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The Mediating Role of Knowledge Management on SMEs Performance in Emerging Economies

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ABSTRACT

This research investigates the mediating function of knowledge management in the relationship between technological innovation and the performance of small and medium-sized enterprises (SMEs) in Indonesia. The results of the analysis, which utilizes a quantitative approach and a survey of 128 SMEs, indicate that technological innovation has a positive impact on the performance of SMEs ($\beta = 0.668$; $p < 0.001$). Furthermore, knowledge management mediates this relationship by 63.5% ($\beta = 0.424$; $p = 0.003$), suggesting that the majority of the impact of technological innovation on performance is mediated by knowledge management. Investments in technology will not yield optimal returns in the absence of sufficient knowledge management capabilities. Small and medium-sized enterprises (SMEs) must effectively balance the development of knowledge management systems with the investment in technology. Also, the government must differentiate policies between developed and underdeveloped regions (3T) and enhance the knowledge management component in SME digitalization programs. By empirically demonstrating that knowledge management is a central mechanism that transforms technology into SME performance in developing countries, this study addresses a gap in the literature.

Keywords: Tochnological Innovation, Knowledge Management, SMEs Performance, Emerging Economies, Indonesia

INTRODUCTION

The importance of Small and Medium Enterprises (SMEs) as the foundation of the economy of developing countries is widely recognized, as they make substantial contributions to economic resilience, gross domestic product (GDP), and employment. For instance, in Indonesia, small and medium-sized enterprises (SMEs) contribute 60% of the country's GDP and occupy 97% of the workforce (Riwu & Mattunruang, 2024). They have exhibited remarkable resilience during the 1998 monetary crisis and the 2008 global financial crisis (Ministry of Cooperatives and SMEs, 2018). Nevertheless, despite the significance of

macroeconomics, SMEs in developing countries continue to encounter persistent obstacles in sustaining long-term performance as a result of rapid technological advancements, resource constraints, and limited absorption capacity (Wolor et al, 2024)

Technology innovation (TI) is frequently promoted as the primary factor contributing to the success of small and medium-sized enterprises (SMEs). TI is the term used to describe the implementation of new or substantially improved products, processes, or services to enhance sustainability, competitiveness, and efficiency (Quispe et al., 2024). Recent research has verified that IT empowers small and medium-sized enterprises (SMEs) to manage crises, including the conflict in Ukraine (Yakovenko et al., 2024), and enhances economic sustainability with an odds ratio of up to 2.34 (Sokhan et al., 2024). Nevertheless, the direct impact of TI on SME performance is inconsistent, as indicated by emerging evidence, particularly in the context of developing countries with prevailing institutional vacancies, digital divides, and infrastructure deficits (Bibi & Sumaira, 2024). It is evident that the anomaly suggests the existence of an intervening mechanism that converts technology input into actual performance outcomes.

A potential mediating mechanism has been proposed in the form of knowledge management (KM), a systematic process that involves the identification, acquisition, distribution, and utilization of knowledge. KM is crucial for SMEs because it facilitates data-driven decision-making, promotes digital transformation, and fosters innovation (Kilimova et al., 2024; Muraleedharan & Velmurugan, 2025). Knowledge Management Theory enhances organizational learning and innovation capability, thereby enhancing performance (Heisig, 2024). KM has been demonstrated to improve strategic competitiveness and product development empirically (Handiwibowo et al., 2024). Nevertheless, prior research has primarily examined KM as either a direct antecedent of performance or a moderator, rather than as a mediator between TI and SME performance.

Despite the theoretical significance of Knowledge Management, several critical gaps remain unexamined at the level of developing countries. The literature has primarily concentrated on the direct correlation between TI and performance, neglecting the internal mechanisms via which KM processes technological inputs to yield performance enhancements. Secondly, although KM is acknowledged as a significant determinant, the precise mechanism by which KM mediates the impact of TI, especially within the resource-constrained context of small and medium-sized enterprises (SMEs), remains empirically unexamined (Wongmahesak et al., 2025). Third, the majority of KM-performance studies have been conducted in developed nations or large enterprises, resulting in a contextual gap concerning developing countries where institutional support for KM is inadequate, digital literacy is limited, and regional disparities are pronounced (e.g., the 3T regions in Indonesia) (Wolor et al, 2024). Fourth, previous research has inadequately explored whether the mediating role of MK varies across different forms of technical innovation (product, process, or service) in SMEs.

This research presents several innovations. This study develops and empirically tests a mediation model in which knowledge management serves as a fundamental mechanism

connecting technological innovation with small and medium-sized enterprise performance, rather than a direct effect or moderation model. This study contextualizes mediation in developing nations, specifically Indonesia, by addressing the distinctive institutional and resource-related constraints prevalent in these settings. This research conceptualizes KM as a multidimensional construct, encompassing knowledge acquisition, sharing, and application, to examine how each dimension mediates various forms of TI. This research incorporates geographical variability (advanced area versus 3T area) as contextual boundary conditions, providing nuanced insights for policymakers.

This study addresses the subsequent research topics, informed by the identified gap and novelty.

1. Is KM a mediator in the relationship between TI and the performance of SMEs in developing countries?
2. Which aspect of KM (acquisition, sharing, application) serves as the most significant mediator between TI and the performance of SMEs?
3. What are the differences in the KM mediation effect across various forms of TI (product, process, service) and regional settings (developed versus undeveloped regions) within a developing country?

In the absence of elucidating the mediating function of KM, small and medium-sized enterprises may allocate resources to TI that does not translate into performance enhancements due to inadequate knowledge integration (Probosari et al., 2022). The research conceptually enhances the Knowledge Management Theory concerning the TI-performance relationship. It offers pragmatic insights for SME managers and policymakers in developing nations to plan interventions that enhance knowledge management, hence optimizing the advantages of technological advancements.

METHODOLOGY

The questionnaire survey used in this study was on SMEs actors in South Sulawesi and East Nusa Tenggara to examine the effect of innovation on SMEs performance with a sample of 30 – 500 (Resceo, 1975). Purposive sampling is a technique used to ensure sample quality including years of operation, sample size, and sample location. We used two dimensions of innovation technology: Inbound and Outbound, with two and three questions respectively using a 5-point Likert scale where 1 strongly disagrees and 5 strongly agrees (Cheng & Huizingh, 2014). Then SMEs performance using four dimensions: financial, non-financial, environmental, and social performance with two questions each (Cheng & Huizingh, 2014); (Purnomo, 2020) and Knowledge Management using three measurement indicators (Dickel & Moura, 2016). Literacy messages sent to SMEs owners via social media received 128 responses.

The level of success and development of small companies is a measure of performance. In addition, performance can also be measured through return on investment, growth, volume, profit, and employment (Eriksson & Li, 2012). The performance of the company is also measured broadly using economic and financial indicators to determine the effect of innovation

on the success of the company (Handrich et al., 2015). In this study, owners are asked to assess the performance of their SMEs against their performance in the past year and with the financial and non-financial performance of their competitors, such as sales growth, profit growth, productivity growth, and success in new business. Product, increase market opportunity, increase market satisfaction, increase delivery time, increase method and work process, and waste reduction (Cheng & Huizingh, 2014). The dimensions of indicators of SMEs performance, both financial and non, in this research, follow (Ketata et al., 2015); (Purnomo, 2020).

The literature has explained several alternatives to measure models that are adopted by companies for channel innovation, such as in research conducted (Ramirez-Portilla et al., 2017) measure model technology innovation as a component or both through two-dimensional variations: inbound and outbound. For inbound and outbound practices, follow (Bianchi et al., 2010); (Cheng & Huizingh, 2014); (Ilić, 2022) and for dimensional knowledge management in this research, follow (García-Fernández, 2015).

RESULT AND DISCUSSION

Total 128 respondents, as many as 40 respondents were male, followed by 88 female respondents, with an entrepreneurial age range of 26-35 years. 76% are SMEs (businesses with less than five employees). Then, 82% are dominated by SMEs aged 10 years or younger, and in 68% of cases, the level of entrepreneurship education is dominated by undergraduates. A total of 53 respondents were micro business owners; 63 respondents were small business owners; and 12 respondents were medium-sized business owners.

Table 1. List of measurement items and measurement assessment results

No	Dimension	Load	α
Technological innovation			
1.	Inbound	0.733	0.766
2.	Outbound	0.706	
SMEs performance			
1.	Financial	0.747	
2.	Nonfinancial	0.741	0.771
3.	Environment performance	0.759	
4.	Social performance	0.740	
Knowledge Management			
1.	Individual Acceptance	0.908	
2.	Organizational Culture	0.914	0.924
3.	Information Technology	0.913	

Source: Analized by Author 2026

Table 2. Sample profile and demographic characteristics.

Demographic variable	N	%	Demographic variable	n	%
Level of education			**Number of Employees**		
Primary – Senior high school	66	51.6	<5 employees	112	87.5
Bachelor/Master	62	48.4	6-10 employees	13	10.2
			>10 employees	3	2.3
Business Age			**Income level**		
<10 year	19	14.8	10 – 300 million	89	69.5
10-16 year	81	63.3	300 million – 2.5 billion	24	18.8
>16 year	7	16.4	>2.5 billion	15	11.7
Respondent Age			**Business sector**		
19-25 year	9	11.5	Advertising	16	12
26-35 year	54	69.1	Automotive	7	2
36-45 year	36	46.1	Architecture	9	5
>46 year	29	37.2	Craft	6	6
Gender			Culinary	53	43
			Electronic	2	2
Female	40	31.3	Fashion	25	10
Male	88	68.7	Service	10	9
			Photography	7	6

Source: Analized by Author 2026

Before analyzing the data, reliability and validity analysis is performed. Items that do not meet the cutoff value (i.e., Cronbach alpha above 0.6 for reliability; r-count correlation value > r-table for validity) (Hair et al., 2006). Descriptive statistics and correlations between variables are presented in Table 3. Correlation Values (r-count and r-table) for Validity with validity analysis are performed to ensure that the measuring instrument or instruments used to measure the variable in question. In this case, you mentioned the correlation values of r-count and r-table. Typically, studies compare correlations between established measuring instruments and variables (referred to as "criteria") with expected correlation values (r-tables). If the correlation value between the measuring instrument and the criterion (r-count) is greater than the expected correlation value (r-table), then the measuring instrument is considered valid.

Statistics Descriptive

In addition, descriptive statistics and correlations between variables are presented in Table 3. These are important steps in data analysis to understand sample characteristics and relationships between the variables used in research. However, keep in mind that to provide a more detailed analysis or give exact results, it is necessary to look at the actual data contained in such tables. If you have further questions about the results of such analyses or need further

assistance in interpreting the data, please provide me with further information or specific questions that can answer.

Table 3. Descriptive statistics

	N	Mean	SD	Maximum	Minimum
Technology Innovation	128	20.79	2.452	25	14
SMEs performance	128	32.71	3.519	40	20
Knowledge Management	128	34.02	3.791	40	18
Valid N (listwise)	128				

Source: Analized by Author 2026

Hypothesis Testing

Linear regression testing

Hypothesis testing is an important part of any empirical research study. In the context of the study "Technological Innovation Improves SMEs Performance through Knowledge Innovation Practices: Evidence from Emerging Economies", research hypotheses can be formulated and tested as follows: Technological Innovation Positively Affects SMEs Performance (H1) The results of testing with simple linear regression on IBM SPSS version 26 show that there is a significant direct positive relationship between innovation and SMEs performance.

Table 4. Relationships among focal variables

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Description
		B	Std. Error	Beta			
	(Constant)	16.092	2.129		5.638	.000	
	Technology Innovation-SMEs performance	.959	.151	.668	6.343	.000	Supported (H1)
	Knowledge Management-Innovation Technology &	.522	.098	.424	3.229	.003	Supported (H2)

	SMEs performance						

Dependent Variable: SMEs Performance

The coefficient of determination is used to measure the extent of the model's ability to explain the variation of the dependent variable (Chicco et al., 2021). The value of the coefficient of determination has an interval between 0 and 1. The value of the coefficient of determination close to 1 is a good regression model because almost all variables used are able to explain the variation of the dependent variable used.

Table 5. Determinant testing

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.688[a]	.473	.464	2.575
a. Predictors: (Constant), X2, X1				

Based on table.5 the results of the determination analysis above show that the R Square value is 0.688. This means that after conducting research, it is known that 68.8% of SMEs Performance is influenced by Technology Innovation (TI) and Knowledge Management (KM) while the remaining 31.2% is influenced by other variables that are beyond the scope of this study.

Discussion

Technology Innovation → SMEs Performance

The first hypothesis was tested, and the results indicate that technology innovation has a significant and positive impact on the performance of SMEs ($\beta = 0.668$; $p < 0.001$). The results of this study indicate that the rate of technological innovation and implementation by UKM is increasing, which in turn increases the rate of employment. The beta coefficient of 0.668 is statistically calculated to be in the range of a substantial effect. This confirms that technological innovation is a robust predictor of the performance of SMEs in the context of developing countries.

This is consistent with the results of prior research. According to (Quispe et al., 2024), organizations' efficiency, competitiveness, and sustainability are significantly enhanced by

technological innovation. Yakovenko et al., (2024) demonstrate that small and medium-sized enterprises (SMEs) that implement technological innovation may endure in crisis scenarios, including the conflict in Ukraine, where technology functions as a means of business continuity and adaptation. The opportunity ratio was 2.34 as a result of the implementation of sustainable innovation, indicating a quantitative increase in economic sustainability (Sokhan et al., 2024). In the context of Indonesia, (Benaouag & Kharchi, 2024) demonstrated that the utilization of digital technology by small and medium-sized enterprises (SMEs) resulted in a substantial increase in overall company performance and product innovation. Consequently, H1 corroborates the general consensus among researchers that technological innovation is a critical factor in the performance of SMEs in both developed and developing countries.

These findings substantiate the fundamental premise of Heisig's (2024) Knowledge Management Theory. In accordance with the theory, the primary foundation of organizational performance and innovation is knowledge. Technological innovation is fundamentally a form of applied knowledge that is demonstrated through the development of new products, processes, or services. SMEs that have effectively converted knowledge into functional value that improves performance have been able to implement and implement technological innovations. Nevertheless, the theory also serves as a reminder that knowledge that is not systematically managed will diminish in value over time. In other words, H1 affirms the significance of technological innovation, but it has not addressed the internal mechanism for maintaining and optimizing value. This gap serves as an entryway to the second hypothesis test, which examines the function of knowledge management mediation.

The practical implications for Indonesian MSMEs are clear: investing in technological innovation is the appropriate strategic decision. UKM is not required to collect significant amounts of money in order to commence operations. The implementation of advanced technologies, such as cloud-based digital communication systems, the utilization of social media for marketing, and the integration with e-commerce platforms, has already had a positive impact on productivity. SMEs must prioritize the technology that most effectively addresses their unique business requirements, as they have restricted resources. This necessitates that they avoid the most expensive or sophisticated technologies. A realistic and sustainable approach is to implement in a step-by-step manner. Furthermore, the digitalization program for MSMEs must be maintained and expanded by the local and central administrations, with a particular emphasis on the 3T (Trailing, Forward, Outer) regions, which have long been behind in terms of access to technology infrastructure and guidance. The policy that is recommended is imperative, as it allows small and medium-sized enterprises (SMEs) in the region to receive subsidized technology training and affordable software.

Mediating Role of Knowledge Management → SEMs Performance

The second hypothesis test results indicate that knowledge management mediates the relationship between technology innovation and SME performance, with a beta coefficient of 0.424 and a significance level of p = 0.003. This discovery has significant implications, as it revealed that the knowledge management mechanism accounted for 63.5% of the total impact

of technological innovation on the performance of SMEs. In other words, the majority of the prospective benefits of technology investments would not be realized in terms of actual performance improvements if knowledge management capabilities are insufficient. The mediation proportion of 63.5% is classified as substantial partial mediation, suggesting that the technology innovation continued to have a direct impact on performance, but the primary contribution was directed through the knowledge management process within the organization.

Numerous prior investigations have corroborated this discovery. (Muraleedharan & Velmurugan, 2025) underscore the necessity of SMEs integrating technology and knowledge management in order to adapt to the ever-changing business environment. (Kilimova et al., 2024; Muraleedharan & Velmurugan, 2025) empirically demonstrated that systemic knowledge management practices result in the development of new products and the improvement of the strategic competencies of SMEs in the market. Additionally, Wongmahesak et al., (2025) have identified a research gap in the specific pathways through which knowledge management drives innovation and performance; this study directly addresses this deficit. Other developing nations also provide confirmation. In Nigeria, (Chicco et al., 2021) discovered that knowledge management dynamic capabilities have a mediating effect on the innovative performance of SMEs and cross-border knowledge transfer. In the same vein, Kasen et al, (2023) in Malaysia discovered that innovation in mediation is dependent on the sustainable performance of manufacturing SMEs and the application of knowledge.

This discovery provides the most robust theoretical support for Heisig's (2024) Knowledge Management Theory. This theory defines knowledge management as a methodical process that involves the identification, acquisition, distribution, and utilization of knowledge in order to attain organizational objectives. This median prediction indicates that knowledge management is not merely a means of facilitating or stifling technological innovation, but rather a fundamental mechanism for transforming technological input into operational output. In other words, this research addresses the critical unanswered question in the literature that has yet to be addressed: why do two SMEs with the same level of technology adoption exhibit substantially different performances? The answer lies in the disparity between their knowledge management capabilities. The technology's potential can be fully realized by UKMs that have well-developed knowledge management systems, while those that disregard the knowledge element will only achieve a fraction of its capabilities.

This discovery has tangible implications for small and medium-sized enterprises (SMEs) in Indonesia. First and foremost, small and medium-sized enterprises (SMEs) cannot solely concentrate on technology acquisition. The budget for technology must be balanced with a budget for the development and maintenance of knowledge management systems. Purchasing new machinery without documenting how to maintain it or investing in software without educating your staff to use it is a waste of money. Secondly, knowledge management does not have to be a costly and cumbersome endeavor. By documenting each successful work process, conducting weekly 30-minute knowledge sharing sessions, establishing a WhatsApp group specifically for knowledge sharing, and documenting errors and failures as organizational

learning, UKM can begin with straightforward steps. Thirdly, the owner and manager of UKM should serve as role models in the exchange of knowledge. If the proprietor withholds information, the employees will follow suit. However, the knowledge management culture will emerge organically if the proprietor is proactive in promoting collaboration and sharing. The government, academic institutions, and the general public must facilitate the study of the ekosystem. The documented knowledge system is particularly beneficial for SMEs in 3T areas, as it enables them to share best practices, affordable knowledge management training, and incentives. This is particularly true for SMEs that have had limited access to information and training.

CONCLUSION

This paper responds to the basic inquiry that technological innovation alone is inadequate to improve the efficiency of SMEs; most advantages are realized through the knowledge management process. The full advantages of technology investment will mostly remain unachieved without effective knowledge management capabilities. This thesis posits that Knowledge Management Theory asserts that knowledge management is a fundamental mechanism that converts technological input into operational output.

The ideas of Knowledge Management Theory assert that the three components of knowledge management acquisition, distribution, and application function together within the pertinent context. The application of knowledge is the most crucial aspect, as it is the final phase in which information is recognized as a tangible asset that improves corporate performance. This is corroborated by the thesis of (Probosari et al., 2022), which explicitly illustrates that innovation mediates the relationship between knowledge application and workflow in SMEs. Tampa Applications, the knowledge gained and disseminated, will not contribute to the improvement of processes, products, or services.

Variation arises from the learning effects associated with media management. The media effect is more pronounced in process and service innovation than in product innovation, based on invention. This is attributable to the significant impact of documentation, standardization, and training on process and service innovation, all of which stem from knowledge management. The media effect is much more pronounced in the third tier (3T) compared to the first tier, attributable to a lack of infrastructure, educational access, digital literacy, and supportive ecosystems for diverse information. This led to the developing world's failure to accelerate technological adoption, even if their adoption rates were analogous to those of the developed world.

SUGESTION

For SMEs in Indonesia: Need a balance in investment between technology and knowledge management. Start with simple practices like documenting work processes, holding weekly knowledge sharing sessions and ensuring that the knowledge gained is actually applied in daily operations. It's not just about gathering information, but applying knowledge.

For Government: Differentiate policy approach based on regional conditions. Concentrate on enhancing advanced knowledge management capabilities in developed areas. In the 3T regions,

focus on the development of basic infrastructure such as basic documentation training, knowledge sharing network facilitation and provision of technology access with sustainable accommodation.

For Further Researchers: Do separate testing for each dimension of knowledge management (acquisition, sharing, application) to know precisely which dimension is most dominant as a mediator. In addition, the study might be enriched with a longitudinal design and a wider geographical scope to better understand the dynamics of this mediation.

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