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Digital Financial Literacy As an Antecedent to Financial Inclusion and MSME Performance

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ABSTRACT

MSMEs experience various vulnerabilities that emphasize the importance of government digital onboarding programs as part of financial inclusion. To address these challenges, it is crucial to understand the role of digital financial literacy in enhancing access to financial services and improving business performance. This study investigates the influence of digital financial literacy on financial inclusion and MSME performance, with a focus on digital finance adoption and access as key of financial inclusion. Employing a quantitative research approach, the study surveyed 400 MSMEs in East Java, Indonesia, using a structured questionnaire and purposive sampling technique. Descriptive statistical analysis was conducted to outline the characteristics of the data. To explore the relationships among the variables, Partial Least Squares Structural Equation Modeling (PLS-SEM) was utilized with WarpPLS software. The analysis reveals that digital financial literacy significantly impacts digital finance adoption, which, in turn, enhances MSME performance. However, access to digital finance, while positively associated with digital finance adoption, does not show a significant direct impact on MSME performance. The results highlight the need for targeted educational programs to boost digital financial literacy among MSMEs, ensuring that digital financial tools are effectively utilized to foster business growth and financial inclusion.

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Introduction

The COVID-19 pandemic has left a lasting negative impact, with approximately 82.9% of MSMEs experiencing significant losses and growth challenges [1]. In response, the Indonesian government launched various economic recovery acceleration programs, one of which is the digitally onboarding program [2]. Digitally onboarding refers to integrating businesses into the digital ecosystem, allowing MSMEs to leverage available digital spaces, such as through the adoption of digital finance. Several previous studies have shown that digital finance adoption can enhance operational efficiency [3], create added value for stakeholders, and improve sales growth and financial performance [4]; [5]; [6].

Digital finance adoption is also linked to increased financial inclusion [7], which is believed to be an effective tool for reducing poverty and improving well-being, as it expands access to financial services for individuals and businesses [8]; [9], providing them with greater opportunities to enhance productivity [10]; [7]. However, the phenomenon of "negative financial inclusion" can arise when access to financial services is not accompanied by the ability to utilize them optimally, potentially leading to stagnation or even a decline in business performance [11], [12]. In this context, digital financial literacy is believed to be crucial in facilitating digital finance adoption and is seen as an important antecedent in optimizing the use of digital financial technology [13]; [14]; [15]; [16]. Research on the role of digital financial literacy in influencing digital financial technology adoption and its impact on MSME performance is essential to promote digital financial literacy [17] and to mitigate the risks of negative financial inclusion that could hinder the economic recovery of MSMEs post-pandemic.

While digitalization in the MSME sector is considered a strategic solution for accelerating economic recovery, focusing research specifically on MSMEs is critical because of their significant role in the economy of many countries [18]. MSMEs are a crucial part of the economic structure, especially in developing countries like Indonesia, where they

contribute 60.5% to the national Gross Domestic Product (GDP) [1]. The effectiveness of digitalization implementation is heavily influenced by regional contexts and the technological readiness of each area. East Java has been selected as the study location due to its highest rate of digital technology adoption nationally [19] making it an ideal environment for examining the impact of digital financial inclusion on MSME performance. East Java also has a large and diverse population of MSMEs, providing broader insights into how businesses in the region utilize digital technologies to support their operations. Thus, East Java serves as an appropriate setting to explore the relationship between digital financial literacy, digital finance adoption, and MSME performance, while understanding how digitalization can be optimized to support post-pandemic economic recovery.

This study evaluates the influence of four main variables: digital financial literacy, access to digital finance, digital finance adoption, and business performance. In the proposed model, digital financial literacy serves as an antecedent that affects the ability of business owners to understand and effectively use digital financial services. In financial inclusion, two dimensions are frequently used for measurement: digital finance adoption and access to digital finance [9]; [13]; [20]. Access to digital finance acts as a critical factor that determines the extent to which financial literacy leads to meaningful adoption, which in turn is expected to have a positive impact on MSME performance. Access to digital finance can be assessed through several dimensions: the availability of digital financial services, proximity to financial services, and the abundance of digital platforms [21].

Hence, digital financial inclusion for MSMEs means that they have broader access to support their business processes, obtain financing for working capital, and improve their business capacity [10], all of which are linked to business performance [21]; [22]; [23]; [24]. The relationship between digital financial literacy and digital finance adoption is supported by Social Cognitive Theory (SCT), which suggests that learning occurs through selective observation, involving the observation and modeling of existing behaviors [25]. Meanwhile, the relationship between access to digital finance and digital finance adoption can be

explained through Dynamic Capabilities Theory (DCT), which posits that continuously changing environments challenge businesses to adapt and turn these changes into competitive advantages [26]; [27]. Additionally, the relationship between digital finance adoption and MSME performance is framed within Resource-Based Theory (RBT), as other studies have used it in the context of digital transformation [27]; [21]. These theories provide a foundation for understanding the dynamics between the variables in the context of MSME digitalization.

Several conclusions remain unintegrated from the existing literature on financial inclusion, digital finance adoption, and MSME performance. Although financial inclusion, represented by digital finance adoption and access to financial services, is believed to significantly influence MSME performance, stronger empirical evidence is needed to support these claims. Research by Eton et al. (2021) found a significant but weak relationship between financial inclusion and MSME growth, with financial inclusion contributing only about 12.8% to MSME growth. Eton suggested that other factors, such as limited education regarding access to digital finance and the high associated costs, may hinder the effectiveness of financial inclusion [10]. This aligns with the findings of Morgan & Pontines, who also highlighted the potential negative impacts of financial inclusion [11]. On the other hand, digital finance tools, such as financial management applications, can create operational efficiencies [3], thereby reducing operational costs [28]. Furthermore, recent studies emphasize the importance of financial literacy as a key driver of financial inclusion and financial resilience [29]; [16]. In fact, financial literacy has been identified as one of the most critical factors influencing business performance [14]. Meanwhile, digital financial innovations have been found to positively impact business performance [30]; [31], particularly in terms of sales growth, pre-tax profit, cash flow, and stakeholder value [4]. Overall, the adoption of digital finance and digital payment methods has the potential to significantly improve business performance [32].

Based on these findings, this study seeks to integrate these variables into a model to test their relationships. It fills the existing gap by specifically evaluating the role of digital financial literacy as an antecedent variable that influences digital finance adoption while including access to digital finance, both of which represent financial inclusion. The study will then assess the impact of digital finance adoption on MSME performance to ensure that digital adoption is followed by business performance growth. This research is specifically conducted in East Java, Indonesia, to provide new insights into financial inclusion in developing countries. The novelty of this study lies in its focus on combining three theoretical perspectives—SCT, DCT, and RBT—to explain the relationships between the variables, including the incorporation of digital financial literacy, which is increasingly necessary amid the growing digital financial innovation landscape [33]; [34]. The results of this study are expected to offer deeper insights into the importance of digital financial literacy and the adoption of financial technology in supporting the sustainability and performance improvement of MSMEs in the digital era. The primary objective of this research is to provide strategic recommendations for the government and MSME actors to optimize digital financial technologies for improving business performance.

Digital Financial Literacy and Digital Finance Adoption

Social Cognitive Theory (SCT) underpins the relationship between digital financial literacy and digital finance adoption. This theory, proposed by Bandura in 1986, is an extension of Social Learning Theory (SLT). According to Bandura, learning occurs through selective observation, which involves observing and then considering existing behavioral models [25]. Bandura refers to this as a cognitive process supported by knowledge, which provides the substance and operations needed for cognitive problem-solving [35].

Digital financial literacy plays a crucial role as a foundation in the process of digital transformation [36] and is considered a key antecedent to the adoption of digital finance. Digital financial literacy refers to traditional financial literacy enhanced by digital elements [37] and should be integrated into the broader concept of financial literacy [29]. Digital

financial literacy encompasses four key components: digital financial knowledge, digital financial experience, digital financial risk awareness, and digital financial skills [38]; [39]; [17]. Digital financial literacy is directly linked to financial management capabilities, technology utilization, and strategic handling of financial assets [21]. This perspective aligns with the notion that digital financial literacy influences individual behavior and access to technology through decision-making processes, such as technology adoption [21]; [38]; [33]; [29]; [37] and financial inclusion [40]; [41]; [42]. This is because digital financial literacy has a direct impact on an individual's financial behavior [33]; [43], [16]; [44]. In the SME context, digital financial literacy becomes a significant asset, contributing to their capacity to leverage the benefits of the digital financial revolution by becoming familiar with and utilizing various digital financial services available. H1: Digital financial literacy has a positive and significant effect on digital finance adoption.

Access to Digital Finance and Digital Finance Adoption

The Dynamic Capabilities Theory (DCT) serves as the theoretical foundation for the relationship between access to digital finance and digital finance adoption. According to this theory, the constantly changing and dynamic environment challenges businesses to adapt and transform these changes into competitive advantages [26]; [27]. This perspective explains how companies can adapt to rapidly changing climates and create new business value by integrating, building, and reconfiguring internal and external resources. Digital finance adoption can be seen as an internal resource for businesses as a result of their ability to adapt to environmental changes. H2: Access to digital finance has a positive and significant effect on digital finance adoption.

Digital Finance Adoption and Business Performance

Digital finance adoption can be considered an internal resource for businesses, reflecting their adaptability to environmental changes. It can also provide a competitive advantage that ultimately enhances the performance of MSMEs. RBT has frequently been associated with digital transformation [27]; [21]. This theory argues that resources are the

most critical factors in improving business performance and maintaining high competitiveness [45]. Wernerfelt highlighted technology as one of the company's resources that can improve business performance. By combining these resources with organizational processes and characteristics, companies can achieve their corporate strategies.

Business performance is a critical indicator of a company's success or failure [30]. It reflects the extent to which a company achieves its objectives [31], influenced by both internal and external factors [30]. Business performance can be measured using a variety of financial and non-financial metrics. Business performance is assessed through capital expenditure, revenue growth, and cost of production [21] net sales and labor productivity [31], financial and operational performance [22], further emphasizing the multidimensional nature of business performance. According to RBT, these resources are aspects of the business that influence profitability, growth, and overall performance. The resources must be valuable, rare, and difficult to replicate [21]. In this study, RBT underpins the relationship between digital finance adoption, access to digital finance, and MSME performance. H3: Digital finance adoption has a positive and significant effect on MSME performance.

Method

This study was conducted on MSMEs in East Java Province. Respondents were selected using a purposive consecutive sampling technique, which determines the number of respondents based on the data collection period. The data collection was scheduled for March-April 2024, in line with the research timeline. Specific criteria were established to ensure that the respondents met the research requirements, including MSMEs based in East Java that use one or more digital financial technologies in their business operations. These digital financial technologies include accepting and making payments using e-money, using marketplaces or e-commerce for business operations, employing budgeting or e-accounting applications, and utilizing other digital financial services for financing, insurance, and more. Participation in the study was voluntary, with respondents agreeing to take part. Prior to data collection, respondents were given a comprehensive explanation of the research objectives,

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their rights as participants, and assurances regarding the confidentiality of their personal data. Out of 408 data entries received, 400 respondents completed the questionnaire fully, and this data was used for further analysis.

The survey instrument used was a questionnaire with a 5-point Likert scale, where 1 indicated "strongly disagree" and 5 indicated "strongly agree." The distributed questionnaire comprised five sections: survey background, participation consent, respondent criteria confirmation, business and respondent information, and statements used to measure the variables in the study. This study measures four main variables: digital financial literacy, digital finance adoption, access to digital finance, and MSME performance. The variables, indicators, and items used in this study are detailed in Table 1. The data were analyzed descriptively and inferentially. The analysis was conducted using SEM-PLS with WarpPLS software. The initial phase of the PLS analysis involved the measurement model to evaluate the validity and reliability of constructs, both 1st order and 2nd order. Subsequently, the structural model was evaluated to examine the relationships between latent constructs within the structural model. This phase included hypothesis testing or the examination of relationships between latent constructs forming the structural model.

Table 1. Variable Operational Definitions

Variable	Dimension	Indicator	Ref
Digital Financial Literacy (DFL)	Digital Financial Knowledge (DFK)	Knowledge of digital payment product (DFK_1) Knowledge of marketplace or e-commerce (DFK_2) Knowledge of digital financial technology for budgeting or recording financial transactions (DFK_3) Knowledge about digital financial technology that can be used to obtain business capital loans (DFK_4) Knowledge of customer rights and protection (DFK_5)	[38]; [39]; [17]

	Digital Financial Experience (DFE)	Experience using digital financial products for making online payments (DFE_1)	
		Experience using marketplace or e-commerce (DFE_2)	
		Experience using digital financial technology for budgeting or recording financial transactions (DFE_3)	
		Experience using online financial applications that can be used to obtain business capital loans (DFE_4)	
	Digital Financial Risk Awareness (DFR)	Awareness of security risks in using DFS (DFR_1)	
		Awareness of digital footprint risks in using DFS (DFR_2)	
		Awareness of the risk of possible fund loss due to overborrowing (DFR_3)	
		Awareness of agreed digital contracts (DFR_4)	
	Digital Financial Skills (DFSL)	Skill in making online payments using digital payment products ($DFSL_1$)	
		Skill in utilizing marketplaces or e-commerce ($DFSL_2$)	
		Skill in creating budgets or recording financial transactions using digital financial technology ($DFSL_3$)	
		Skill in applying for digital financing ($DFSL_4$)	
Access to Digital Finance (ADF)		Access to digital finance (ADF_1)	
		Proximity to digital finance (ADF_2)	[21]
		The abundance of digital platforms (ADF_3)	
Digital Finance Adoption (DFA)		Money transfer and payments (DFA_1)	
		E-commerce trade/utility bill (DFA_2)	[46]
		Budgeting and e-accounting (DFA_3)	
		Borrowing and Insurance (DFA_4)	
		Sales Growth (FP_1)	[22]

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SME Performance (SMEP)	Financial Performance (FP)	Profitability (FP_2)
		Number of paying customers (FP_2)
	Operational Performance (OP)	Development of new products and services (OP_1)
		Efficiency of operations (OP_2)

Source: Author's elaboration from various sources

Results and Discussion

Respondent Characteristics

Based on the respondent characteristics (Table 2), the majority of respondents are female, comprising 76.2% of the sample. The highest proportion of respondents has completed education up to the high school level (65%), followed by bachelor's degree holders (25.5%) and diploma holders (6.8%). A small percentage of respondents have a master's degree (2%) or education below high school (0.7%). Regarding the birth years of respondents, most were born between 1981 and 1995, accounting for 58.2% of the sample. As of 2024, this age group ranges from 29 to 43 years old, indicating that the majority of respondents are in the young to middle-aged adult demographic. Additionally, 30.3% of respondents were born after 1995, making them 29 years old or younger. This data reflects that the majority of respondents are within a relatively young to middle-aged productive age range, with a small proportion being older. Information about the businesses owned by the respondents reveals that most are in the early stages of development, with 78% of companies being between 0 and 7 years old. The majority of businesses employ fewer than 5 people (80.8%), indicating that most of the enterprises are micro-businesses. Only a small fraction of companies have more than 20 employees (2.7%), suggesting that these businesses are likely still in the early stages of growth and focus on a small scale.

Table 2. Respondent Characteristics

Characteristic		Frequency (n)	Percentage (%)
Gender	Male	95	23,8
	Female	305	76,2

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Characteristic		Frequency (n)	Percentage (%)
Education Level	Bellow High School	3	0,7
	High School	260	65
	Diploma	27	6,8
	Bachelor's Degree	102	25,5
	Master's Degree	8	2
Birth Year	Before 1965	14	3,5
	1966 – 1980	32	8
	1981 – 1995	233	58,2
	After 1995	121	30,3
Business Age	0 to 7 years	312	78
	7 to 12 years	67	16,8
	more than 12 years	21	5,2
Number of Employees	20 to 99	11	2,7
	6 to 19	66	16,5
	less than 5 people	323	80,8

Source: Data processed by the researcher, 2024

Evaluation of Measurement Model with Reflective Constructs (1st Order and 2nd Order)

The measurement model analysis was first conducted through the evaluation of convergent validity at the 2nd order to determine the validity of dimensions in measuring new variables, followed by testing convergent validity at the 1st order. Convergent validity for each dimension in measuring variables is indicated by the magnitude of the loading factor (see Table 3). In the context of reflective measurement models, a high correlation between indicators and the measured construct is typically marked by loading factor values greater than 0.70. However, for research in the early stages of scale development, loading factor values in the range of 0.50 to 0.60 are still considered acceptable [47]. Further testing of convergent validity was conducted using the Average Variance Extracted (AVE) values (see Table 3).

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Table 3. Results of Validity and Reliability Testing

Variable/Dimension	Indicator	Loading factor* 2nd Order	Loading factor* 1st Order	AVE**	Comp. Reliability ***	Cronbach's Alpha ****
Digital Financial Literacy (DFL)						
DFK	DFK_1		0.610	0.551	0.859	0.794
	DFK_2		0.746			
	DFK_3	0.923	0.814			
	DFK_4		0.760			
	DFK_5		0.768			
DFE	DFE_1		0.708	0.558	0.834	0.735
	DFE_2	0.916	0.743			
	DFE_3		0.780			
	DFE_4		0.754			
DFR	DFR_1		0.774	0.617	0.865	0.792
	DFR_2	0.693	0.790			
	DFR_3		0.814			
	DFR_4		0.762			
DFS	DFS_1		0.703	0.564	0.837	0.740
	DFS_2	0.891	0.825			
	DFS_3		0.777			
	DFS_4		0.691			
Access to Digital Finance (ADF)				0.668	0.857	0.748
	ADF_1	0.721				
	ADF_2	0.870				
	ADF_3	0.853				
Digital Finance Adoption (DFA)				0.582	0.847	0.759
	DFA_1	0.705				
	DFA_2	0.771				
	DFA_3	0.823				
	DFA_4	0.748				
MSME's Performance (SMP)						
FP	FP_1		0.923	0.850	0.944	0.912
	FP_2	0.943	0.932			
	FP_3		0.912			
OP	OP_1	0.943	0.912	0.832	0.908	0.798
	OP_2		0.912			

Source: Processed by the researcher, 2024

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Discriminant Validity and Construct Reliability Analysis

Discriminant validity was assessed using cross-loading values by comparing the cross-loading values of variables with the cross-loading values of constructs. Based on the cross-loading measurement presented in Table 4, it can be concluded that, overall, the indicators measuring the dimensions are considered valid. The second phase of the measurement model analysis involved testing construct reliability. Construct reliability was evaluated using Composite Reliability and Cronbach's Alpha, as shown in Table 3. The results of the Composite Reliability and Cronbach's Alpha calculations indicate that all dimensions meet the criteria and are considered reliable.

Table 4. Discriminant Validity Testing via Cross-Loading Factor

Indicator	X11	X12	X13	X14	X2	Y1	Y21	Y22
DFK_1	**0.610**	-0.319	0.030	0.142	0.305	-0.457	-0.169	0.064
DFK_2	**0.746**	0.142	-0.042	0.101	0.332	-0.245	-0.221	0.067
DFK_3	**0.814**	0.041	-0.018	-0.153	-0.337	0.291	0.165	-0.165
DFK_4	**0.760**	0.351	-0.066	0.045	-0.466	0.334	0.149	-0.059
DFK_5	**0.768**	-0.275	0.102	-0.092	0.254	-0.039	0.026	0.117
DFE_1	-0.254	**0.708**	0.066	-0.001	0.482	-0.569	-0.038	0.073
DFE_2	-0.332	**0.743**	0.002	0.297	0.381	-0.316	-0.151	-0.019
DFE_3	0.489	**0.780**	-0.023	-0.039	-0.419	0.410	0.117	-0.112
DFE_4	0.060	**0.754**	-0.040	-0.251	-0.395	0.422	0.064	0.066
DFR_1	0.343	-0.226	**0.774**	0.115	0.026	-0.084	0.025	0.006
DFR_2	-0.135	0.112	**0.790**	0.071	-0.169	-0.121	0.032	-0.025
DFR_3	-0.263	0.108	**0.814**	-0.105	-0.022	0.080	0.004	-0.013
DFR_4	0.072	-0.001	**0.762**	-0.079	0.173	0.125	-0.062	0.033
DFS_1	0.062	-0.288	0.166	**0.703**	0.414	-0.394	-0.255	0.144
DFS_2	-0.182	-0.184	-0.056	**0.825**	0.171	-0.040	0.070	-0.108
DFS_3	0.376	0.101	-0.113	**0.777**	-0.265	0.290	0.137	-0.035
DFS_4	-0.268	0.400	0.025	**0.691**	-0.327	0.122	0.021	0.022
ADF_1	0.367	-0.290	0.086	0.216	**0.721**	0.030	-0.087	0.122
ADF_2	-0.121	0.191	-0.040	-0.253	**0.870**	0.005	0.038	0.080
ADF_3	-0.187	0.050	-0.032	0.075	**0.853**	-0.030	0.035	-0.185
DFA_1	0.107	-0.265	0.103	-0.001	0.453	**0.705**	-0.138	0.189
DFA_2	-0.054	-0.119	-0.070	0.204	0.033	**0.771**	-0.110	0.073
DFA_3	0.128	0.143	-0.001	-0.166	-0.306	**0.823**	0.206	-0.155

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Indicator	X11	X12	X13	X14	X2	Y1	Y21	Y22
DFA_4	-0.186	0.215	-0.024	-0.026	-0.124	**0.748**	0.017	-0.083
FP_1	-0.133	-0.033	0.004	0.134	0.007	0.094	**0.923**	-0.128
FP_2	0.180	-0.072	-0.000	-0.159	0.018	-0.028	**0.932**	0.049
FP_3	-0.049	0.107	-0.004	0.027	-0.026	-0.067	**0.912**	0.080
OP_1	-0.034	0.013	-0.003	0.054	-0.197	0.110	-0.024	**0.912**
OP_2	0.034	-0.013	0.003	-0.054	0.197	-0.110	0.024	**0.912**

Source: Processed by the researcher, 2024

Structural Model Evaluation

The structural model evaluation was conducted by examining the Goodness of Fit of the model using the coefficients of determination (R^2) and predictive relevance (Q^2). The results of the evaluation indicate the following: For MSME's Performance, the R^2 value of 0.382 indicates a moderate model strength, meaning that 38.2% of the variance in business performance is explained by the variables in this study, while the remaining 61.8% is influenced by other variables not covered in this research. For Digital Finance Adoption, the R^2 value of 0.581 reflects a moderate model strength, with 58.1% of the variance in digital finance adoption explained by the model, and 41.9% influenced by other unexamined variables. The Q^2 values indicate that Digital Financial Literacy and Access to Digital Finance have strong predictive relevance for Digital Finance Adoption. Similarly, Digital Finance Adoption shows strong predictive relevance for MSME's Performance (Table 5).

Table 5. Results of Structural Model Evaluation

Variable	R^{2*}	Q^{2**}
Digital finance adoption	0.581	0.582
MSME's Performance	0.382	0.380

Source: Processed by the researcher, 2024

Hypothesis Testing

The results of hypothesis testing for direct effects reveal diverse outcomes at an α level of 5%. The analysis demonstrates that digital financial literacy significantly influences digital finance adoption. The direct effect of digital financial literacy on digital finance adoption is confirmed to be positive and statistically significant, with a p-value below the

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0.05 threshold. This indicates that increased digital financial literacy enhances the adoption of digital finance. Conversely, access to digital finance shows a positive effect on digital finance adoption, but this effect is not statistically significant. The p-value for this relationship exceeds 0.05, indicating that although there is a positive association, it lacks statistical significance. This suggests that the effect of access to digital finance on digital finance adoption may be weak or inconsistent, and therefore, does not provide sufficient evidence to conclude that access to digital finance plays a significant role in influencing digital finance adoption. In other words, the positive relationship observed may be due to random variation or other factors not accounted for in the study. Regarding the impact of digital finance adoption on MSME's performance, the results indicate a significant positive effect. The direct coefficient for this relationship is significant, with a p-value below 0.05. This finding supports the hypothesis that adopting digital finance positively affects the performance of MSMEs. Overall, the results highlight that while digital financial literacy plays a crucial role in promoting digital finance adoption, access to digital finance does not have a significant direct impact. However, once digital finance is adopted, it significantly improves MSME performance. Figure 2 illustrates the path diagram and the direct effects analysis, providing a visual representation of these relationships.

Table 6. Results of Direct Effect Testing

Hypothesis	Variable		Direct Coef*	P-Value**	Conclusion
	Exogenous	Endogenous			
H_1	DFL	DFA	**0.739**	<0.001	Significant
H_2	ADF	DFA	0.032	0.260	Not significant
H_3	DFA	SMP	0.618	<0.001	Significant

Source: Data processed by the researcher, 2024

Discussion

Digital Financial Literacy and Digital Finance Adoption

Hypothesis 1 examines the relationship between digital financial literacy and digital finance adoption. The analysis reveals a significant positive effect, with a path coefficient of 0.739 and a p-value of <0.001, validating this hypothesis. This finding indicates that higher levels of digital financial literacy are associated with greater adoption of digital financial tools. This result aligns with Social Cognitive Theory (SCT), which posits that individual knowledge supports cognitive processes and learning. Knowledge facilitates selective observation processes in deciding which behavior models to adopt or reject [35].

Empirically, this finding supports previous research suggesting that digital financial literacy positively impacts the use of digital finance, thereby enhancing financial inclusion [42]. Tony and Desai (2020) argue that high digital financial literacy increases awareness and encourages the use of digital finance [42]. Similarly, despite widespread digital technology use, its benefits are not fully realized due to low digital finance literacy [48]. Other studies, confirm that financial literacy stimulates the use of digital financial services like online banking and mobile money [21]; [33]. Moreover, financial literacy helps individuals make informed decisions before engaging with complex financial products provided by formal financial institutions [13]. These findings are consistent with the result that emphasize the role of digital financial literacy in driving financial behavior changes and promoting financial inclusion [38]; [29].

The findings of this study indicate practical implications for the development of MSMEs. Improved digital financial literacy enables MSME actors to more easily adopt digital financial tools such as e-wallets, online payments, and money transfer services. This directly enhances cash flow management and accelerates transactions, thereby increasing operational efficiency. In addition, the integration of e-commerce trade and utility bill payments offers opportunities for MSMEs to manage transactions more effectively. By adopting e-commerce platforms, MSMEs can expand their market reach and reduce dependency on conventional sales channels, while integrated utility bill payment features optimize business expense management automatically. The use of budgeting and e-

accounting also plays a crucial role in supporting better financial decision-making. These applications allow MSMEs to create accurate budgets and perform real-time digital bookkeeping, facilitating the monitoring of revenues and expenses. This, in turn, improves transparency and ensures that MSMEs are well-prepared to meet financial administrative requirements when applying for loans or attracting investment. Furthermore, enhanced digital financial literacy expands MSMEs' access to borrowing and insurance services. A deeper understanding of the risks and benefits of these financial products equips business owners to effectively leverage microcredit for business expansion or liquidity management. At the same time, insurance provides protection for business assets and operations, thereby strengthening the resilience of enterprises against external risks.

Thus, structured digital financial literacy programs can become a strategic component for governments and financial institutions to promote financial inclusion and strengthen MSME business performance. Implementing comprehensive financial literacy not only improves efficiency and competitiveness but also contributes to long-term economic stability and business sustainability.

Access to Digital Finance and Digital Finance Adoption

The impact of access to digital finance on digital finance adoption yielded unexpected results. Despite a positive path coefficient of 0.032, the p-value exceeds the 5% significance level, indicating that this effect is not statistically significant. However, the positive relationship between these variables is consistent with previous research. Chamboko (2024) suggests that financial infrastructure accelerates the adoption of mobile money services [49]. Access to financial services logically promotes their utilization. Advancements in financial inclusion and sophisticated technology enable users to leverage devices like computers and smartphones for expanding business needs [48]. This supports the notion that financial access, availability, and quality, as indicators of financial inclusion, positively affect digital finance usage, access, and quality.

Access to digital finance reflects a dynamic business environment, offering choices for SMEs to either remain stagnant or adapt to changes [37]. This perspective aligns with the Dynamic Capabilities Framework, which posits that adapting to environmental changes can enhance business performance. Therefore, improved access to digital financial services and platforms offers SMEs greater opportunities for adoption and integration of digital finance, potentially leading to performance improvements. These findings hold practical significance for MSMEs. While the statistical results indicate that access alone may not guarantee immediate adoption, the availability of financial platforms still creates an enabling environment. Increased access to digital financial services can empower MSMEs to gradually integrate financial technologies into their operations. For example, easy access to online payment systems, e-commerce platforms, and mobile banking allows businesses to streamline transactions and improve cash flow. Additionally, the availability of credit and insurance helps MSMEs build resilience, safeguarding their operations against unexpected disruptions and enabling sustainable expansion.

Policymakers and financial institutions should ensure that access to digital financial services is accompanied by initiatives that promote digital financial literacy. This approach would enhance the ability of business owners to effectively use financial platforms and tools, leading to more sustainable adoption. Structured literacy programs and targeted support can bridge the gap between access and adoption, ensuring that MSMEs fully benefit from available financial resources. By emphasizing both access and literacy, governments and institutions can foster a more inclusive financial ecosystem where MSMEs not only adopt digital finance but also leverage it to improve competitiveness, efficiency, and long-term business performance. Thus, the study's contribution lies in highlighting the importance of combining access with capability-building efforts to unlock the full potential of digital financial tools.

Digital Finance Adoption and MSME Performance

Hypothesis 3 posits that digital finance adoption positively influences MSME performance. This hypothesis is supported, with a path coefficient of 0.618 and a significant p-value (<0.001) at the 5% alpha level. This finding reflects the Dynamic Capabilities Framework, suggesting that effective responses to business environment changes can create new business value and competitive advantage, consistent with Resource-Based Theory [26], [27]. Empirically, the positive impact of digital finance adoption on business performance is well-documented. Adopting digital finance innovations enhances overall organizational performance [4]; [5], including customer experience [50], stakeholder value [4], service efficiency [28], operational efficiency [3], and cost efficiency [28], and sales growth [4]. To leverage these benefits, SMEs are encouraged to adopt comprehensive fintech strategies. These strategies should focus on knowledge dissemination, expanding digital and product knowledge, and customizing digital services such as digital payments, mobile banking, and crowdfunding. Implementing these strategies effectively can lead to significant enhancements in financial performance and operational success [51]. Thus, the integration of digital finance not only improves immediate business outcomes but also positions SMEs for sustained growth and competitive advantage in the evolving digital economy.

The implications of these findings for MSMEs are profound. To effectively leverage the benefits of digital finance adoption, MSMEs are encouraged to develop comprehensive fintech strategies that address various critical aspects. One significant element of these strategies is knowledge dissemination. Educating employees and stakeholders about digital financial tools and their potential applications within the business context fosters a culture of digital competence. This cultural shift is essential for driving the successful implementation of digital solutions within the organization. Moreover, it is crucial for MSMEs to focus on expanding digital and product knowledge. By understanding the specific features and advantages of different digital finance solutions, MSMEs can make informed decisions regarding which tools align best with their operational needs. This knowledge empowers them to select solutions that not only fit their current requirements but also have

the potential to scale as the business grows. Another vital aspect of a successful fintech strategy is customizing digital services. Tailoring offerings such as digital payments, mobile banking, and crowdfunding to meet the unique demands of the business can significantly enhance customer satisfaction and improve financial outcomes. Customization ensures that the services provided resonate with the target audience, leading to stronger customer relationships and loyalty.

Implementing these strategies effectively can lead MSMEs to experience substantial improvements in financial performance and operational success. The integration of digital finance offers not only immediate benefits, such as increased efficiency and streamlined processes but also positions MSMEs for sustained growth and competitive advantage in the increasingly digital economy. Furthermore, the positive relationship between digital finance adoption and MSME performance emphasizes the need for policymakers and financial institutions to create an environment that nurtures digital innovation. This supportive environment can be established through various mechanisms, including financial literacy programs that educate business owners and employees about the available digital finance tools. Additionally, enhancing access to digital infrastructure and providing incentives for adopting advanced financial technologies can facilitate a smoother transition to digital finance for MSMEs. In conclusion, this research highlights that the adoption of digital finance is not simply a reaction to technological trends but rather a strategic imperative for MSMEs aiming to succeed in a competitive landscape. By embracing digital finance, MSMEs can unlock new opportunities for operational efficiency, enhance customer engagement, and ultimately achieve long-term business success.

Conclusion

This study concludes that digital financial literacy significantly impacts the adoption of digital financial services, which, in turn, enhances MSME performance. Individuals with higher financial literacy are more likely to adopt digital finance, leading to increased operational efficiency, market expansion, and profitability. While access to digital finance

shows a positive relationship with adoption, the effect is not statistically significant, highlighting the importance of literacy over mere access. The findings support Social Cognitive Theory, Dynamic Capabilities Theory, and Resource-Based Theory, demonstrating that digital financial literacy and technology adoption are critical for business success in a dynamic environment. Practically, this suggests that efforts to improve MSME performance should prioritize enhancing digital financial literacy, accompanied by technical and strategic training to ensure effective utilization of financial services. The study's limitations include the use of cross-sectional data, regional focus, and the exclusion of factors like organizational readiness and trust in technology. Future research should explore these variables, use longitudinal methods, and incorporate qualitative insights to provide a deeper understanding of digital finance adoption and its impact on MSME performance.

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