

Technology Adaptation as a Driver of Process Innovation: Evidence from Culinary MSMEs in West Java, Indonesia

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ABSTRAK

Adaptasi teknologi telah menjadi salah satu pendorong penting inovasi proses pada usaha mikro, kecil, dan menengah (UMKM) di era digital. Namun, bukti empiris mengenai hubungan tersebut masih terbatas, khususnya dalam konteks UMKM kuliner di negara berkembang. Penelitian ini bertujuan untuk menganalisis pengaruh adaptasi teknologi terhadap inovasi proses pada UMKM kuliner di Provinsi Jawa Barat, Indonesia. Pendekatan kuantitatif eksplanatori digunakan dengan memanfaatkan data survei dari 376 UMKM kuliner yang dipilih melalui teknik purposive sampling. Data dianalisis menggunakan regresi Weighted Least Squares (WLS) setelah dilakukan perbaikan terhadap masalah heteroskedastisitas pada model regresi awal. Hasil penelitian menunjukkan bahwa adaptasi teknologi berpengaruh positif dan signifikan terhadap inovasi proses ($\beta = 0,615$; $t = 15,077$; $p < 0,001$). Temuan ini menunjukkan bahwa UMKM dengan kemampuan yang lebih kuat dalam mengintegrasikan teknologi digital ke dalam aktivitas operasionalnya cenderung mampu meningkatkan proses bisnis melalui efisiensi dan responsivitas yang lebih baik. Penelitian ini memperkuat Technology–Organization–Environment (TOE) Framework dengan menunjukkan bahwa kemampuan organisasi dalam mengadaptasi teknologi merupakan faktor penting yang menentukan inovasi proses. Selain itu, hasil penelitian memberikan implikasi praktis bagi pembuat kebijakan dan lembaga pengembangan usaha dalam merancang program peningkatan kapabilitas digital untuk mendorong inovasi pada UMKM.

ABSTRACT

Technology adaptation has become an important driver of process innovation among micro, small, and medium-sized enterprises (MSMEs) in the digital era. However, empirical evidence regarding this relationship remains limited, particularly in the context of culinary MSMEs in developing countries. This study examines the effect of technology adaptation on process innovation among culinary MSMEs in West Java Province, Indonesia. A quantitative explanatory approach was employed using survey data from 376 culinary MSMEs selected through purposive sampling. Data were analyzed using Weighted Least Squares (WLS) regression after correcting for heteroscedasticity in the initial regression model. The results indicate that technology adaptation has a positive and significant effect on process innovation ($\beta = 0.615$; $t = 15.077$; $p < 0.001$). The findings suggest that MSMEs with stronger capabilities to integrate digital technologies into their operational activities are more likely to improve business processes through greater efficiency and responsiveness. This study reinforces the Technology–Organization–Environment (TOE) Framework by demonstrating that organizational capability to adapt technology is a key determinant of process innovation. The findings also provide practical insights for policymakers and

business development agencies in designing digital capability development programs to enhance innovation among MSMEs.

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1. INTRODUCTION

The development of digital technology has transformed the way organizations create value, manage resources, and maintain competitiveness in an increasingly dynamic business environment. Digitalization is no longer understood merely as the use of technology-based devices or applications, but has evolved into a transformation process that affects almost all organizational activities, ranging from decision-making and operational coordination to the creation of new business models. For micro, small, and medium-sized enterprises (MSMEs), digital transformation creates opportunities to improve operational efficiency, expand market access, and strengthen the ability to adapt to changing customer needs and market dynamics (OECD, 2021; Verhoef et al., 2021). However, these benefits are not obtained automatically through the use of technology. The success of digital transformation is largely determined by the ability of business owners to integrate technology into business processes so that it produces changes that add value to the organization.

In Indonesia, MSMEs play a strategic role as drivers of the national economy through their contribution to job creation, increased economic activity, and stronger community economic resilience. Along with the acceleration of digital transformation, the government continues to promote MSME digitalization through various programs that facilitate the use of marketplaces, social media, digital payment systems, and business management applications. However, technology implementation among most MSMEs is still dominated by marketing activities, while its use to improve the efficiency of operational processes has not yet developed optimally. This condition is reflected in the innovation patterns of Indonesian MSMEs, where 65.10% of innovation still focuses on product development, while process innovation (PI) accounts for only 13.00% (Figure 1). This means that a large proportion of business owners still view innovation primarily as a strategy for producing new products to improve competitiveness, while business process renewal has not yet become a priority. In fact, process innovation is an important factor in increasing productivity, reducing operating costs, accelerating service delivery, and maintaining consistent product and service quality (Cillo et al., 2021; OECD, 2018). The low level of process innovation indicates that increased use of digital technology has not been fully accompanied by MSMEs' ability to transform technology into sustainable business process improvements.

TYPES OF INNOVATION IMPLEMENTED BY MSMEs

Percentage of MSMEs Engaging in Innovation

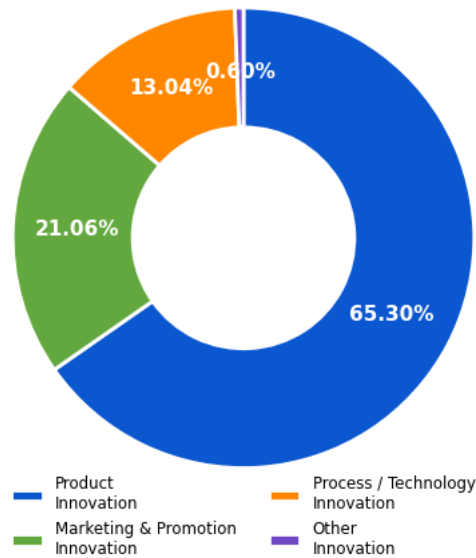


Figure 1. Percentage of MSMEs by Type of Innovation Implemented in Indonesia in 2024

Source: Statistics Indonesia, 2024 (processed data).

This condition becomes even more noteworthy when associated with patterns of digital technology use among MSMEs. Statistics Indonesia data show that 82.20% of MSME owners use digital technology for marketing activities, while its use for business information management, digital payment systems, and other operational activities remains relatively limited. Most business owners have adopted technology, but have not yet fully integrated it into their internal business processes. Consequently, technology use has not directly generated process innovation capable of improving organizational operational effectiveness.

DIGITAL TECHNOLOGY USE AMONG MSMEs

Percentage of MSMEs Using Technology

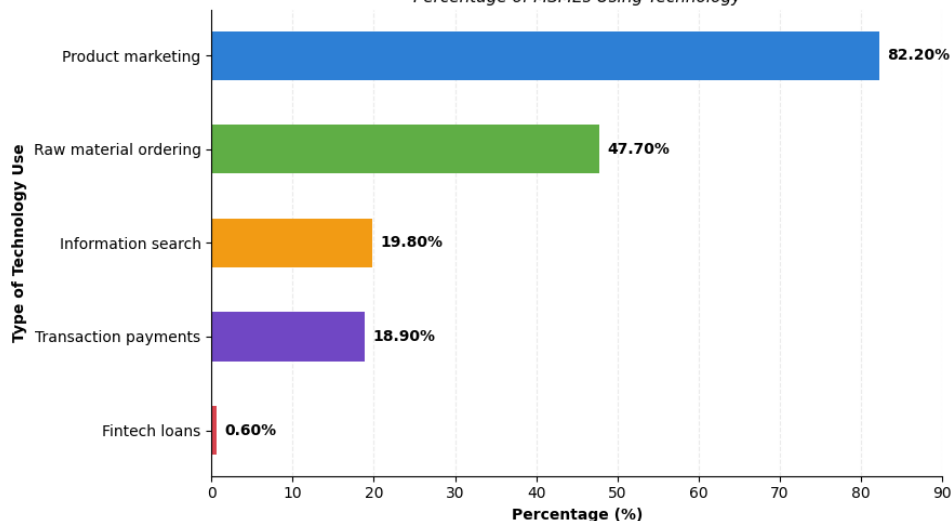


Figure 2. Level of Digital Technology Adoption among MSMEs in Indonesia in 2024 by Type of Use*

Source: Statistics Indonesia, 2026 (processed data).

In the digital transformation literature, this condition is related to the concept of technology adaptation (TA), namely an organization's ability to recognize, integrate, and utilize technology in accordance with operational needs and changes in the business environment (Warner & Wäger, 2019; Verhoef et al., 2021). Unlike technology adoption, which places greater emphasis on the decision to use technology, technology adaptation describes an organization's ability to adjust the use of technology so that it can improve work procedures, strengthen operational coordination, accelerate information flows, and support more effective decision-making. Therefore, technology adaptation is viewed as an organizational capability that enables digital transformation to generate tangible changes in a firm's operational activities.

The relationship between technology adaptation and innovation has received considerable attention in prior research. Several studies report that an organization's ability to utilize digital technology contributes to improved firm performance, competitive advantage, and innovation capability (Hanelt et al., 2021; Kraus et al., 2022). Nevertheless, these studies leave several areas for further development. First, most previous research measures innovation as a multidimensional construct encompassing product, marketing, organizational, and process innovation, and therefore does not specifically explain how technology adaptation influences process innovation. Second, research on this relationship has been conducted mainly in large firms or manufacturing sectors, while empirical evidence from MSMEs, particularly culinary businesses in developing countries, remains relatively limited. Third, most studies place greater emphasis on the level of technology adoption than on an organization's ability to adapt technology to generate business process renewal. These gaps indicate the need for research that can explain the mechanism linking technology adaptation and process innovation in the MSME context.

The Technology–Organization–Environment (TOE) Framework introduced by Tornatzky and Fleischer (1990) provides the conceptual foundation for explaining how organizations adopt and utilize technology in their business activities. This framework positions technology implementation as the result of interactions among the characteristics of the technology used, internal organizational readiness, and dynamics in the external environment. Technology use does not directly generate improved performance; rather, its effect depends on the organization's ability to integrate technology into operational processes in ways that encourage changes in work procedures, strengthen coordination, and improve business process effectiveness. In this context, technology adaptation is viewed as a capability that enables MSMEs to convert technology investment into process innovation that creates organizational value.

This study focuses on culinary MSMEs in West Java Province because this subsector has experienced a continuing increase in digital technology adoption that has not always been accompanied by adequate business process renewal. Various forms of technology use, including marketplaces, digital payment applications, social media, and business management applications, have been adopted by MSME owners in conducting business activities. However, such use still tends to be oriented toward market expansion and marketing, meaning that the potential of technology as a driver of process innovation has not been utilized optimally. This condition makes culinary MSMEs a relevant context for examining how the ability to adapt to technology can be translated into improvements in operational processes.

This study offers several contributions to the literature on MSME digital transformation. Unlike most previous studies that conceptualize innovation as a multidimensional construct, the discussion focuses specifically on process innovation as a primary consequence of technology adaptation capability. In addition, the application of the TOE Framework to culinary MSMEs in developing countries remains relatively limited, so the empirical findings are expected to broaden evidence regarding the relevance of this framework. The empirical evidence is also expected to provide a more comprehensive understanding of the mechanism through which the ability to adapt technology is translated into business process improvements that strengthen MSME operational capabilities.

Based on the preceding discussion, this study aims to examine the effect of technology adaptation on process innovation among culinary MSMEs in West Java Province. The findings are expected not only to enrich the discourse on digital transformation and process innovation in MSMEs, but also to provide input for local governments, business support institutions, and business owners in formulating strategies to strengthen digital capabilities with greater emphasis on operational efficiency and business sustainability.

2. LITERATURE REVIEW

2.1 *Technology Adaptation*

The development of digital transformation has changed the way organizations perceive technology, from merely a supporting instrument to a strategic capability that determines business continuity. In recent literature, discussion of technology utilization no longer focuses solely on the decision to adopt technology (technology adoption), but rather on an organization's ability to integrate and adjust technology to its operational needs (technology adaptation or technology assimilation). This shift in perspective is based on findings that technology use does not necessarily create added value unless it is accompanied by changes in work processes, organizational learning, and adjustments in business practices. For MSMEs, technology adaptation is increasingly important because resource limitations often cause technology to be used only for certain activities, such as marketing or digital transactions, without driving comprehensive changes in business processes. Therefore, the success of digital transformation is determined more by the ability of business owners to internalize technology into operational activities so as to create efficiency, flexibility, and the capacity to respond sustainably to changes in the business environment (de Mattos et al., 2024; Anatan & Nur, 2023).

From an organizational perspective, technology adaptation is a dynamic process involving adjustments to work procedures, improvements in human resource competencies, and continuous learning so that technology can be utilized optimally according to business characteristics. This capability enables organizations not only to use technology as an operational tool but also to employ it as a driver of business process renewal and enhanced organizational capability. Several studies show that organizations capable of effectively assimilating technology tend to have stronger innovation capabilities because technology has become part of organizational routines rather than merely a supporting device for business activities. Technology adaptation can therefore be viewed as a mechanism that bridges digital transformation and the creation of process innovation, particularly among MSMEs facing rapidly changing market dynamics and consumer behavior (Hassan et al., 2024; Díaz-Arancibia et al., 2024).

2.2 *Process Innovation*

Process innovation is regarded as a form of innovation oriented toward improving the way organizations conduct their business activities. Unlike product innovation, which produces new goods or services, process innovation focuses on changes in work methods, operational procedures, production systems, and service delivery mechanisms so that organizational activities can be performed more effectively and efficiently. Such improvements do not always require large-scale technology investments; they may also be achieved through workflow simplification, administrative digitalization, payment system integration, application-based inventory management, and the use of information systems that support faster and more accurate decision-making. Process innovation is therefore considered an important determinant of higher productivity, lower operating costs, improved service quality, and stronger organizational competitiveness in a continuously changing business environment (OECD, 2018; Nylén & Holmström, 2020).

The development of digital transformation further emphasizes that successful process innovation is determined not only by the level of technology use but also by an

organization's ability to integrate technology continuously into operational activities. Digitalization enables the automation of routine work, accelerates information exchange, improves coordination across functions, and supports more responsive decision-making. However, various empirical findings show that technology investment does not necessarily result in business process renewal if it is not accompanied by the organization's ability to adapt technology to operational needs. Process innovation can therefore be understood as the result of interactions among technology utilization, organizational learning, and adaptive capability in responding to changes in the business environment. This perspective reinforces the view of technology as an enabler that facilitates the creation of more effective, efficient, and sustainable business processes (Ferreira & Fernandes, 2024; Scuotto et al., 2023).

2.3 Technology–Organization–Environment (TOE) Framework

The Technology–Organization–Environment (TOE) Framework introduced by Tornatzky and Fleischer (1990) is one of the most widely used conceptual frameworks for explaining technology implementation at the organizational level. TOE explains that successful technology utilization is determined not only by the characteristics of the technology itself but also by organizational readiness and surrounding external environmental conditions. This perspective developed from the view that organizational decisions regarding technology use result from interactions between internal and external factors; therefore, technology adoption and adaptation cannot be understood merely as technical decisions. As digital transformation has progressed, TOE has increasingly been used to explain how organizations build digital capabilities, enhance innovation capability, and improve operational performance through the integration of technology into business processes (Awa et al., 2021; Walter et al., 2021).

The relevance of TOE to this study lies in its ability to explain the mechanism through which technology adaptation can generate process innovation. Technology characteristics determine how easily organizations can utilize digital technology, while organizational readiness reflects the availability of resources, competencies, and managerial commitment needed to integrate technology into operational activities. At the same time, environmental pressures, including changing consumer preferences, business competition, and developments in the digital ecosystem, encourage organizations to continuously improve their business processes. The interaction among these three dimensions makes TOE relevant not only for explaining decisions concerning technology utilization but also for providing a theoretical basis for understanding how technology adaptation capability is translated into process innovation that strengthens organizational operational capability (Baker, 2022; Gangwar, 2023).

2.4 The Effect of Technology Adaptation on Process Innovation

Digital transformation has changed the way organizations build innovation, shifting the emphasis from technology investment toward the capability to integrate technology into operational activities. This perspective positions technology adaptation as an organizational capability that allows technology to be utilized optimally according to business needs and environmental dynamics. In other words, the strategic value of technology is determined not only by the level of its use but also by the extent to which it supports changes in work procedures, accelerates information flows, improves coordination, and enhances business process effectiveness. Organizations with strong technology adaptation capabilities are generally more responsive in identifying opportunities for operational improvement and are therefore more likely to generate business process innovation than organizations that merely adopt technology without making continuous adjustments (Warner & Wäger, 2019; Verhoef et al., 2021).

Empirical findings also show that the ability to adapt technology contributes to improved organizational innovation, particularly innovation related to operational

processes. Hassan et al. (2024) explain that the use of digital technology integrated with organizational activities can strengthen a firm's ability to generate innovation through improvements in work processes and information management. Similar results were reported by Usai et al. (2021), who found that the integration of digital technology has a positive effect on firm innovation capability because it accelerates organizational learning and supports more effective decision-making. In addition, de Mattos et al. (2024) emphasize that the success of digital transformation in small businesses is determined more by the organization's ability to assimilate technology into business processes than by the level of adoption alone. These findings indicate that technology adaptation serves as a mechanism that enables organizations to convert technology use into more efficient and adaptive operational process improvements.

The characteristics of MSMEs reinforce the importance of this relationship because limited resources often require business owners to use technology selectively according to operational needs. The ability to adjust technology to business characteristics allows activities such as inventory management, transaction recording, production coordination, and customer service to be conducted more effectively. These improvements not only enhance operational efficiency but also encourage process innovation that supports stronger business competitiveness. Based on the theoretical arguments and empirical evidence presented above, the following hypothesis is proposed.

H1: Technology adaptation has a positive effect on process innovation among culinary MSMEs in West Java Province.

3. RESEARCH METHODS

This study employs a quantitative approach with an explanatory research design to examine the causal relationship between technology adaptation and process innovation among micro, small, and medium-sized enterprises (MSMEs) in the culinary subsector of West Java Province. This approach was selected because it enables hypothesis testing based on empirical data collected through a structured questionnaire survey, allowing relationships between variables to be analyzed objectively and quantitatively (Creswell & Creswell, 2023).

The study population comprises all MSMEs in West Java Province. However, the research focuses on culinary MSME owners under the supervision of the West Java Provincial Office of Cooperatives and Small Enterprises. Respondents were selected using purposive sampling based on the following criteria: (1) operating a business in the culinary subsector, (2) being under the supervision of the West Java Provincial Office of Cooperatives and Small Enterprises, and (3) being willing to participate in the study. The questionnaire was then distributed randomly to MSME owners who met these criteria. A total of 376 questionnaires that met the requirements were successfully collected and all were included in the analysis. Purposive sampling was selected because it enables researchers to obtain respondents who are consistent with the research objectives, thereby producing information that is more relevant for explaining the relationship between technology adaptation and process innovation (Campbell et al., 2020).

The research instrument was developed by adapting indicators from previous studies relevant to each construct. The technology adaptation variable was measured using indicators describing business owners' ability to integrate digital technology into operational activities, while process innovation was measured using indicators reflecting the renewal of work methods, improvements in operational processes, and the use of technology to increase business efficiency. All indicators were measured using a five-point Likert scale ranging from 1 = never to 5 = always, as this scale is considered capable of consistently measuring respondents' perceptions and behavior in social research (Joshi et al., 2015).

Data analysis was conducted using IBM SPSS Statistics version 26. The initial stage of analysis involved descriptive statistics to describe respondent characteristics and the data

distribution. Instrument quality was then assessed through validity testing using Pearson Product-Moment correlation and reliability testing using Cronbach's Alpha. Before hypothesis testing, the model was evaluated against classical assumptions including normality, multicollinearity, and heteroscedasticity. The relationship between technology adaptation and process innovation was analyzed using simple linear regression, while hypothesis testing was conducted using a t-test at a 5% significance level ($\alpha = 0.05$). The extent to which the independent variable explained the dependent variable was evaluated using the coefficient of determination (R^2) (Hair et al., 2022).

4. RESULTS AND DISCUSSION

4.1 Respondent Characteristics

Table 1. Respondent Characteristics (n = 376)

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	98	26.06
	Female	278	73.94
Age	< 30 years	59	15.69
	31–40 years	141	37.50
	41–50 years	134	35.64
	> 50 years	40	10.64
Highest Education	Elementary School	18	4.79
	Junior High School	27	7.18
	Senior High School/Vocational High School	195	51.86
	Diploma	40	10.64
	Bachelor's Degree (S1)	90	23.94
	Master's Degree (S2)	6	1.60
Year Business Established	≤ 2015	55	14.63
	2016–2019	106	28.19
	2020–2023	167	44.41
	≥ 2024	48	12.77
Number of Employees	1–4 employees	304	80.85
	5–19 employees	71	18.88
	20–99 employees	1	0.27
Business Capital	< IDR 1 billion	370	98.40
	IDR 1–5 billion	4	1.06
	> IDR 15 billion	2	0.53
Annual Revenue	< IDR 2 billion	374	99.47
	IDR 2–15 billion	2	0.53

A total of 376 culinary MSME owners under the supervision of the West Java Provincial Office of Cooperatives and Small Enterprises participated in this study. Based on demographic characteristics, respondents were predominantly female, comprising 278 individuals (73.94%), while male respondents totaled 98 individuals (26.06%). In terms of age, most respondents were between 31–40 years (37.50%) and 41–50 years (35.64%), while 15.69% were under 30 years and 10.64% were over 50 years. This composition indicates that the majority of MSME owners were within productive age groups that generally possess both business experience and the capacity to adapt to technological changes and evolving market needs.

In terms of educational attainment, most respondents were senior high school/vocational high school graduates or equivalent, totaling 195 individuals (51.86%), followed by bachelor's degree holders (23.94%), diploma graduates (10.64%), junior high school graduates (7.18%), elementary school graduates (4.79%), and master's degree holders

(1.60%). These characteristics indicate that culinary MSME owners have diverse educational backgrounds, although the majority have sufficient formal education to support learning processes, technology adoption, and innovation development in their business activities.

Based on business characteristics, most respondents established their businesses during the 2020-2023 period (44.41%), with business scale dominated by enterprises employing 1-4 workers (80.85%). In addition, almost all respondents had business capital below IDR 1 billion (98.40%) and annual revenue below IDR 2 billion (99.47%), which is consistent with the characteristics of micro and small enterprises under applicable Indonesian regulations. These findings indicate that the study represents the actual conditions of micro- and small-scale culinary MSMEs targeted by government development programs, and therefore is expected to provide empirical evidence on the relationship between technology adaptation and process innovation in this business segment.

4.2 Statistical Analysis Results

This section presents the results of classical assumption testing, regression analysis, and hypothesis testing to evaluate the effect of TA on PI among culinary MSMEs in West Java Province. The analysis was conducted using IBM SPSS Statistics version 26. Because the initial regression model indicated a violation of the homoscedasticity assumption, the final estimation was performed using the Weighted Least Squares (WLS) method so that hypothesis testing was based on a model that satisfied the regression assumptions.

a. Classical Assumption Tests

Before hypothesis testing, the regression model was evaluated through classical assumption tests covering normality, heteroscedasticity, and multicollinearity. A summary of the test results is presented in Table 2.

Table 2. Summary of Classical Assumption Test Results

Assumption	Method	Result	Decision
Normality	<i>One-Sample Kolmogorov-Smirnov</i>	Monte Carlo Sig. = 0.187	Residuals are normally distributed
Heteroscedasticity (OLS)	<i>Glejser Test</i>	Sig. = 0.016	Heteroscedasticity detected
Heteroscedasticity (WLS)	<i>Glejser Test</i>	Sig. = 0.064	Heteroscedasticity resolved
Multicollinearity	<i>Tolerance = 1.000; VIF = 1.000</i>	No multicollinearity	

Source: IBM SPSS Statistics 26 output (processed data).

The test results show that the model residuals satisfy the normality assumption, with a Monte Carlo significance value of 0.187 (> 0.05). The Monte Carlo significance value was used because it provides a more accurate estimate than Asymptotic Significance for a relatively large sample. The Glejser test on the OLS model subsequently indicated heteroscedasticity (Sig. = 0.016), so the model was re-estimated using Weighted Least Squares (WLS) with a weight of $1/TA^2$. After WLS was applied, the Glejser test produced a significance value of 0.064 (> 0.05), indicating that heteroscedasticity had been resolved. In addition, Tolerance = 1.000 and VIF = 1.000 indicate the absence of multicollinearity, as is commonly expected in a simple linear regression model involving only one independent variable.

b. Regression Analysis

Because the WLS model satisfied all regression assumptions, this estimation was used as the final model in the study. The regression analysis results are presented in Table 3.

Table 3. WLS Regression Analysis Results

Variable	B	Std. Error	β	t	p-value
Constant	12.779	1.701	–	7.512	<0.001
Technology Adaptation	0.380	0.025	0.615	15.077	<0.001

Source: IBM SPSS Statistics 26 output (processed data).

Regression equation:

$$PI = 12.779 + 0.380TA$$

The estimation results show that TA has a positive effect on PI, with a regression coefficient of 0.380. This value indicates that a one-unit increase in TA is associated with a 0.380-unit increase in PI. In addition, the standardized coefficient ($\beta = 0.615$) indicates that TA has a relatively strong effect on PI among culinary MSMEs in West Java Province.

c. Hypothesis Testing

Hypothesis testing was conducted based on the estimation results of the Weighted Least Squares (WLS) model. A summary of the test results is presented in Table 4.

Table 4. Summary of Hypothesis Testing

Hypothesis	B	t	p-value	Decision
H1: Technology Adaptation → Process Innovation	0.615	15.077	<0.001	Accepted

Source: IBM SPSS Statistics 26 output (processed data).

The results show that TA has a positive and significant effect on PI ($\beta = 0.615$; $t = 15.077$; $p < 0.001$). Therefore, H1 is accepted, indicating that the greater the MSMEs' ability to adapt technology, the higher the level of PI they are able to generate.

4.3 Discussion

The results show that technology adaptation has a positive and significant effect on process innovation among culinary MSMEs in West Java Province. This finding indicates that the greater the ability of business owners to adapt digital technology, the greater their ability to renew operational business processes. Technology adaptation is reflected not only in the use of digital devices or applications but also in business owners' ability to align technology with everyday business needs, such as inventory management, transaction recording, production coordination, digital marketing, and customer service. This capability allows business processes to become more efficient, flexible, and responsive to changing market needs, thereby encouraging sustainable process innovation. The finding supports the view that digital transformation in MSMEs depends not merely on technology ownership but on the ability to assimilate technology continuously into business activities (Verhoef et al., 2021; Kraus et al., 2022; de Mattos et al., 2024).

The findings also demonstrate that technology does not automatically generate innovation; it must be accompanied by the organization's ability to integrate and utilize it in operational activities. In culinary MSMEs, this adaptation process is reflected in the transition from manual to more digitalized work practices, the use of applications to support decision-making, and workflow simplification that improves operational efficiency. Technology adaptation therefore serves as an organizational capability that bridges technology utilization and tangible changes in business processes. This becomes particularly important for resource-constrained MSMEs, because the ability to adjust available technology often determines innovation success more strongly than the scale of technology investment itself. These findings are consistent with AlNuaimi et al. (2022), Scuotto et al. (2021), and Sagala and Óri (2024), who emphasize that successful digital transformation in MSMEs is determined by the organization's ability to develop digital capabilities,

organizational learning, and strategic technology utilization rather than by the level of technology adoption alone.

From a theoretical perspective, the findings reinforce the Technology–Organization–Environment (TOE) Framework, which positions technological aspects as one of the primary determinants of organizational change. TOE explains that the characteristics of technology accessible to and usable by an organization influence its ability to develop more effective business processes. In the context of this study, technology adaptation demonstrates that the benefits of technology depend not only on the level of adoption but also on the ability of MSME owners to integrate technology into operational activities according to business needs. Process innovation therefore emerges as a consequence of the organization's success in adapting technology to its business characteristics. The findings also support developments in TOE research that position organizational readiness and adaptive capability as important factors in the success of MSME digital transformation (Hendri & Sudarmilah, 2024; Wang & Zhang, 2025).

The findings are consistent with various empirical studies showing that technology adaptation contributes to improved process innovation and organizational performance. Verhoef et al. (2021) explain that digital transformation enables organizations to renew business processes by integrating technology into operational activities. Kraus et al. (2022) add that digital technology increases operational flexibility and accelerates firms' ability to respond to changes in the business environment. de Mattos et al. (2024) show that the success of technological transformation in MSMEs is influenced more strongly by technology assimilation than by technology adoption alone, while Wang and Zhang (2025) find that digital transformation is a key link among technological, organizational, and environmental factors and sustainable innovation capability. In addition, the systematic review by Sagala and Óri (2024) identifies digital capability development, organizational learning, and technology integration into business processes as major determinants of successful MSME digital transformation. These findings not only confirm previous research but also extend the empirical evidence to the context of culinary MSMEs in Indonesia, particularly those supported by local government development programs.

From a practical perspective, the findings imply that MSME development programs should not focus solely on providing access to technology or digital infrastructure. Development programs should also enhance business owners' ability to adapt technology to the characteristics of their business processes through digital training, implementation assistance, stronger digital literacy, and innovation competency development. Such an approach is expected to produce more effective technology utilization, thereby encouraging sustainable process innovation and strengthening MSME competitiveness in the digital economy. This view is consistent with recent studies emphasizing that successful MSME digital transformation depends on a combination of technological readiness, organizational capability, and a supportive business environment.

5. CONCLUSION

This study aimed to analyze the effect of technology adaptation on process innovation among culinary MSMEs in West Java Province. The analysis shows that technology adaptation has a positive and significant effect on process innovation, and the research hypothesis is therefore accepted. The findings indicate that MSME owners' ability to integrate and adapt digital technology within operational activities can promote business process renewal that is more efficient, adaptive, and responsive to changing market needs. Technology adaptation functions not merely as a form of technology adoption but also as a capability that enables MSMEs to create sustainable process innovation.

Theoretically, this study strengthens the application of the Technology–Organization–Environment (TOE) Framework, particularly its technological dimension, by showing that successful digital transformation in MSMEs is determined not only by technology availability but also by the organization's ability to adapt and integrate technology into business processes. These findings enrich the empirical evidence regarding the relationship between technology adaptation and process innovation in the context of culinary MSMEs in Indonesia.

This study provides practical implications for local governments, particularly the West Java Provincial Office of Cooperatives and Small Enterprises, indicating that MSME development programs should be directed not only toward providing access to technology but also toward strengthening technology adaptation capabilities through training, implementation assistance, and improved digital literacy. For MSME owners, the findings show that the ability to align technology with the operational characteristics of the business is an important factor in improving process efficiency and business competitiveness. From an academic perspective, the study provides additional empirical evidence regarding the application of the TOE Framework in explaining the mechanisms through which process innovation is formed in MSMEs in developing countries.

This study has several limitations. First, it involved only culinary MSMEs under the supervision of the West Java Provincial Office of Cooperatives and Small Enterprises; therefore, the findings cannot yet be generalized to all MSME sectors or other regions. Second, the research model includes only one independent variable, while variation in process innovation may also be influenced by other factors that were not analyzed, such as digital capability, organizational culture, leadership, or support from the business environment. Third, the study uses a cross-sectional design and therefore cannot capture changes in technology adaptation and process innovation over the long term.

Future research is encouraged to develop the model by adding organizational and environmental factors relevant to the TOE Framework, such as organizational readiness, top management support, and environmental uncertainty, in order to obtain a more comprehensive understanding of the determinants of process innovation in MSMEs. Future studies may also expand respondent coverage across different MSME subsectors and regions and employ longitudinal designs to evaluate the dynamics of technology adaptation and process innovation over time.

REFERENCES

- Anatan, L., & Nur. (2023). Micro, Small, and Medium Enterprises' Readiness for Digital Transformation in Indonesia. *Economies*, 11(6), 156. <https://doi.org/10.3390/economies11060156>
- Awa, H. O., Ojiabo, U. O., & Emecheta, B. C. (2021). Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. *Journal of Science and Technology Policy Management*, 12(2), 252–278. <https://doi.org/10.1108/JSTPM-04-2020-0063>
- Baker, J. (2022). The Technology–Organization–Environment Framework. In *Information Systems Theory: Explaining and Predicting Our Digital Society*. Springer. <https://doi.org/10.1007/978-3-030-80089-6>
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive Sampling: Complex or Simple? Research Case Examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/10.1177/1744987120927206>
- Cillo, V., Petruzzelli, A. M., Ardito, L., & Del Giudice, M. (2021). Understanding Sustainable Innovation: A Systematic Literature Review. *Corporate Social Responsibility and Environmental Management*, 28(2), 463–476. <https://doi.org/10.1002/csr.1965>
- Creswell, J. W., & Creswell, J. D. (2023). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (6th ed.). SAGE Publications.
- de Mattos, C. S., Pellegrini, G., Hagelaar, G., & Dolfisma, W. (2024). Systematic Literature Review on Technological Transformation in SMEs: A Transformation Encompassing Technology Assimilation and Business Model Innovation. *Management Review Quarterly*, 74(2), 1057–1095.

- <https://doi.org/10.1007/s11301-023-00327-7>
- Development, O. for E. C. and. (2021). *The Digital Transformation of SMEs*. OECD Publishing. <https://doi.org/10.1787/bdb9256a-en>
- Development, O. for E. C. and, & Eurostat. (2018). *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation* (4th Edition). OECD Publishing. <https://doi.org/10.1787/9789264304604-en>
- Díaz-Arancibia, J., Hochstetter-Diez, J., Bustamante-Mora, A., Sepúlveda-Cuevas, S., & Arango-López, J. (2024). Navigating Digital Transformation and Technology Adoption: A Literature Review from Small and Medium-Sized Enterprises in Developing Countries. *Sustainability*, 16(14), 5946. <https://doi.org/10.3390/su16145946>
- Ferreira, J. J., & Fernandes, C. I. (2024). Innovation capability and sustainable performance in SMEs. *Technological Forecasting and Social Change*.
- Gangwar, H. (2023). Technology–Organization–Environment Framework and Digital Transformation: A Review and Future Research Directions. *Journal of Enterprise Information Management*.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2022). *Multivariate Data Analysis* (9th ed.). Cengage Learning.
- Hanelt, A., Bohnsack, R., Marz, D., & Marante, C. A. (2021). A Systematic Review of the Literature on Digital Transformation. *Journal of Management Studies*. <https://doi.org/10.1111/joms.12639>
- Hassan, S. S., Meissner, K., Krause, K., & Bzhalava, L. (2024). Is Digitalization a Source of Innovation? Exploring the Role of Digital Diffusion in SME Innovation Performance. *Small Business Economics*. <https://doi.org/10.1007/s11187-023-00826-7>
- Hendri, A. S., & Sudarmilah, E. (2024). Enhancing Information Technology Adoption Potential in MSMEs: A Conceptual Model Based on TOE Framework. *JUITA: Jurnal Informatika*, 12(1), 91–100. <https://doi.org/10.30595/juita.v12i1.21051>
- Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396–403. <https://doi.org/10.9734/BJAST/2015/14975>
- Kraus, S., Breier, M., & Jones, P. (2022). Digital Transformation and SME Performance: A Systematic Literature Review. *Journal of Small Business Management*.
- Nylén, D., & Holmström, J. (2020). Digital Innovation Strategy: A Framework for Diagnosing and Improving Digital Product and Service Innovation. *Business Horizons*, 63(1), 17–28. <https://doi.org/10.1016/j.bushor.2019.08.001>
- Sagala, G. H., & Óri, D. (2024). Toward SMEs Digital Transformation Success: A Systematic Literature Review. *Information Systems and E-Business Management*, 22(4), 667–719. <https://doi.org/10.1007/s10257-024-00682-2>
- Scuotto, V., Del Giudice, M., Garcia-Perez, A., & Orlando, B. (2023). Digital Transformation and Process Innovation in SMEs: A Knowledge-Based Perspective. *Journal of Knowledge Management*.
- Usai, A., Fiano, F., Petruzzelli, A. M., Paoloni, P., Briamonte, M. F., & Orlando, B. (2021). Unveiling the Impact of the Adoption of Digital Technologies on Firms' Innovation Performance. *Journal of Business Research*, 133, 327–336. <https://doi.org/10.1016/j.jbusres.2021.04.035>
- Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital Transformation: A Multidisciplinary Reflection and Research Agenda. *Journal of Business Research*, 122, 889–901. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- Walter, C. E., Au-Yong-Oliveira, M., & Veloso, C. M. (2021). Management and innovation in micro and small enterprises: A research proposal through structural equation modeling. *Quality - Access to Success*, 22(183), 23–28. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85110829122&partnerID=40&md5=47436a48d095a34774384a2aa8414d0f>
- Wang, S., & Zhang, H. (2025). Enhancing SMEs sustainable innovation and performance through digital transformation: Insights from strategic technology, organizational dynamics, and environmental adaptation. *Socio-Economic Planning Sciences*, 98.

<https://doi.org/10.1016/j.seps.2024.102124>

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326–349.