlation and regression analysis. *Behavior Research Method*, *41*(4), 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Franco, M., Haase, H., Magrinho, A., & Ramos Silva, J. (2011). Scanning practices and information sources: an empirical study of firm size. *Journal of Enterprise Information Management*, *24*(3), 268-287. https://doi.org/10.1108/17410391111122853

Gong, Y., Zhou, J., & Chang, S. (2013). Core knowledge employee creativity and firm performance: The moderating role of riskiness orientation, firm size, and realized absorptive capacity. *Personnel Psychology*, *66*(2), 443-482. https://doi.org/10.1111/peps.12024

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, *17*(S2), 109-122. https://doi.org/10.1002/smj.4250171110

Ha, S. T., Lo, M. C., & Wang, Y. C. (2016). Relationship between knowledge management and organizational performance: a test on SMEs in Malaysia. *Procedia-Social and Behavioral Sciences*, *224*, 184-189. https://doi.org/10.1016/j.sbspro.2016.05.438

Hartono, B., Sulistyo, S. R., Chai, K. H., & Indarti, N. (2019). Knowledge management maturity and performance in a project environment: Moderating roles of firm size and project complexity. *Journal of Management in Engineering*, *35*(6), 04019023. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000705

Hassan, N., & Raziq, A. (2019). Effects of knowledge management practices on innovation in SMEs. *Management Science Letters*, *9*(7), 997-1008. https://doi.org/10.5267/j.msl.2019.4.005

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach, 3rd ed.* Guilford Publications.

Hermawati, W., Febrianda, R., Aminullah, E., Ariyani, L., Hidayat, A. S., & Fizzanty, T. (2024). SME owners' roles for mutual reinforcement of innovation and entrepreneurship in dealing with digital technologies: case studies of selected Indonesian SMEs. *Asian Journal of Technology Innovation*, 1-26. https://doi.org/10.1080/19761597.2024.2376602

Hock-Doepgen, M., Clauss, T., Kraus, S., & Cheng, C. F. (2021). Knowledge management capabilities and organizational risk-taking for business model innovation in SMEs. *Journal of Business Research*, *130*, 683-697. https://doi.org/10.1016/j.jbusres.2019.12.001

Jiang, X., Li, S., & Jiang, F. (2017). Resource Complementarity and Alliance Performance in Emerging Economies. In *Academy of Management Proceedings* (Vol. 2016, No. 1, p. 12777). Briarcliff Manor, NY 10510: Academy of Management. https://doi.org/10.5465/ambpp.2016.12777abstract

Kardoyo, H., Handoyo, S., & Asmara, A. Y. (2018). Knowledge Accumulation-based Entrepreneurship (KABE) in the Creative Industry: A Case Study of Woodwork Firms in Indonesia. *STI Policy and Management Journal*, *3*(2), 161-173. http://dx.doi.org/10.14203/STIPM.2018.149

Kruger, C. J., & Johnson, R. D. (2013). Knowledge management according to organisational size: A South African perspective. *SA Journal of Information Management*, *15*(1), 526-537. http://dx.doi.org/10.4102/sajim.v15i1.526

Kusa, R., Suder, M., & Duda, J. (2024). Role of entrepreneurial orientation, information management, and knowledge management in improving firm performance. *International Journal of Information Management*, *78*, 102802. https://doi.org/10.1016/j.ijinfomgt.2024.102802

Liao, C., Wang, H. Y., Chuang, S. H., Shih, M. L., & Liu, C. C. (2010). Enhancing

knowledge management for R&D innovation and firm performance: An integrative view. *African Journal of Business Management*, *4*(14), 3026-3038.

Masbullah, M. (2023). Implementasi Knowledge Management Untuk Mendorong Inovasi Dan Produktivitas Umkm Menggunakan Big Data Media Sosial. *Jumintal: Jurnal Manajemen Informatika Dan Bisnis Digital*, *2*(1), 12-23. https://doi.org/10.55123/jumintal.v2i1.1887

Massaro, M., Handley, K., Bagnoli, C., & Dumay, J. (2016). Knowledge management in small and medium enterprises: a structured literature review. *Journal of Knowledge Management*, *20*(2), 258-291. https://doi.org/10.1108/JKM-08-2015-0320

Mehralian, G., Sheikhi, S., Zatzick, C., & Babapour, J. (2023). The dynamic capability view in exploring the relationship between high-performance work systems and innovation performance. *The International Journal of Human Resource Management*, *34*(18), 3555-3584. https://doi.org/10.1080/09585192.2022.2138494

Miles, J. A. (2012). *Management and organization theory: A Jossey-Bass reader*. John Wiley & Sons.

Moffett, S., & McAdam, R. (2006). The effects of organizational size on knowledge management implementation: opportunities for small firms? *Total Quality Management & Business Excellence*, *17*(2), 221-241. http://dx.doi.org/10.1080/14783360500450780

Muniz-Rodriguez, N. M., Rego, A. Z., Navajas-Romero, V., & Ceular-Villamandos, N. (2024). Exploring the Role of Organizational Learning and Knowledge Management in the Acceleration of Current Small Business's Digital Transformation. In *Knowledge Management and Knowledge Sharing: Business Strategies and an Emerging Theoretical Field* (pp. 117-146). Cham: Springer Nature Switzerland.

Nasution, S. M. A., Daulay, R., Purnama, N. I., Alryani, I., & Purba, N. L. (2025). Knowledge sharing and absorbtive capacity in improving the innovation performance of MSMES handicrafts in Indonesia. *Problems and Perspectives in Management*, *23*(2), 357-370. http://dx.doi.org/10.21511/ppm.23(2).2025.25

Nowacki, R., & Bachnik, K. (2016). Innovations within knowledge management. *Journal of Business Research*, *69*(5), 1577-1581. https://doi.org/10.1016/j.jbusres.2015.10.020

Papa, A., Dezi, L., Gregori, G. L., Mueller, J., & Miglietta, N. (2020). Improving innovation performance through knowledge acquisition: the moderating role of employee retention and human resource management practices. *Journal of Knowledge Management*, *24*(3), 589-605. https://doi.org/10.1108/JKM-09-2017-0391

Penrose, E. (1959). *The Theory of the Growth of the Firm* (ed.). Oxford: Blackwell.

Petrov, V., Ćelić, Đ., Uzelac, Z., & Drašković, Z. (2020). Three pillars of knowledge management in SMEs: evidence from Serbia. *International Entrepreneurship and Management Journal*, *16*, 417-438. https://doi.org/10.1007/s11365-018-00557-2

Rochma, F., Larassaty, A. L., Qurratu'aini, N. I., & Sholikhah, A. (2025). The Mediating Role of Innovation Capability to Improve Knowledge Sharing on Smess Performancce. *LITERACY: International Scientific Journals of Social, Education, Humanities*, *4*(1), 110-123. https://doi.org/10.56910/literacy.v4i1.2036

Roscoe, J. T. (1975). *Fundamental Research Statistics for the Behavioural Sciences*, 2nd edition. New York: Holt Rinehart & Winston.

Roxas, B., Battisti, M., & Deakins, D. (2014). Learning, innovation and firm performance: knowledge management in small firms. *Knowledge Management Research & Practice*, *12*(4), 443-453. https://doi.org/10.1057/kmrp.2012.66

Sunaryudanto, Y. M. F., & Rofiaty, R. (2024). Pengaruh knowledge management dan inovasi terhadap kinerja organisasi. *Jurnal Kewirausahaan dan Inovasi*, *3*(4), 1012-1020. https://doi.org/10.21776/jki.2024.03.4.07

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z

Torabi, M. H. R., Kyani, A., & Falakinia, H. (2016). An investigation of the impact of knowledge management on human resource performance in management of Keshavarzi bank branches in Tehran. *Procedia-Social and Behavioral Sciences*, *230*, 471-481. https://doi.org/10.1016/j.sbspro.2016.09.059

Utami, C. W., & Ferdiansah, M. (2017). Development of knowledge management model in establishing innovation and company performance in UMKM/SME in Indonesia. *European Research Studies Journal*, *XX*(4B), 655-665.

Valeri, M. (Ed.). (2024). *Knowledge management and knowledge sharing: Business strategies and an emerging theoretical field* (Vol. 131, No. 5). Springer.

Vepo do Nascimento Welter, C., Oneide Sausen, J., & Rossetto, C. R. (2020). The development of innovative capacity as a strategic resource in technology-based incubation activities. *Revista de Gestão*, *27*(2), 169-188. https://doi.org/10.1108/REGE-02-2019-0034

Wang, M. H., & Yang, T. Y. (2016). Investigating the success of knowledge management: An empirical study of small-and medium-sized enterprises. *Asia Pacific Management Review*, *21*(2), 79-91. https://doi.org/10.1016/j.apmrv.2015.12.003

Wang, Z., Wang, N., & Liang, H. (2014). Knowledge sharing, intellectual capital and firm performance. *Management decision*, *52*(2), 230-258. https://doi.org/10.1108/MD-02-2013-0064

Wernerfelt, B. (1,984). Harmonised implementation of application-specific messages (ASMs). *Strategic Management Journal, 5*(2), 171-180.

Wooi, C. J. T. (2024). Knowledge management in the 21st century: Trends, developments, and strategies. *International Journal of Multidisciplinary: Applied Business and Education Research*, *5*(10), 4234-4257. https://doi.org/10.11594/ijmaber.05.10.29

Wu, H., & Leung, S. O. (2017). Can Likert scales be treated as interval scales?—A simulation study. *Journal of Social Service Research*, *43*(4), 527-532. https://doi.org/10.1080/01488376.2017.1329775

Xingyu, S. I. M. A., Coudert, T., Geneste, L., & de Valroger, A. (2022). Knowledge management in SMEs: preliminary ideas for a dedicated framework. *IFAC-PapersOnLine*, *55*(10), 1050-1055. https://doi.org/10.1016/j.ifacol.2022.09.528

Yuningsih, N., Maryadi, A., & Rustianah, R. (2023). Analisis knowledge management dan kualitas SDM terhadap kinerja bisnis melalui inovasi sebagai variabel mediasi pada UMKM. *REVITALISASI: Jurnal Ilmu Manajemen*, *12*(1), 56-62. https://doi.org/10.32503/revitalisasi.v12i1.3827