The Role of Digital Financial Services on the Performance of MSMES in Indonesia using the Toe Model

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Abstract

Micro, small, and medium enterprises (MSMEs) play an important role in the global economy. A dynamic business environment triggers increasingly fierce competition among MSMEs, requiring owners to actively interact with their internal and external environments. This study utilizes the Technological, Organizational, and Environmental (TOE) characteristics framework to examine the impact of digital financial services (DFS) on MSMEs performances in Indonesia. Empirical investigation is conducted using a closed-ended questionnaire. Data was collected from August 2022 to October 2022, with MSMEs players in Indonesia serving as respondents. Employing quantitative methods, we analyzed 200 responses through structural equation modeling. The findings indicate that the TOE framework has a positive effect on DFS adoption, DFS adoption has a positive effect on MSMEs performances, and DFS adoption mediates the impact of the TOE framework on MSMEs performances. The practical implication of this study is that, in the current digital era, MSMEs should prioritize the implementation of DFS to enhance and maintain their performance.

Keywords: *MSMEs performance, TOE Model, digital financial services.*

Introduction

Globally, in developing countries, the number of MSMEs exceeds 90%, making them a significant component of the gross domestic product (GDP) (Ogundana et al., 2017). In Indonesia, the Ministry of Cooperatives and SMEs has noted a continuous increase in the number of MSMEs, which now accounts for 99.99% of total businesses in the country. In 2021, Indonesian MSMEs contributed 61.97% to the GDP (Data Indonesia, 2022; Kompas, 2022).

The COVID-19 pandemic has had a major impact on the survival of MSMEs in Indonesia, which have historically been the driving force behind the domestic economy and the largest source of employment. A survey conducted by the Indonesian Institute of Sciences (LIPI) revealed that during the pandemic (2019-2020), 94.69% of businesses experienced a decline in sales (LIPI, 2020). The scale of sales decrease varied, with more than a 75% decline reported by 49.01% of ultra-micro businesses, 43.3% of micro businesses, 40% of small businesses, and 45.83% of medium-sized businesses. However, recent research by KoinWorks indicates an improving business climate in Indonesia as COVID-19 cases decreased starting in April 2021. According to the Digital SME Confidence Index Report 2nd Half 2021, the digital SME optimism index increased by 6% from 2.49 to 2.64 (Swa, 2022).

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To promote the globalization of SMEs and facilitate social interaction mechanisms such as collaboration, knowledge sharing, and collective action, the adoption of digital platforms is necessary (Cao & Yu, 2019; Costa et al., 2020). Enabling SME digitalization has become a key policy priority in OECD countries and beyond (OECD, 2021). The Indonesian government is actively encouraging the digital transformation of all aspects of economic activities, particularly in the digital economy sector. In 2020, Indonesia accounted for 41.9% of total digital economic transactions in the Southeast Asian region, amounting to US$ 44 billion, with e-commerce contributing the majority (Republika, 2020).

Technological innovation has revolutionized various sectors, including the financial sector, with digital payment systems emerging as the latest form in many developing countries (Mustapha, 2018). Currently, numerous financial services in Indonesia have transitioned to Digital Financial Services (DFS), also known as branchless banking. DFS refers to payment and financial services that utilize digital technology, such as mobile or web-based platforms, facilitated by third parties. These services include peer-to-peer lending, risk and investment management, crowdfunding, e-wallets, clearing, payment gateways, and settlement services. Digital lending and payment services dominate the DFS landscape in Indonesia (Finantier, 2022), with regulations provided by Bank Indonesia and the Financial Services Authority.

The objective of DFS is to expand access to financial services and facilitate public payments to support economic activities and improve the welfare of individuals or households. MSMEs find DFS appealing due to its user-friendly nature, cost-effectiveness, easy technical management, and the ability to reach a wide consumer base. DFS adoption is growing exponentially among businesses and is considered a key strategy, with various DFS platforms available for companies to choose from. In Tanzania, DFS has created opportunities for financial inclusion, helped develop effective monetary policy frameworks, and opened up new avenues (Kaffenberger et al., 2018). Digital finance can contribute to financial inclusion, making access to financing easier, especially for MSMEs, a significant proportion of which face challenges in securing traditional bank loans (Shofawati, 2019).

Behind the vast opportunities for innovation, Indonesia still faces several challenges in creating a favorable digital economic ecosystem. According to the Global Innovation Index 2021, Indonesia ranks 87th out of 132 countries, experiencing a two-level decline compared to the previous year (DetikEdu, 2022). However, when considering the income level, Indonesia ranks 27th among upper-middle-income countries. This position is significantly lower than China, Bulgaria, and Malaysia, which hold the top three positions. In terms of regional rankings, Indonesia ranks 14th in Southeast Asia, East Asia, and Oceania, with neighboring countries such as Malaysia and Singapore performing better. Developing digital infrastructure, enhancing human resources, and implementing effective regulations are key factors in building a digital economic ecosystem that supports economic recovery across various sectors.

Previous studies have investigated the impact of technological, organizational, and environmental (TOE) factors on SME performance. The TOE framework has been widely used in analyzing the adoption of various innovative technologies and has proven to be valid (Chiu et al., 2017). TOE has also been examined in the context of social media adoption in developing countries, particularly Pakistan, where the lack of government regulations and trust among individuals is common (Ali Qalati et al., 2020). Technological innovation has been found to positively influence environmentally friendly owners and subsequently impact firm performance in Kenya (Chege & Wang, 2020). In Ghana, significant effects of technology, organization, environment, and digital payment system usage on SME performance have been observed (Kwabena et al., 2019). Numerous studies on technological innovation have adopted the TOE model, exploring

areas such as information systems, e-commerce, web services, e-CRM, and cloud computing.

Factors influencing the adoption of digital payment systems include entrepreneur characteristics, usability (Sokobe & Kenyatta, 2015), trust, cost, security, convenience, perceived benefits, IT skills, flexibility (Kabir et al., 2017), behavioral intention to use digital payment systems, and innovation resistance (Sivathanu, 2019). Perceived benefits and perceived ease of use are also key factors. Furthermore, future research can explore the effects of government support on the construction of the environment and examine the mediating effects of digital payment system implementation (Kwabena et al., 2019).

Previous research has examined the role of digital payments and social media as part of DFS, but there is limited research on the impact of DFS on SME performance. Therefore, this study aims to investigate the role of DFS. The article utilizes the Diffusion of Innovation (DOI) theory (Rogers et al., 2003) and the Technological, Organizational, and Environmental (TOE) framework (Tornatzky et al., 1990) to examine the influence of DFS implementation on SME performance in Indonesia. DOI, popularized by American communication theory and sociologist Everett Rogers in 1962, aims to explain the spread of new products, services, or processes through populations or social systems. In other words, the diffusion of innovation explains the speed at which new ideas and technologies are communicated within a culture or society.

Following the suggestion by Kwabena et al. (2021), this study incorporates the role of the government in the environmental construct and examines the mediating role of DFS implementation in the relationship between TOE factors and SME performance. The paper includes methodology, analysis of results, research implications, limitations, and future directions.

Research Method

The population of this study includes all MSMEs players in Indonesia who were supported by business incubator institutions in 2022. According to Roscoe (in Kalnadi, 2013), a minimum sample of 100 is required for data analysis using SEM PLS. The respondents for this study were incidentally determined, resulting in a sample size of 200 people.

This study employs exogenous, endogenous, and mediating (intervening) variables to investigate whether the proposed hypotheses can be accepted or rejected. The variables used in this study are as follows:

1)   Exogenous variables (Xi), which are variables not predicted by other variables in the model, consisting of Technological context (X1), Organizational context (X2), and Environmental context (X3).

2)   Endogenous variables (Yi), which are variables predicted by one or more other variables in the model, consisting of DFS implementation (Y1) and MSMEs performances (Y2).

3)   This study also includes DFS (Y1) as a mediating variable.

Table 1 presents the variables used in this study, along with their operational definitions and indicator variables.

Table 1. Variables, Operational Definitions, and Indicator Variables

No	Variables	Operational Definitions	Indicator Variables	
X1	Technological Context	The technology owned and currently used, as well as the technology available to the organization, including knowledge and processes for developing and adopting technology.	X1.1	IT expertise
			X1.2	Relative advantage
			X1.3	Compatibility
			X1.4	Complexity
			X1.5	Convenience
X2	Organizational Context	The tangible and intangible resources needed by the organization	X2.1	Top management support
			X2.2	Coordination
			X2.3	Training
			X2.4	Organizational structure
			X2.5	Information sharing
X3	Environmental Context	The business environment conditions such as regulations, competition, community support, and government support	X3.1	Regulatory environment
			X3.2	Community encouragement
			X3.3	Competitive pressure
			X3.4	Internet network infrastructure
Y1	Digital Financial Services (DFS)	Financial transaction services utilizing digital technology, such as through smartphones or the web	Y1.1	Perceived ease of use
			Y1.2	Desired benefits
			Y1.3	Behavioral intention
			Y1.4	Actual usage
Y2	MSMEs Performances	The outcomes of MSMEs business activities	Y2.1	Sales level
			Y2.2	Market share
			Y2.3	Profitability

The data source for this research was primary data in the form of perceptions. The variable indicators were measured using a 5-point Likert scale to assess the level of agreement or disagreement of respondents with a statement. Data collection was conducted through an online questionnaire instrument distributed using Google Forms, which had been previously tested for validity and reliability. The survey instrument consisted of two parts. The first part included general information about the respondents, while the second part contained the construct questions used in this study.

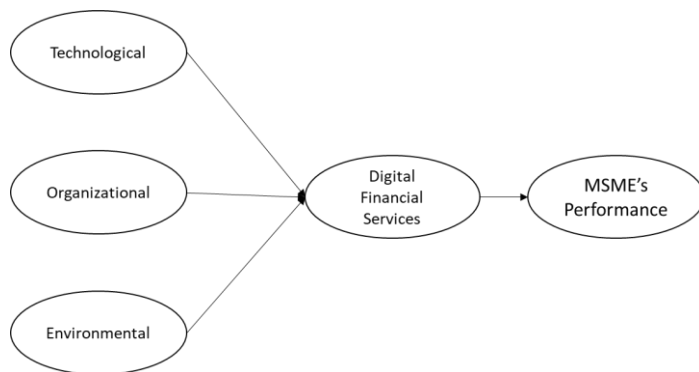The conceptual framework of this study was presented in Figure 1.

Figure 1. Conceptual Framework

This study employed the Partial Least Squares (PLS) analysis technique, which is a variance or component-based structural equation modeling (SEM) analysis. The testing of the structural model was conducted after constructing the relationship model based on the observed data and assessing the overall model fit (goodness-of-fit). The purpose of testing the structural relationship model was to determine the relationships between the latent variables proposed in this study. According to the conceptual framework, testing the relationships and hypotheses between latent variables was done in two stages: (1) hypothesis testing and examination of direct effect coefficients, and (2) hypothesis testing and examination of mediation effect path coefficients.

Results and Discussion

The study examined the characteristics of the respondents, including their domicile, age, gender, business field, business scale, and the application of DFS for payments, loans, and funds. The sample consisted of 200 respondents. The characteristics of the respondents are presented in Table 2.

Table 2. Characteristics of Respondents

No	Characteristics of Respondents		Frequency	Percentage
1	Domicile of MSMEs	Java	78	39%
		Bali	32	16%
		Sumatera	32	16%
		Kalimantan	18	9%
		Sulawesi	26	13%
		West Nusa Tenggara	8	4%
		East Nusa Tenggara	6	3%
2	Age	<30 years	44	22%
		30-35 years	87	44%
		>35-40 years	39	20%
		>40 years	30	15%
3	Gender	Man	128	64%
		Woman	72	36%
4	Business sector	Agriculture	39	20%
		Commerce	46	23%
		Creative Industry	107	54%
		Tourism	8	4%
5	Business Scale	Micro	49	25%
		Small	148	74%
		Medium	3	2%
6	Adoption of DFS for payment	Electronic peyment	99	50%
		E-wallet	143	72%
		Payment Gateway	67	34%
		QR Code Standar Indonesia (QRIS)	124	62%
		Pay later	89	45%
7	Adoption of DFS for loans	P2P lending	73	47%
		Crowdfunding	6	3%
		Digital Bank	0	0%
8	DFS Adoption for Funds	Fund delivery	189	95%
		Remittance	78	39%
		Open API	106	53%
		Identity Verification	15	8%

Source: Primary data processed (2022)

Most of the respondents who own MSMEs are domiciled in Java, with 78 respondents or 39%. Other significant domiciles include Bali, Sumatra, and Sulawesi. In terms of age, the majority of respondents in this study fall into the 30-35 years age group, with 87 respondents or 44%. In terms of gender, the majority of respondents are male, with 128 respondents or 64%. The majority of respondents (74%) are engaged in small-scale businesses. Regarding the industry type, the creative industry sector has the highest number of respondents, with 107 respondents or 54%.

Regarding the adoption of DFS by MSMEs, the data shows that out of 200 respondents, the majority use digital payment services such as e-wallets, with 143 respondents or 62%.

Additionally, 73 respondents or 47% utilize P2P lending services, and 189 respondents or 95% have used DFS for fund transfers.

Descriptive analysis in this study includes measures such as the minimum, maximum, standard deviation, and average values. Table 2 provides a detailed frequency distribution of the respondents' answers for each variable indicator.

Table 2. Frequency Distribution of Respondents' Answers

Items	Frequency					Mean	Category
	1	2	3	4	5		
X1= Technology context							
X1.1	0	48	93	37	22	3.17	High
X1.2	0	9	32	111	48	3.99	High
X1.3	0	18	52	83	47	3.80	High
X1.4	0	9	48	76	67	4.01	Very high
X1.5	0	22	41	63	74	3.95	High
Mean						3.78	High
X2= Organizational context							
X2.1	0	26	60	76	38	3.63	High
X2.2	0	38	100	44	18	3.21	High
X2.3	0	60	105	22	13	2.94	Moderately high
X2.4	0	69	91	22	18	2.95	Moderately high
X2.5	0	27	87	62	24	3.42	High
Mean						3.23	High
X3= Environmental Context							
X3.1	0	38	129	24	9	3.02	High
X3.2	0	36	31	94	39	3.68	High
X3.3	0	38	8	70	84	4.00	High
X3.4	0	78	79	22	21	2.93	Moderately high
Mean						3.41	High
Y1= DFS adoption							
Y1.1	0	9	25	72	94	4.26	Very high
Y1.2	0	11	26	71	92	4.22	Very high
Y1.3	0	15	19	30	136	4.44	Very high
Y1.4	0	30	88	81	1	3.27	High
Mean						4.04	Very high
MSMEs Performance							
Y2.1	0	13	87	78	22	3.55	High
Y2.2	0	28	110	46	16	3.25	High
Y2.3	0	34	124	28	14	3.11	High
Mean						3.30	High

Source: Data processed (2022)

The measurement model (outer model) is evaluated to assess the validity and reliability of the relationship between indicators and their latent variables. This evaluation includes tests for convergent validity, discriminant validity, and reliability.

Table 3. Validity and Reliability Test Results

Description	Criteria	Result	Conclusion
Convergent validity test	Indicators are said to be valid if their value is greater than 0.70	All indicator variables have a loading factor value above 0.70.	Valid
Discriminant validity test	The Average Variance Extraction (AVE) value is said to be good if it is greater	The AVE value of all research variables is above 0.50 and the root AVE value is higher than	Valid

	than 0.50 and the correlation between variables is smaller than the AVE root.	the correlation between variables	
Reliability test	Cronbach's alpha and composite reliability values should be greater than 0.70.	Each variable has a Cronbach's alpha and composite reliability value above 0.70.	Reliable

Source: Data processed (2022)

The proposed model represents the relationships between latent variables, known as inner relationships, to examine the nature and strength of the influence of independent latent variables on dependent latent variables. This testing process involves two stages: 1) the determination coefficient test (R^2) to assess the extent to which the independent latent variable explains the variance in the dependent latent variable, and 2) hypothesis testing, specifically examining the hypotheses of the research model.

Table 4. Determinant Coefficient R Square (R^2)

	Original R^2 Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-statistic (|O/STDEV|)	P value
Y1. DFS	0,486	0,494	0,058	8,348	0,000
Y2. MSMEs performance	0,553	0,561	0,046	11,900	0,000

Source: Data processed (2022)

According to Table 4, the TOE variable has a significant impact on DFS, as indicated by an R^2 value of 0,486. This means that 48,6 percent of the variation in DFS can be explained by variations in TOE. Furthermore, both TOE and DFS significantly affect MSMEs performance, with an R^2 value of 0,553. This indicates that 55,3 percent of the variation in MSMEs performance can be attributed to TOE and DFS.

The Q^2 calculation results are as follows: $Q^2 = 1 - (1 - R1^2)(1 - R2^2) = 1 - (1 - 0,486)(1 - 0,553) = 0,770$. Since the value is greater than 0, it demonstrates that the exogenous latent variables serve as suitable explanatory variables capable of predicting endogenous variables, specifically financial conditions. In other words, this model exhibits good predictive relevance.

The path coefficient values and corresponding p-values are presented in Table 5, reflecting the results of the structural equation analysis.

Table 5. Path Coefficient Value and P-Value

Variable	Coefficient	P-Value	Conclusion
Direct Effect			
X1.TC → Y1.DFS	0,381	0,000	Significant
X1.TC → Y2.MSMEs	0,142	0,005	Significant
X2.OC → Y1.DFS	0,184	0,004	Significant
X2.OC → Y2.MSMEs	0,318	0,000	Significant
X3.EC → Y1.DFS	0,272	0,001	Significant
X3.EC → Y2.MSMEs	0,231	0,000	Significant
Y1.DFS → Y2.MSMEs	0,215	0,001	Significant
Indirect Effect			
X1.TC → Y1.DFS → Y2.MSMEs	0,082	0,003	Significant
X2.OC → Y1.DFS → Y2.MSMEs	0,040	0,032	Significant
X3.EC → Y1.DFS → Y2.MSMEs	0,059	0,017	Significant

Source: Data processed (2022)

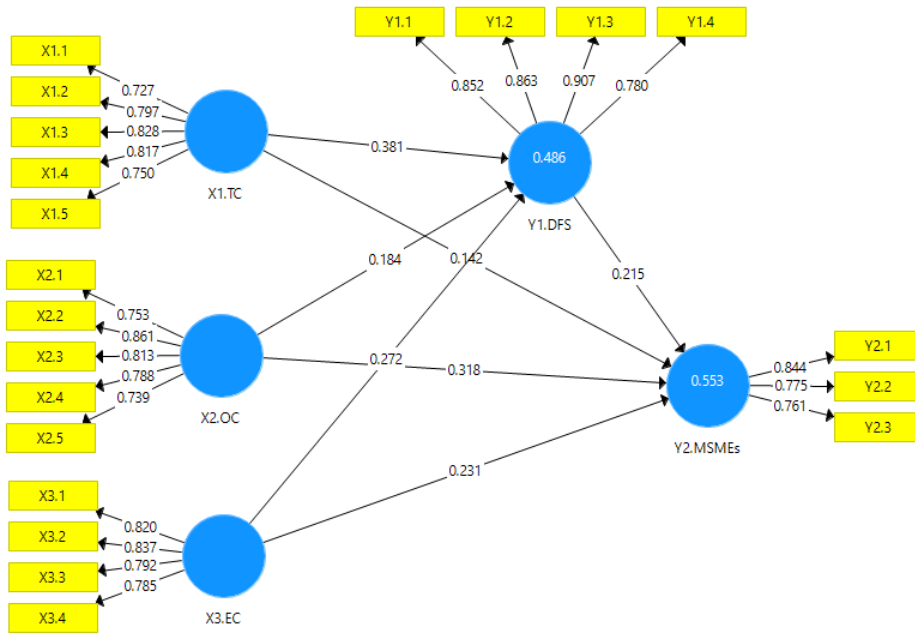The results of the structural equation are as follows:

Figure 2. Results of the Path Coefficient Calculation of the Research Model (Coefficient Value)
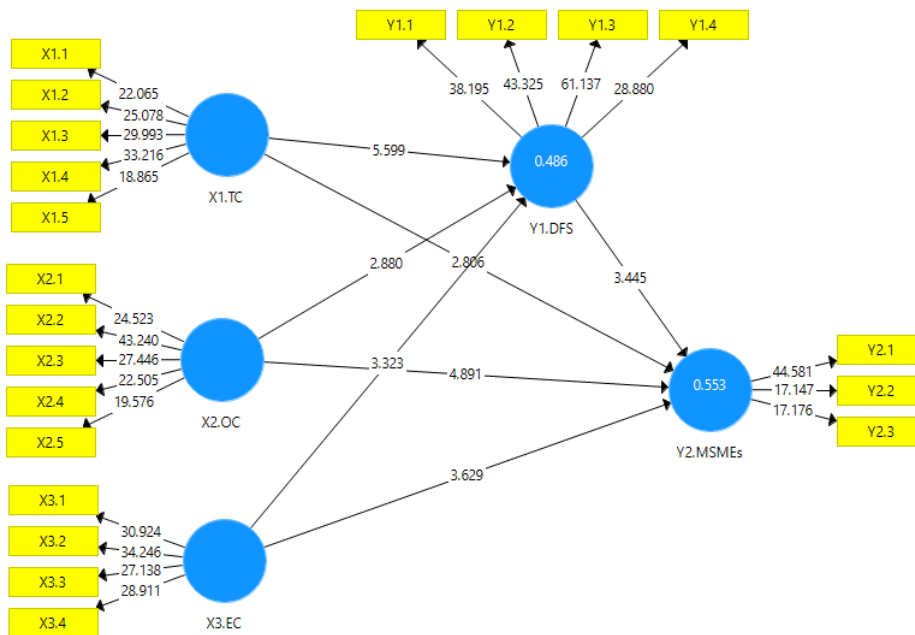

Figure 3. Calculation Results of the Research Model Path Coefficient (T Statistical Value)

The results of the direct effect hypothesis test are explained below. A significant effect is indicated when the significance value is below 0.05.

H1: Technological context has a positive and significant effect on DFS adoption.

Technological context has a significant effect on DFS adoption, with a coefficient of 0.381 and a p-value of 0.000, indicating a significance value smaller than 0.05. The positive coefficient value suggests that the technological context variable positively influences the adoption of DFS. This means that as the technological context improves, the adoption of DFS also improves, and vice versa. The test results confirm the correctness of hypothesis 1, which states that the technological context significantly affects the adoption of DFS.

H2: Technological context has a positive and significant effect on MSMEs performance

Technological context has a significant effect on MSMEs performance, with a coefficient of 0.142 and a p-value of 0.005, indicating a significance value smaller than 0.05. The positive coefficient value indicates that the technological context variable positively influences MSMEs performance. This implies that a better technological context leads to higher MSMEs performance, while a lower technological context results in lower MSMEs performance. The test results support the correctness of hypothesis 2, which states that the technological context has a positive and significant effect on MSMEs performance.

H3: Organizational context has a positive and significant effect on DFS adoption

Organizational context has a significant effect on DFS adoption, with a coefficient of 0.184 and a p-value of 0.004, indicating a significance value smaller than 0.05. The positive coefficient value suggests that the organizational context variable positively affects the adoption of DFS. This means that as the organizational context improves, the adoption of DFS also increases, while a lower organizational context leads to lower DFS adoption. The test results validate the correctness of hypothesis 3, which states that the organizational context significantly influences DFS adoption.

H4: Organizational context has a positive and significant effect on MSMEs performance

Organizational context has a significant effect on MSMEs performance, with a coefficient of 0.318 and a p-value of 0.000, indicating a significance value smaller than 0.05. The positive coefficient value indicates that the organizational context variable positively influences MSMEs performance. This implies that a better organizational context results in higher MSMEs performance, while a lower organizational context leads to lower MSMEs performance. The test results support the correctness of hypothesis 4, which states that the organizational context has a positive and significant effect on MSMEs performance.

H5: Environmental context has a positive and significant effect on DFS adoption

Environmental context has a significant effect on DFS adoption, with a coefficient of 0.272 and a p-value of 0.001, indicating a significance value smaller than 0.05. The positive coefficient value suggests that the environmental context variable positively influences the adoption of DFS. This means that as the environmental context improves, the adoption of DFS also increases, while a lower environmental context leads to lower DFS adoption. The test results confirm the correctness of hypothesis 5, which states that the environmental context significantly affects the adoption of DFS.

H6: Environmental context has a positive and significant effect on MSMEs performance

Environmental context has a significant effect on MSMEs performance, with a coefficient of 0.231 and a p-value of 0.000, indicating a significance value smaller than 0.05. The positive coefficient value indicates that the environmental context variable positively influences MSMEs performance. This means that a better environmental context leads to higher MSMEs performance, while a lower environmental context results in lower MSMEs performance. The test results support the correctness of hypothesis 6, which states that the environmental context has a positive and significant effect on MSMEs performance.

 H7: DFS adoption has a positive and significant effect on MSMEs performance

DFS adoption has a significant effect on MSMEs performance, with a coefficient of 0.215 and a p-value of 0.001, indicating a significance value smaller than 0.05. The positive coefficient value suggests that the adoption of DFS has a positive effect on MSMEs performance. This means that a higher DFS adoption leads to higher MSMEs performance, while a lower DFS adoption results in lower MSMEs performance. The test

results support the correctness of hypothesis 7, which states that the application of DFS has a positive and significant effect on MSMEs performance.

The following is an explanation of the results of the indirect effect hypothesis test, where there is a significant effect if the significance value is below 0.05.

H8: DFS adoption mediates the effect of technological context on MSMEs performance

Technological context has a significant effect on MSMEs performance mediated by DFS adoption, with a coefficient of 0.082 and a p-value of 0.003, indicating a significance value smaller than 0.05. The positive coefficient value suggests positive mediation, meaning that the technological context variable has a positive influence on the DFS adoption variable, which in turn has a positive effect on MSMEs performance. The test results confirm the correctness of hypothesis 8, which states that DFS adoption mediates the effect of technological context on MSMEs performance.

H9: DFS adoption mediates the effect of organizational context on MSMEs performance

Organizational context has a significant effect on MSMEs performance mediated by DFS adoption, with a coefficient of 0.040 and a p-value of 0.032, indicating a significance value smaller than 0.05. The positive coefficient value suggests positive mediation, indicating that the organizational context variable has a positive influence on the DFS adoption variable, which indirectly has a positive effect on MSMEs performance. The test results support the correctness of hypothesis 9, which states that DFS adoption mediates the effect of organizational context on MSMEs performance.

H10: DFS adoption mediates the effect of environmental context on MSMEs performance

Environmental context has a significant effect on MSMEs performance mediated by DFS adoption, with a coefficient of 0.059 and a p-value of 0.017, indicating a significance value smaller than 0.05. The positive coefficient value suggests positive mediation, meaning that the environmental context variable has a positive influence on DFS adoption, which indirectly has a positive effect on MSMEs performance. The test results validate the correctness of hypothesis 10, which states that DFS adoption mediates the effect of environmental context on MSMEs performance.

Discussion

Based on the characteristics of the respondents presented in Table 2, it is evident that Indonesian MSMEs have embraced various types of DFS (Digital Financial Services). Among these services, funding services and e-wallets are the most widely used, with 72% of 200 respondents utilizing them, followed by the QR Code Indonesian Standard (QRIS) with 62% of respondents using it. For funding purposes, P2P Lending services are the most prevalent, being used by 73 respondents or 47%. Additionally, 189 respondents, accounting for 95% of the total, have employed DFS for fund transfers.

Chaffey et al. (2019) state that MSMEs in developing countries must transition from paper-based payment systems to digital payment systems to compete with multinational companies both domestically and internationally. The technological context variables, which include the technology owned and utilized by the organizations, as well as the available technology including knowledge and processes for technology development and adoption, exhibit high average values, indicating a strong presence of technology. Despite the perceived complexity of technology, its ease of use encourages widespread adoption of DFS. MSMEs, in an effort to adapt quickly to digital technology, are inclined to adopt DFS.

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Most indicators of organizational and environmental context variables also demonstrate high average values. MSMEs are making internal organizational adjustments to adapt to the changing external demands brought about by digitalization. This reflects the positive response of MSMEs to the Indonesian government's "UMKM Go Digital" program. MSMEs recognize the necessity of DFS adoption for their survival. The government's role as an indicator of the environmental context, according to MSMEs perception, shows that the government has provided support for the digitalization of MSMEs. This support may include enhancing digital technology skills and improving internet network infrastructure to facilitate the use of DFS.

The mastery of technology and high adoption of DFS by MSMEs are expected to enhance financial inclusion. This aligns with Shofawati's (2010) assertion that digital finance promotes financial inclusion, making access to financing easier, particularly for unbankable MSMEs. Furthermore, it assists the government in developing an effective and future-oriented monetary policy framework (Kaffenberger et al., 2018).

The direct effect test reveals that the Technological-Organizational-Environmental (TOE) framework has a positive influence on DFS adoption. As the TOE factors increase, so does the adoption of DFS, and conversely, as the TOE factors decrease, the adoption of DFS also declines. Similarly, the TOE framework has a direct positive effect on MSMEs performance. With an increase in the TOE factors, MSMEs performance improves, whereas a decrease in the TOE factors results in lower MSMEs performance.

The findings of the direct effect test support previous studies that highlight the significant impact of technology, organization, environment, and the use of digital payment systems on SME performance in different contexts, such as Ghana (Kwabena et al., 2019), Kenya (Awinja & Fatoki, 2021), and the positive influence of digital finance on financial performance (Daud et al., 2022). Additionally, the study corroborates the positive impact of green technology innovation on the performance of business owners in Kenya (Chege & Wang, 2019).

The indirect effect test demonstrates that the TOE framework has a positive and significant effect on MSMEs performance through the mediation of DFS adoption. DFS plays a crucial role in mediating the influence of TOE factors on MSMEs performance. In today's digital era, MSMEs would face significant challenges in competing and enhancing their performance without embracing DFS.

Overall, this study provides a foundation for understanding the configuration of the TOE framework's direct and indirect effects on MSMEs performance through DFS adoption. The study also demonstrates the effectiveness of the TOE framework and DOI Theory in exploring the factors influencing the acceptance of technological innovation.

Research Implications

1)   This study confirms the effectiveness of the TOE Framework and DOI Theory in understanding the factors that influence the acceptance of technological innovation.

2)   The practical implication of this study is that MSMEs in the digital era should prioritize the implementation of DFS to enhance and maintain their performance.

Research Findings

Based on the results of data analysis, theoretical insights, and empirical studies, the key findings of this study are as follows:

1)   This study provides insights into the configuration of the TOE framework in modeling the direct and indirect effects on MSMEs performance through DFS.

2)   Empirical evidence supports the notion that DFS aims to enhance access to financial services and public payments, thereby supporting economic activities and improving individual or household welfare.

3)   The adoption of DFS plays a significant mediating role in the relationship between the TOE framework and MSMEs performance.

Research Limitations

This research has made significant efforts to address the following limitations:

1)   The data analysis in this study is based on cross-sectional survey data, representing a snapshot of the business environment at a specific time. Given the dynamic nature of the business environment, further research is needed to explore how changes in variables may affect the relationships examined in this study.

2)   The study's respondents were limited to MSMEs nurtured by the Business Incubator Institute, primarily consisting of startups aged 1 to 3 years. It is recommended to expand the research scope to include established MSMEs and those not associated with business incubation.

Conclusion

Based on the research findings, it can be concluded that: 1) The TOE framework positively influences DFS adoption; 2) DFS adoption positively impacts MSMEs performance; and 3) DFS mediates the relationship between the TOE framework and MSMEs performance. In the digital era, MSMEs should prioritize the implementation of DFS to enhance their performance. Furthermore, the study affirms the effectiveness of the TOE Framework and DOI Theory in understanding the factors influencing the acceptance of technological innovation. To promote DFS adoption, MSMEs owners are advised to provide technology adoption training to employees and adjust the organizational structure accordingly.

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