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Revolutionizing MSMEs: The Impact of Mobile Payment Readiness through TOE Framework

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Abstract

This study seeks to examine the influence of the Technology, Organization, and Environment (TOE) Framework on the adoption of mobile payments and its consequential impact on firm performance. Employing a purposive sampling technique, data analysis was conducted using Structural Equation Modelling-Partial Least Square (SEM-PLS). Questionnaires served as the primary data collection method and were distributed among 202 micro, small, and medium enterprises (MSMEs) in Surakarta City. The results underscore that TOE Framework factors, encompassing relative advantage, compatibility, innovativeness, and competitive pressure, wield a positive and significant influence on the adoption of mobile payments. Nevertheless, mobile payment knowledge and external support were found to have no substantial effect on mobile payment adoption. Notably, the study establishes a positive and significant relationship between mobile payment adoption and firm performance. These findings contribute valuable insights for businesses aiming to leverage mobile payment technologies to enhance overall performance in the contemporary business landscape.

Keywords: Business Growth; Technology Maximization; Business Sustainability; MSMEs; Uncertainty

Introduction

In recent years, Indonesia has witnessed significant technological advancements, leading to improved access to information and enhanced efficiency in resource management. The surge in internet development has mainly spurred innovations in financial technology, notably in mobile payment services, offering greater financial accessibility to the population (Namira, 2022). The technological landscape has also evolved to benefit micro, small, and medium-sized enterprises (MSMEs), creating expansive market opportunities for these businesses (Namira, 2022).

Integrating Information Technology (IT) is crucial to staying abreast of technological developments. Adapting to the current trends in information technology is an essential motivator for MSMEs operators to implement mobile payment systems in their business (Fawzi & Subriadi, 2022). While SME growth has been noteworthy, with a 6% annual increase, there must be a significant gap in introducing information technology to business owners, hindering their ability to harness its potential benefits (Normansyah, 2022). Various studies have explored technology adoption in MSMEs, spanning social media, big data, E-Commerce, QRIS, and mobile payment systems (Qalati et al., 2021; Maroufkhani et al., 2020; Harfie & Lastiati, 2022; Sulistyaningsih and

Hanggraeni, 2021; Mahakittikun et al., 2020; Kwabena et al., 2019, 2021; Tajudeen et al., 2018). Mobile payment systems, in particular, have gained prominence, with Li et al. (2019) highlighting their impact on Indonesia's fintech industry.

The growth of smartphone users in Indonesia, surpassing the number of active bank accounts, provides a substantial opportunity for the widespread adoption of mobile payment systems (Adiatama & Lestari, 2020). Consumers are increasingly inclined toward online transactions to reduce physical contact, prompting MSMEs to adapt their payment methods to align with changing consumer behavior (Chandra et al., 2020). Despite the growing trend, many MSMEs in Indonesia still need to be connected to digital ecosystems, including mobile payment systems. Considering the evolving preferences of the digital-savvy population, this gap poses a challenge that needs to be addressed.

This paper investigates the adoption of mobile payment systems among MSMEs in Indonesia, exploring the factors influencing their decision-making process. Drawing on the Technological-Organizational-Environmental (TOE) framework, we delve into the technological, organizational, and environmental contexts that shape MSMES operators' perceptions and choices regarding mobile payment adoption. Understanding the complexities of these contexts is essential for policymakers, financial institutions, and MSMEs support organizations to formulate effective strategies that encourage the seamless integration of mobile payment systems into the fabric of SMEs operations. As we navigate this exploration, we will explore existing research, providing a comprehensive understanding of the factors influencing MSMES engagement with mobile payment systems and the broader implications for the Indonesian business landscape.

Literature Review

Innovation Diffusion Theory

The adoption of the Diffusion of Innovation (DOI) framework developed by Rogers (2003) delineates a theory that explains the adoption of IT. The primary goal of this theory is to facilitate the progression of technological innovations from adoption to utilization. According to Matias and Hernandez (2021), the diffusion of innovation theory illustrates adoption patterns diffusion mechanisms and subsequently aids in predicting the success of technological innovations.

Oliveira et al. (2014) categorize diffusion into five factors explaining innovation adoption: relative advantage, which measures how much an innovation is better than its predecessor; compatibility, assessing how well an invention can be assimilated into existing business processes practices. Moreover, value systems, complexity, indicating the difficulty level of using the innovation; observability, measuring how visible the creation is to others; and trialability, denoting the ease of experimenting with the invention. DOI is primarily based on technological characteristics and user perceptions of technological innovations.

DOI, heavily grounded in technology characteristics and user perceptions, acknowledges that organizations are more complex entities than individuals regarding technology adoption. Three factors influencing technology adoption within organizations are individuals (leadership attitude toward change), internal organizational structure (centralization, complexity, interconnectedness, number of employees, and organizational slack), and external characteristics related to organizational system openness (Rogers, 2003).

The adoption of non-cash payment innovations in Indonesia is currently on the rise, aligning with the growth of financial technology (fintech) services such as digital wallets or mobile payments like Go-pay, OVO, Dana, LinkAja, Paytren, Shopeepay, and others. The proliferation of these mobile payment services demonstrates that fintech innovations are accepted by Indonesian society, leading to an increased usage of non-cash transactions in the economy (Badri, 2020).

Changes in societal behavior indirectly emphasize the widespread technological developments (Houston, 2020). This indirect shift in societal behavior occurs due to the adoption of innovation. Technology adoption across various sectors eventually transforms consumer behavior from offline to online, and there is a concurrent shift in transaction methods towards digital transactions or mobile payments (Saputri, 2021).

In the study conducted by Mahakittikun et al. (2020), it is asserted that the Relative Advantage in the adoption of mobile payment has a positive and significant impact on Firm Performance. Relative advantage refers to the achievement of the technological service provider's result being better than or at least not worse than the previous method. Therefore, when MSMEs recognize the relative benefits of adopting mobile payments, it can help save time and costs, leading to increased intensive service usage and enhanced company performance. This viewpoint is supported by Qalati et al. (2021) (social media adoption), Maroufkhani et al. (2022) (significant data adoption), and G. Y. Kwabena et al. (2021) (mobile payment adoption). Thus, the hypothesis in this study is:

H1: The Relative Advantage has a positive impact on Mobile Payment Adoption

Technology Organization Environment (TOE)

The Technology Organization Environment (TOE) framework was initially developed by Tornatzky (1990) to explain technological innovation, specifically adopting and implementing technology within three distinct contexts: technology, organization, and environment. According to Maroufkhani et al. (2022), the TOE framework is crucial in companies' decision-making regarding technology adoption.

In the technological context of the TOE framework, various relevant technologies within the company are considered, encompassing three crucial factors: compatibility, complexity, and trialability (Hussain et al., 2022). The organizational context explains the structure and processes within the organization that either facilitate or constrain innovation adoption (Matias & Hernandez, 2021). According to Bhattacharya and Wamba (2018), the environmental context refers to the environment in which the organization conducts its business, including industry and relationships with business partners, competitors, and the government.

Chiu et al. (2017) divided the TOE framework into three essential aspects to develop factors influencing organizational acceptance of technological innovation. These aspects are divided into technical factors, encompassing characteristics and the utility of innovative technology; organizational factors, covering internal issues within the company such as management, employees, products, and services; and environmental factors involving business-related matters such as competitors and business partners.

According to Tajudeen et al. (2018), the TOE framework explains the adoption of technological innovation by providing three analytical frameworks that can be used to study the adoption of various types of IT innovations. The technical framework explains existing or new relevant technologies used by the company, the organizational framework is based on the scope and size of the company, and the environmental framework pertains to the arena in which the company conducts its business, referring to industry, competitors, and government relations.

The TOE framework is an integrative concept forming the theoretical basis for adopting or diffusing innovative technology platforms. This framework refers to three perspectives in the technological context that influence the adoption or implementation of technological innovations (Kumar & Singh, 2022). The TOE framework aligns with the theory of Diffusion of Innovation (DOI). Still, it introduces a new context, the environment, making it considered more comprehensive and novel in explaining the adoption of technology innovation (Tajudeen et al., 2018).

Based on the Diffusion of Innovation (DOI) theory developed by Rogers (2003), compatibility is a characteristic in adopting technology that drives decisions to adopt new

technological systems consistently. Therefore, when companies perceive that mobile payments are compatible with the mobile payment system, it is highly likely that they will continue to use it, subsequently benefiting their overall performance.

Research by Khan and Ali (2018) states that Compatibility significantly influences the adoption of mobile payments. Compatibility represents the state of technology adoption consistent with existing values, potential adoption activities, and considerations of past, present, and current circumstances. Thus, when MSMEs adopt mobile payment systems and find them compatible with their business, they are more likely to continue using them, enhancing their performance. This viewpoint is supported by Setiyani and Yeny Rostiani (2021) and Yadegaridehkordi et al. (2019). However, studies conducted by Tajudeen et al. (2018) and Chau Deng (2018) have yielded negative results regarding technology adoption. Therefore, the hypothesis in this study is:

H2: Compatibility has a positive impact on Mobile Payment Adoption.

Based on the theory developed by Tornatzky (1990), Innovativeness is the ability to use innovations to further innovate within the company. According to Beyhan Yasar et al. (2019), a company can achieve outstanding results by continuously improving its creation. Consequently, the company's sustained improvement and innovation processes can improve overall performance.

Research conducted by Mahakittikun et al. (2020) states that Innovativeness positively impacts Firm Performance. Innovativeness involves the process of generating new ideas in the adoption of technology for the improvement of management processes. Since innovation implies that a company is continuously enhancing its operations, it is likely to achieve better results in terms of overall performance. This viewpoint is supported by Beyhan Yasar et al.'s (2019) study, indicating that a balance between innovation processes and continuous improvement can provide outstanding financial performance for a company. Therefore, the hypothesis in this study is:

H3: Innovativeness has a positive impact on Mobile Payment Adoption.

Mobile Payment Knowledge, or knowledge about mobile payments, can elevate the level of understanding regarding the adoption of technology by enhancing individuals' ability to adopt innovation (Tornatzky, 1990). In line with research conducted by Mahakittikun et al. (2020), Nair et al. (2019), Chau & Deng (2018), and Chiu et al. (2017), it is stated that companies with a higher level of knowledge about the use of mobile payment systems are more likely to implement them effectively and generate positive outcomes for their businesses. Therefore, the hypothesis in this study is:

H4: Mobile Payment Knowledge has a positive impact on Mobile Payment Adoption.

Based on the theory developed by Tornatzky (1990), Competitive Pressure can be explained as the level of competition that businesses must face. The study by Hou et al. (2019) shows that retail companies inside stores feel pressure from technological advancements and are compelled to adopt technology to remain competitive. Intense competition can motivate companies to embrace innovation.

Research by Mahakittikun et al. (2020) states that Competitive Pressure positively impacts Firm Performance. Competitive Pressure is the condition in which companies compete within an environment where similar activities occur. The power of customers can drive MSMEs to adopt systems, impacting business performance. This viewpoint is supported by Maroufkhani et al. (2020) and Kwabena et al. (2021), suggesting that competition can motivate business owners to succeed and act professionally while facing competitive pressure. Therefore, the hypothesis in this study is:

H5: Competitive Pressure has a positive impact on Mobile Payment Adoption.

Based on the theory developed by Tornatzky (1990), External Support refers to external assistance during the adoption process of mobile payment systems. According to Eze et al. (2019), support from the government and payment providers can positively impact the sustained use of mobile payment systems, benefiting businesses. Given adequate external support for merchants using mobile payments, merchants will benefit from it, leading to better performance.

Research by Kwabena et al. (2019) states that External Support positively impacts Firm Performance. External Support represents assistance in implementing technological innovation adoption to understand knowledge about technology adoption (Mahakittikun et al., 2020). This implies that with sufficient external support for merchants during the use of mobile payments, merchants will benefit from the use of mobile payments, leading to better performance. This viewpoint is supported by Kwabena et al. (2019) and Sulistyaningsih Hanggraeni (2021). Therefore, the hypothesis in this study is:

H6: External Support has a positive impact on Mobile Payment Adoption.

Mobile Payment, or mobile payment, can be defined as using mobile phones to facilitate payments from customers to businesses. To accept mobile payments from customers, companies must have payment terminals or digital wallets (Mahakittikun et al., 2020).

Research by G. Y. Kwabena et al. (2021) states that mobile payment adoption positively impacts Firm Performance. Mobile payment adoption represents the decision to fully embrace new ideas as the best alternative way for MSMEs to reduce costs, streamline processes, and allocate more time to business activities than waiting in queues for transactions. It also helps reduce the risk of theft and health hazards associated with handling cash while enhancing international business and commerce. This viewpoint is supported by Sulistyaningsih & Hanggraeni (2021), Maroufkhani et al. (2022), and Qalati et al. (2021). Therefore, the hypothesis in this study is:

H7: Mobile Payment Adoption has a positive impact on Firm Performance

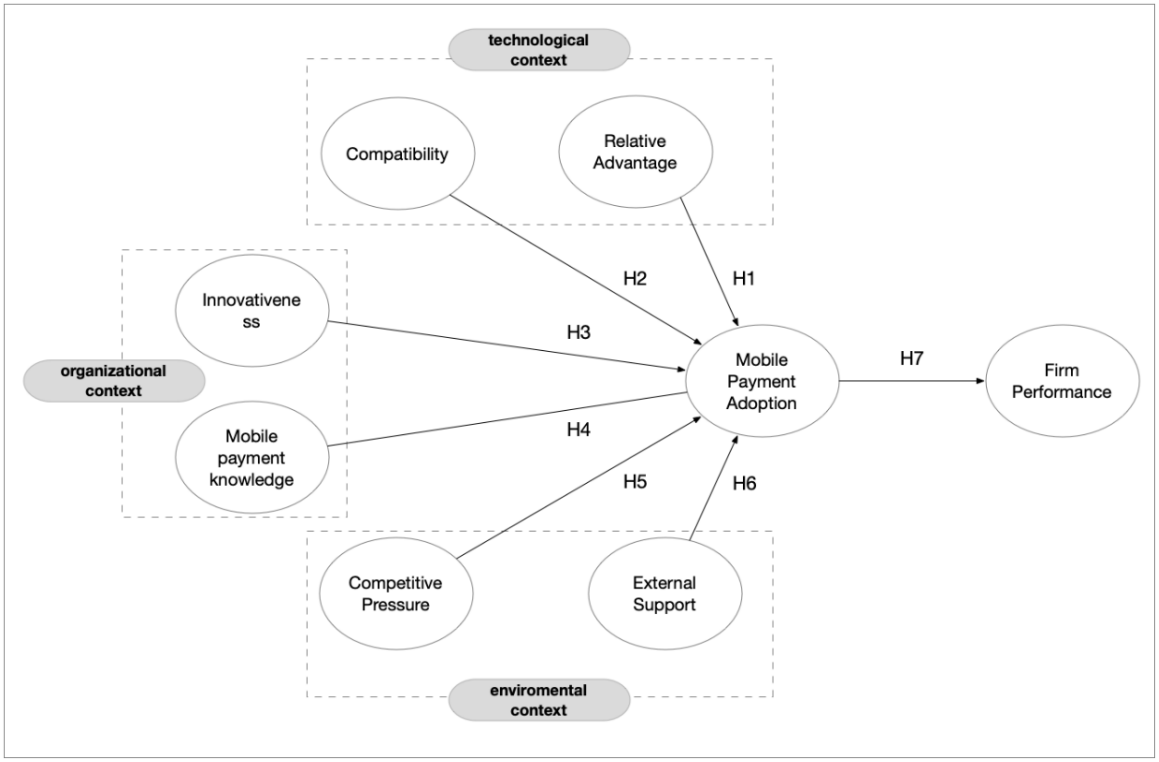

Figure 1. Research Model

Research Method

Data and sample

The data source was obtained by distributing questionnaires to MSMEs operating in the trade sector that utilize mobile payment as a payment tool. The owners or responsible parties in these MSMEs served as respondents in this study. This study employed a convenience sampling method for enacting the sample.

The data collection technique employed in this research involved the distribution of questionnaires. Questionnaires consist of formulated questions that respondents will answer (Sekaran & Bougie, 2017, p. 112). These questionnaires were given to MSMEs operating in the trade sector and utilizing mobile payment as a payment tool.

The questionnaire comprises structured questions and statements. Respondents provide assessments by indicating their chosen responses on a Likert scale. The questions in this research are based on previous studies and relevant journals that contributed to the formulation of this research.

Data Analysis

Based on Figure 1, this study proposes eight variables into the model: relative advantage, compatibility, innovativeness, mobile payment knowledge, competitive pressure, external support, mobile payment adoption, and firm performance. All indicators of such variables are shown in Table 1 and are present in the result section. This research employs a variance-based structural equation model with Smart-PLS to analyse those variables' relationships.

Results and Discussion

Table 1 presents the descriptive statistics of employed variables in this work. Such analysis comprises the value of the mean, standard deviation, minimum value, and maximum value.

Table 1. Descriptive Statistics

	Mean	Std. Deviation	Minimum	Maximum
Relative advantage	16.84	2.178	8	20
Compability	16.92	2.13	12	20
Innovativeness	16.21	1.815	12	20
Mobile payment knowledge	12.5	1.917	7	15
Competitive pressure	12.21	1.653	9	15
External support	8.26	1.199	6	10
Mobile payment adoption	12.33	1.642	9	15
Firm performance	21.32	2.479	15	25

The Technology, Organization, and Environment (TOE) framework variables, including relative advantage, compatibility, and innovativeness, comprise 4 questionnaire items. In comparison, mobile payment knowledge and competitive pressure have 3 items each, and external support consists of 2 questions. For the variable "relative advantage," each questionnaire item must be answered, resulting in a minimum score of 8, a maximum of 20, a mean of 16.84, and a standard deviation of 2.178. With a mean value greater than the standard deviation, the results indicate a satisfactory performance, as the standard deviation reflects a high level of deviation. Thus, the data distribution appears normal and does not exhibit bias. Table 2 shows the descriptive characteristics of our sample.

Table 3 presents the validity and reliability test of all of the indicators employed to measure our proposed variables. Based on the results in Table 3, it can be concluded that the factor loading values for all indicators are greater than 0.70. This evidence indicates that all the indicators used in this study can be considered valid for measuring their respective variables.

Table 2. Sample Characteristics

No	Description	Total	Percentage (%)
1	Attending training on Accounting Technology Systems		
	Yes	118	58,4%
	No	84	41,6%
2	Annual revenue		
	< 200 million per year	172	85.10%
	300 – 500 million per year	23	11.40%
	500 million – 1 billion per year	4	2.00%
	> 1 billion per year	3	1.50%
3	Firm age (year)		
	< 1	32	15,8%
	1 – 5	94	46,5%
	> 5	76	37,6%
4	Adoption of mobile payment		
	Currently utilizing mobile payment	177	87,6%
	Used mobile payment before but not currently using it	25	12,4%
5	Usage of Mobile Payment Platforms		
	Go-pay	138	21.20%
	Shopeepay	167	25.70%
	LinkAja	101	15.50%
	OVO	117	18.00%
	Dana	123	18.90%
	Paytern	4	0.60%
6	Number of employee		
	1 – 5	179	88,6%
	6 – 10	13	6,4%
	11 – 50	7	3,5%
	51 – 99	0	0,0%
	> 100	3	1,5%

Furthermore, each variable's Average Variance Extract (AVE) values are above 0.50. This suggests that each indicator has sufficient reliability to measure its corresponding variable. Table 3 presents the result of the discriminant validity of the measurement indicators.

Table 3. Validity and Reliability Test

Indicators	Factor Loading	AVE
Relative Advantage		
I feel that using Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern can accomplish tasks at work more quickly.	0.757	0.548
I feel that using Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern improves the quality of my work.	0.786	
Using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment system makes my job easier than cash methods.	0.714	
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment system benefits the sales in my business.	0.703	
Compatibility		
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method is compatible with all aspects of my work.	0.825	0.657
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method is fully compatible with my current situation and conditions.	0.83	
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method is suitable for my business.	0.785	
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method is the right payment method to implement in my current business	0.8	
Innovativeness		
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method is the right payment method to implement in my current business.	0.79	0.541
I feel confident that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method can advance my business.	0.78	
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method is often considered new by customers.	0.701	

Indicators	Factor Loading	AVE
I feel that the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method only has small changes from the usual payment method.	0.664	
Mobile payment knowledge		
I feel that using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method often makes me face new competitors.	0.806	
My employees are skilled in using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method.	0.839	0.675
I have employees who are experts in using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method.	0.82	
External Support		
I am confident that my employees have the ability to use the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method like other MSMEs.	0.87	0.794
I believe that if I do not use the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method, I will lose customers.	0.912	
Competitive Pressure		
I feel this is a strategic necessity to use the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method to compete in the market.	0.832	
I feel that some of my competitors have started using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method.	0.823	0.675
I feel that my competitors are aware of the importance of using the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method and are using it for their operations.	0.81	
Firm Performance		
My customers demand the use of the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method.	0.782	
The use of the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method reduces manual work such as (money and invoice reconciliation).	0.743	
The use of the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method reduces the risk costs, namely the risk of miscalculation in recording transactions.	0.801	0.605
The use of the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method improves customer service.	0.762	
The use of the Go-pay, Shopeepay, LinkAja, Dana, OVO, and Paytern paymethods speeds up the queue of customers during payment.	0.8	
Mobile Payment Adoption		
The use of the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment method makes it easier to search for transactions.	0.858	
My MSME or the MSME where I work uses the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment system as a business management tool.	0.776	0,689
My MSME or the MSME where I work has fully implemented the Go-pay, Shopeepay, LinkAja, Dana, OVO, Paytern payment system.	0.853	

Discriminant validity can be assessed by examining the Fornell Larcker criterion values. This measurement indicates that the correlation between a variable and itself should not be smaller than the correlation with other variables. Table 4 meets the criteria mentioned above. The Fornell Larcker criterion has been met; therefore, it can be interpreted that all latent variables have passed the validity test.

Table 4. Discriminant Validity

	CO	CP	XS	FP	IN	MPA	MPK	RA
Compatibility (CO)	**0.81**							
Competitive Pressure (CP)	0.416	**0.926**						
External Support (XS)	0.358	0.822	**0.891**					
Firm Performance (FP)	0.526	0.446	0.42	**0.778**				
Innovativeness (IN)	0.491	0.309	0.297	0.362	**0.736**			
Mobile Payment Adoption (MPA)	0.59	0.498	0.436	0.561	0.441	**0.83**		
Mobile Payment Knowledge (MPK)	0.484	0.456	0.432	0.427	0.382	0.414	**0.822**	
Relative Advantage (RA)	0.584	0.361	0.337	0.489	0.382	0.484	0.447	**0.741**

Table 5 presents additional empirical evidence of the reliability test from the Cronbach-alfa and composite reliability value.

Table 5. Cronbach-alfa and Composite Reliability

	Cronbach's Alpha	Composite Reliability
Relative advantage	0.725	0.829
Compatibility	0.826	0.884
Innovativeness	0.721	0.824
Mobile payment knowledge	0.761	0.862
Competitive pressure	0.761	0.862
External support	0.743	0.885
Mobile Payment Adoption	0.775	0.869
Firm Performance	0.837	0.885

The test results above indicate that all variables meet the criteria of > 0.7 for composite reliability and Cronbach's alpha. Therefore, it can be concluded that the measures used in this study have passed the reliability test. The following Table 6 presents the path analysis in hypothesis testing:

Table 6. Hypothesis Testing

Path	Original sample (O)	Sample mean (M)	Standar Deviasi (STDEV)	t-value	p-value
Relative advantage -> Mobile Payment Adoption	0.14	0.15	0.06	2.24	0.03***
Compatibility -> Mobile Payment Adoption	0.31	0.30	0.07	4.46	0.00***
Innovativeness -> Mobile Payment Adoption	0.14	0.14	0.05	2.58	0.01***
Mobile payment knowledge -> Mobile Payment Adoption	0.03	0.03	0.08	0.33	0.74
Competitive pressure -> Mobile Payment Adoption	0.38	0.38	0.13	2.86	0.00***
External support -> Mobile Payment Adoption	(0.13)	(0.13)	0.12	1.01	0.31
Mobile Payment Adoption -> Firm Performance	0.56	0.56	0.05	11.07	0.00***

Significant at 5%

The results from the bootstrapping resampling tests indicate that the relative advantage variable positively influences mobile payment adoption (H1 supported). With a coefficient path value of 0.141 and a t-statistic of 2.240, the significance is evident as the p-value of 0.026 is < 0.05. Similarly, the compatibility variable demonstrates a significant positive effect on mobile payment adoption (H2 supported). The coefficient parameter value is 0.381, with a t-statistic of 2.865 and a p-value of 0.004, < 0.05, affirming the impact of compatibility on mobile payment adoption. The innovativeness variable, with a coefficient parameter value of 0.145, a t-statistic of 2.583, and a p-value of 0.010, supports H3, highlighting its positive and significant influence on mobile payment adoption.

However, the mobile payment knowledge variable (H4) does not exhibit a significant effect, with a coefficient parameter value of 0.027, a t-statistic of 0.332 (< 1.96), and a p-value of 0.740 (> 0.05). Competitive pressure (H5) positively and significantly influences mobile payment adoption, with a coefficient parameter value of 0.381, a t-statistic of 2.865, and a p-value of 0.004. In contrast, external support (H6) does not exert a significant effect, as indicated by a coefficient parameter value of -0.130, a t-statistic of 1.008 (< 1.96), and a p-value of 0.314 (> 0.05). Finally, the mobile payment adoption variable (H7) has a substantial positive impact on firm performance, supported by a coefficient parameter value of 0.561, a t-statistic of 11.076, and a p-value of 0.000 (< 0.05).

Relative advantage to mobile payment adoption

In the context of technology, precisely the Relative Advantage factor, the t-statistic value of 2.240 and a p-value of 0.026 indicate a positive influence on mobile payment adoption. This finding aligns with previous research (Mahakittikun et al., 2020; Qalati et al., 2021; Maroufkhani et al., 2020), stating that benefits such as cost savings, risk minimization, and a smooth process

drive merchants to use mobile payments. Rogers' Diffusion of Innovation (DOI) theory (2003) emphasizes a positive relationship between Relative Advantage and mobile payment adoption, particularly in enhancing performance and efficiency with time savings. A descriptive analysis of the Relative Advantage variable indicates that MSMEs in Surakarta City have a high advantage in adopting mobile payment technology. SME merchants in Surakarta City, experiencing a high Relative Advantage, can enhance their business performance through effectiveness and time savings, fostering sustained adoption of mobile payments in their operations. This conclusion underscores the significance of perceived advantages in driving the adoption of mobile payment technology among MSMEs.

Compatibility to mobile payment adoption

Compatibility, with a t-statistic value of 2.865 (> 1.96) and a p-value of 0.004 (< 0.05), significantly influences mobile payment adoption among MSMEs in Surakarta City. This finding aligns with previous studies (Mahakittikun et al., 2020; Setiyani & Yeny Rostiani, 2021; Yadegaridehkordi et al., 2019; Khan & Ali, 2018), emphasizing that a high level of compatibility with mobile payment adoption influences its continued use among merchants. When companies perceive mobile payment as highly compatible with their existing payment systems and business lifestyle, they will continue using it, benefiting their business performance.

Based on Rogers' Diffusion of Innovation (DOI) theory (2003), characteristics in adopting technology measure the relationship between Compatibility and mobile payment adoption, driving consistent decisions to adopt new technology systems in business. This, in turn, can enhance the performance of MSMEs adopting mobile payment systems. Descriptive analysis of the Compatibility variable's indicators, answered by respondents, ranges from 34.7 to 37.2 in the "strongly agree" category and from 9.5 to 19.1 in the "neutral" category. This suggests that MSMEs in Surakarta City are highly compatible with mobile payment technology. The high compatibility value during the adoption of mobile payment systems can lead MSMEs in Surakarta City to use this technological adoption consistently. They perceive the technology as compatible with their business, contributing to improved performance.

Innovativeness to mobile payment adoption

Innovativeness, evidenced by a t-statistic value of 2.583 and a p-value of 0.010 (where t-statistic > 1.96 and p-value < 0.05), is deemed influential, signifying a positive impact on mobile payment adoption. This outcome aligns with previous research conducted by Beyhan Yasar et al. (2019), indicating that continuous innovation can lead to remarkable results for a company. Consequently, when a business actively embraces innovation, it enhances its overall performance.

Drawing on Rogers' Diffusion of Innovation (DOI) theory (2003), the connection between innovativeness and mobile payment adoption is characterized by introducing new ideas, practices, or objects perceived as novel by individuals embracing mobile payment technology. The introduction of an innovation by a business, previously unexplored, sets it apart and contributes to improved business performance. As responded to by survey participants, a descriptive analysis of the Innovativeness variable's indicators falls within the range of 57.3 to 64.8, categorized as "agree," with a secondary range of 10.6 to 22.1, indicating a "neutral" stance. This suggests that Small and Medium Enterprises (MSMEs) in Surakarta City exhibit a high degree of innovativeness in their adoption of mobile payment technology. Therefore, a high level of innovativeness among MSMEs in Surakarta City, as they adopt mobile payment solutions, is likely to contribute positively to their business performance. Additionally, it implies that these MSMEs may actively seek and implement innovations to enhance their business operations further. As such, the level of innovativeness among MSMEs in Surakarta City is of substantial significance.

Mobile payment knowledge to mobile payment adoption

Mobile payment knowledge, with a t-statistic of 0.332 and a p-value of 0.740, does not significantly impact its adoption among MSMEs in Surakarta City. This aligns with Schillewaert et al.'s (2005) finding that knowledge about technological innovation only sometimes drives its adoption in small businesses. Typically, MSMEs need formal training to adopt technology based on personal assessments. In the TOE framework by Tornatzky (1990), higher owner knowledge correlates with better tech proficiency, while lower knowledge implies operational challenges. The analysis of respondent answers indicates diverse mobile payment knowledge (5.5 in "strongly disagree," 5 in "disagree," and 15.1 in "neutral"). MSMEs in Surakarta City rely on self-assessment and pre-existing knowledge, regardless of educational qualifications, to navigate mobile payment adoption effectively.

Competitive pressure and mobile payment adoption

Competitive pressure significantly influences mobile payment adoption (t-statistic=2.865, p-value=0.004). This aligns with studies emphasizing the need for innovation in a competitive market. MSMEs face pressure to adopt technology crucial for improved performance, faster transactions, and customer satisfaction. This pressure arises as businesses observe competitors embracing new technologies. The descriptive analysis indicates high competitive pressure (46.7-48.2 in agree, 15.6-19.1 in neutral), urging MSMEs in Surakarta City to adopt mobile payment for enhanced competitiveness and business performance. This aligns with studies by Mahakittikun et al. (2020) and Kwabena et al. (2021), emphasizing that a competitive environment drives improved performance, faster transactions, and higher customer satisfaction. Adopting innovation becomes crucial for staying competitive in a rapidly evolving market. Pressure arises when businesses observe their competitors embracing new technologies.

External support to mobile payment adoption

A descriptive analysis shows that MSMEs in Surakarta City need more external support to adopt mobile payments. Respondents lack strong support, with scores ranging from 19.6-27.1 in agreement and 14.6-24.6 in neutrality. The variable's t-statistic (1.008) and p-values (0.314) suggest that external support does not significantly influence mobile payment adoption among SME owners in Surakarta City. This aligns with Nair et al.'s (2019) findings, indicating that external support has minimal impact on MSMEs' technology readiness. According to the TOE theory by Tornatzky (1990), substantial external support positively influences SME owners, leading to sustained mobile payment system usage. However, low external support results in a lack of sustained usage. SME owners in Surakarta City, giving low ratings to external support items, believe in independent innovation, seeing mobile payment adoption as a product of their initiatives rather than external pressures.

Mobile payment adoption to firm performance

The study affirms a positive correlation between mobile payment adoption and firm performance, echoing findings from various researchers (Kwabena et al., 2021; Sulistyaningsih & Hanggraeni, 2021; Qalati et al., 2021; Maroufkhani et al., 2022). Descriptive statistics reveal a mean of 12.33, surpassing the median of 12.00. SME owners in Surakarta City express high approval (50.3-58.8 in agreement, 14.1-22.1 in neutrality) for mobile payment adoption, indicating a positive perception. The decision to embrace new ideas significantly enhances efficiency, reduces costs, and allows more time for core business activities. The heightened implementation and understanding of mobile payment adoption among MSMEs in Surakarta City contribute to increased performance. This technological innovation in accounting streamlines transactions and minimizes fraudulent activities, fostering business growth and innovation. In conclusion, integrating mobile payment systems has a transformative impact on MSMEs in Surakarta City, leading to improved efficiency, reduced costs, and enhanced overall business performance.

Conclusion

Several findings provide a comprehensive overview based on the data analysis of MSMEs in Surakarta regarding the impact of the TOE (Technology, Organization, and Environment) Framework on Firm Performance. Firstly, Relative Advantage has proven to impact mobile payment adoption positively. Business owners perceive high benefits from using mobile payment, significantly enhancing efficiency and saving time, thus improving business performance. Secondly, high Compatibility has been shown to affect mobile payment adoption positively. The consistency of MSMEs in using this technology is explained by the perception that mobile payment is compatible with the characteristics of their business, thus positively impacting the overall business performance. Meanwhile, Innovativeness in adopting mobile payment also contributes positively to business performance. MSMEs with high innovation levels tend to create positive business changes, significantly improving performance.

However, Mobile Payment Knowledge has proven to hurt adoption. SME owners tend to rely on their knowledge, regardless of formal education levels, thus not positively influencing mobile payment adoption. Furthermore, Competitive Pressure has a positive impact on mobile payment adoption. MSMEs respond to competitive pressure by adopting new technologies, effectively enhancing their business performance to remain competitive. Regarding External Support, the findings indicate a negative impact on mobile payment adoption. MSMEs tend to believe they can adopt innovation without external pressure from business partners or the government, focusing on innovation as the main driving force.

Finally, Mobile Payment Adoption directly contributes positively to Firm Performance. Adopting mobile payment enhances business performance through features that facilitate transactions and reduce fraud risks, enabling MSMEs to achieve significant performance improvement. Overall, these findings provide a comprehensive overview of how TOE Framework factors contribute to mobile payment adoption and its impact on the business performance of SMEs in Surakarta.

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