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Mediating Role of Digital Transformation and Innovation in the Relationship Between External Factors and SME Performance in Central Java After the Covid-19 Pandemic

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ABSTRACT: Advancements in technology have led to substantial changes in the structure and dynamics of business operations, from e-commerce and online marketplaces to social media as sales platforms. Payment technologies like debit cards, e-money, and QR codes have also reached SMEs, enabling cashless transactions even in small retail. In an era of fast-paced technological changes, SMEs must adopt a broad vision to anticipate opportunities and remain competitive. The Indonesian government has proactively supported digitalization through initiatives like the 2017–2019 e-commerce roadmap and the 2021–2024 Digital Indonesia Roadmap. This research explores how external factors—such as regulations, digital experience, technology, and budget—affect SMEs' digital transformation, innovation, and performance. Using a quantitative approach, data will be collected through questionnaires targeting SME managers undergoing digital transformation. Using SEM in SMART-PLS, this study seeks to generate empirical insights into how external pressures shape SMEs' strategies for digital transformation.

KEYWORDS: External Factors, Digital Transformation, Digital Innovation, SMEs

I. INTRODUCTION

The development of technology in the business sector is rapidly advancing, with the emergence of innovations such as e-commerce, online marketplaces, and social media platforms as sales channels. This phenomenon has become an increasingly popular alternative for consumer shopping. Additionally, advancements in payment technologies, particularly cashless payment systems such as debit cards, credit cards, e-money cards, and QR code-based payment technologies, are increasingly penetrating the small retail trade sector, which is predominantly run by Micro, Small, and Medium Enterprises (SMEs). Amid the fast-paced competition across media and technologies, SMEs face uncertainty about the competitors that will emerge and the industries that may replace traditional sectors. Therefore, the only step that can be taken is to broaden the vision to foresee opportunities and threats in the future. Every time a new innovation or industry arises, SMEs must respond seriously to take advantage of these opportunities more quickly than their competitors.

The Indonesian government, recognizing the importance of digitization, has anticipated these developments through various policies, including the E-Commerce Roadmap 2017-2019 and the Digital Indonesia Roadmap 2021-2024. Furthermore, serious attention is given to Indonesia's 64.2 million SMEs to digitalize their businesses, given the vast potential of the country's digital economy. In fact, by 2024, the government aims to have 30 million SMEs join the digital ecosystem through the National Program of Proudly Made in Indonesia.

However, alongside the convenience of digital transactions, there is a serious threat in the form of cybercrime. Cybercrimes such as data breaches, data theft, online fraud, and illegal trade have become increasingly rampant. In response, the Indonesian government oversees online trading practices through Government Regulation No. 80 of 2019 on Electronic System-Based Trade (PMSE). Additionally, the government plans, regulates, and monitors the digital economy comprehensively in the Digital Indonesia Roadmap 2022-2024, covering four strategic sectors: digital infrastructure, digital government, digital economy, and digital society.

This study adapts findings from Surahman et al. (2023) and Porfirio et al. (2018), focusing on External Factors (FEk), Digital Transformation (DTI), Digital Innovation (DII), and Business Performance (PFR) of SMEs. It examines how external factors drive digital transformation and innovation, contributing to SME performance, emphasizing governance and quality attention in the SME-digital technology relationship.

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This study aims to analyze how external factors—including government regulations, digital experience, technology, and budget—affect the digital transformation and digital innovation processes, ultimately leading to improved SME performance. By using this approach, the research hopes to provide a deeper understanding of the impact of the external environment on SMEs' readiness to face digital challenges and its contribution to business performance in SMEs, particularly in Central Java.

II. LITERATURE REVIEW

External Factors and Their Impact on Digital Transformation

External factors such as government regulations, budgets, technology availability, and personnel's digital experience are critical drivers of digital transformation. However, SMEs often face challenges in understanding and utilizing these policies effectively due to limited resources and knowledge. This highlights the need for capacity-building programs and targeted financial incentives to bridge these gaps. The availability and affordability of digital technologies, such as cloud computing and mobile technologies, are foundational to digital transformation. These technologies enable new business models and enhance service delivery. Moreover, external factors not only act as enablers but can also pose constraints; for example, strict regulations or inadequate infrastructure might delay adoption, particularly in rural areas of Central Java.

Digital Transformation

In the rapidly evolving landscape of the 21st century, digital transformation has emerged as a powerful catalyst for innovation, driving organizations across various industries to rethink their strategies, operations, and value propositions. No longer is technology merely a support function that enables business processes, but it has now become a powerful tool capable of driving sales growth, creating new business models, and even serving as a source of competitive advantage (Tang, 2021). The integration of digital technologies into the very fabric of organizations has resulted in a fundamental shift in the way they operate, leading to the concept of "Industry 4.0" or the "smart factory". (Vaska et al., 2021)

Digital technologies have disrupted the status quo, creating new opportunities and challenges for companies to navigate. The exploitation of these digital technologies offers the potential to integrate products and services across functional, organizational, and geographic boundaries, thereby increasing the pace of change and introducing significant transformation. (Vaska et al., 2021). The rise of digital platforms has further catalyzed this transformation, creating a new way of operating for companies and organizations in a "business ecosystem".

III. METHODOLOGY

This study targets SMEs in Central Java in 2024 that have adopted or are undergoing digital transformation. Data is collected through questionnaires distributed to SME managers using purposive sampling, covering five clusters: Semarang City, Kudus, Solo, Magelang, Tegal, and Banyumas. Questionnaire items are derived from theoretical models by Surahman et al. (2023) and Porfirio et al. (2024), adjusted to the Indonesian SME context.

The IS Continuance Model serves as the foundation of this study, utilizing Structural Equation Modeling (SEM) with SMART-PLS to analyze the relationships among external factors, digital transformation, digital innovation, and SME performance. This method allows for robust analysis of direct and indirect influences. Analytical methods include validity and reliability tests to ensure the accuracy and consistency of the questionnaire. Additionally, normality tests (to assess data distribution), multicollinearity tests (to examine correlations between independent variables), and heteroscedasticity tests (to evaluate variance inconsistencies in residuals) will be performed.

Measurement Model Evaluation:

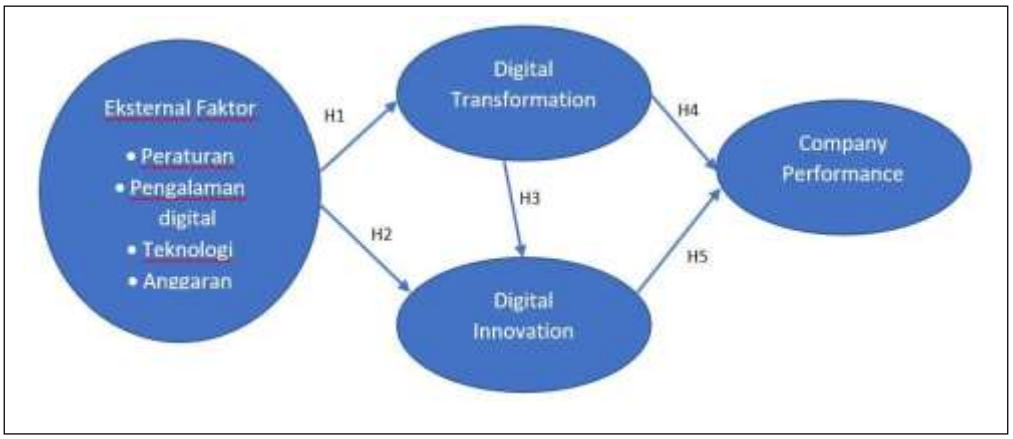
- Convergent Validity is verified by evaluating whether all indicators consistently reflect their respective latent constructs, commonly through the use of Average Variance Extracted (AVE) and indicator loadings.
- Discriminant Validity determines the uniqueness of each construct, often analyzed using cross-loading comparisons and the Fornell-Larcker criterion.
- Reliability pertains to internal consistency and is measured using Cronbach's Alpha and Composite Reliability (CR) values.

Structural Model Evaluation:

- Path Analysis investigates the significance and strength of the relationships among the latent constructs.
- Coefficient of Determination (R^2) indicates the proportion of variance in the endogenous variables explained by the exogenous variables.

- Effect Size (f^2) examines the relative contribution of each predictor variable to the target construct.
- Predictive Relevance (Q^2) evaluates the model's ability to predict future observations through techniques like blindfolding.

By employing these methods, this study will provide comprehensive insights into the factors that influence SME performance through digital transformation and innovation, and the results will offer valuable implications for policymakers and practitioners looking to enhance the digital capabilities of SMEs in Central Java.



Hypotheses:

H1: External factors positively influence digital transformation.

H2: External factors positively influence digital innovation.

H3: Digital innovation positively influences digital transformation.

H4: Digital transformation positively influences company performance.

H5: Digital innovation positively influences company performance.

. The study investigates how external factors—regulations, digital experience, technology, and budget—drive digital transformation and innovation to enhance SME performance. By employing SEM-PLS, the research provides actionable insights for policymakers and SMEs to optimize strategies for sustainable growth in the post-COVID-19 era.

IV. RESULTS AND DISCUSSION

This study involved 187 respondents, consisting of 104 males and 83 females. The majority of respondents, totaling 104, were aged between 18 and 30 years. Most respondents had a high school education as their highest level of education, with 98 individuals in this category. A significant portion of respondents operated SMEs in the culinary sector. In terms of income, most respondents reported a monthly income ranging from Rp 5,000,000 to Rp 20,000,000. The respondents were from six residencies in Central Java.

Convergent Validity

Based on Table 1 below, it can be concluded that all indicators, except for DI3, EF1, and EF4, have outer loading values > 0.70, indicating high validity. Meanwhile, the indicators DI3, EF1, and EF4 have outer loading values > 0.50, which are considered sufficient to meet the requirements for convergent validity. Outer loading values between 0.50 and 0.60 are deemed adequate for convergent validity (Ghozali, 2014). Therefore, these indicators can be considered valid. Additionally, the AVE values > 0.50 meet the rule of thumb (Chinn, 1988), meaning that the indicators in this study are valid. Furthermore, the discriminant validity is demonstrated, as the indicators positively correlate with alternative indicators for the same construct.

Tabel 1 Outer Loading

	Company Performance	*Digital Innovation*	*Digital Transformation*	*External Factors*
CP1	0,720			
CP2	0,783			
CP3	0,770			
CP4	0,762			
CP5	0,756			

DI1		0,800		
DI2		0,785		
DI3		0,672		
DI4		0,754		
DI5		0,732		
DT1			0,871	
DT2			0,790	
DT3			0,775	
DT4			0,742	
DT5			0,707	
EF1				0,692
EF2				0,789
EF3				0,741
EF4				0,612
EF5				0,764
EF6				0,825
EF7				0,776
EF8				0,762

Source: Processed Primary Data, 2024

Tabel 2 Average variance extracted (AVE)

Indikator	***Average variance extracted* (AVE)**
Company Performance	*0,575*
Digital Innovation	*0,518*
Digital Transformation	*0,560*
External Factors	*0,552*

Source: Processed Primary Data, 2024

Discriminant Validity

Based on Table 3, the results of the discriminant validity test indicate that the cross-loading values of indicators in their respective variable blocks exceed 0.7 and are higher than those in other variable blocks. This signifies that all latent variables predict the indicators in their blocks better than in other variable blocks (Ghozali and Latan, 2015). Therefore, it can be concluded that there are no issues with discriminant validity, meaning the constructs are unique and capable of explaining the phenomena being measured.

Table 3. Discriminant Validity Test Results

Indikator	**Company Performance**	**Digital Innovation**	**Digital Transformation**	**External Factors**
CP1	0,720	0,361	0,450	0,204
CP2	0,783	0,454	0,457	0,307
CP3	0,770	0,352	0,382	0,299
CP4	0,762	0,377	0,415	0,323
CP5	0,756	0,425	0,367	0,432
DI1	0,478	0,800	0,592	0,353
DI2	0,501	0,785	0,594	0,338
DI3	0,321	0,672	0,432	0,357
DI4	0,244	0,754	0,404	0,510

DI5	0,249	0,561	0,244	0,242
DT1	0,423	0,643	0,871	0,473
DT2	0,438	0,563	0,790	0,383
DT3	0,402	0,469	0,775	0,222
DT4	0,303	0,279	0,562	0,226
DT5	0,486	0,433	0,707	0,191
EF1	0,385	0,258	0,267	0,692
EF2	0,392	0,518	0,444	0,789
EF3	0,417	0,373	0,329	0,741
EF4	0,247	0,244	0,208	0,566
EF5	0,117	0,404	0,245	0,764
EF6	0,259	0,441	0,316	0,825
EF7	0,319	0,260	0,298	0,776
EF8	0,298	0,322	0,299	0,762

Source: Processed Primary Data, 2024

Reliability Test

The results of the reliability test show that all constructs in this model have excellent internal consistency and reliability. The Cronbach's Alpha values for Company Performance (0.815), Digital Innovation (0.771), Digital Transformation (0.799), and External Factors (0.883) all indicate an adequate level of internal consistency, above the 0.7 threshold. Additionally, the Composite Reliability values for each construct also support these results, with Company Performance (0.871), Digital Innovation (0.841), Digital Transformation (0.862), and External Factors (0.907) demonstrating high reliability. Overall, the constructs used in this study are proven to be reliable, meaning the instruments used to measure these variables can be trusted to provide consistent and accurate results.

Table 4. Reliability Test Results

Indikator	*Cronbach's Alpha*	*Composite Reliability*	Keterangan
Company Performance	0,815	0,871	Reliabel
Digital Innovation	0,771	0,841	Reliabel
Digital Transformation	0,799	0,862	Reliabel
External Factors	0,883	0,907	Reliabel

Source: Processed Primary Data, 2024

R-square Test

The R-squared value measures the proportion of variance in the dependent variable that can be explained by the independent variables, providing insight into the strength of their influence. According to Hair Jr. et al. (2017), the relationship between the dependent variables consists of three criteria: Strong (> 0.67), Moderate (between 0.33 and 0.67), and Weak (< 0.33). In this study, the external factors variable explains 36.6% of the variance in Digital Transformation, which is considered a moderate effect. The combination of external factors and digital transformation explains 49.5% of the variance in Digital Innovation, which also falls under a moderate effect. Lastly, the combined influence of external factors, digital transformation, and digital innovation explains 34.6% of the variance in Company Performance, which is categorized as having a moderate impact.

Table 5. R-Square Test Results

Indicator	R Square	Adjusted R-Square	Description
Digital Transformation	*0,366*	*0,359*	Sedang
Digital Innovation	*0,495*	*0,488*	Sedang
Company Performance	*0,346*	*0,338*	Sedang

Hypothesis Testing

Table 6. Path Coefficients Test Results

Hypothesis	Original Sample (O)	T Statistics	P Values
DI -> CP	*0,283*	*2,232*	*0,026*
DT -> CP	*0,362*	*3,011*	*0,003*
DT -> DI	*0,549*	*8,412*	*0,000*
EF -> DI	*0,267*	*3,933*	*0,000*
EF -> DT	*0,418*	*5,550*	*0,000*

Based on Table 6, the following can be explained regarding each hypothesis:

1. H1: External Factors (EF) Positively Affect Digital Transformation (DT) External factors have a positive and significant impact on digital transformation, with a path coefficient of 0.418, T Statistics of 5.550, and a P Value of 0.000. The P Value being smaller than 0.05 indicates that the result is significant, thus H1 is accepted. This result shows that an increase in external factors, such as government regulatory support, accessible technological advancements, digital experience, and budget support, can help SMEs better prepare for digital transformation. A supportive external environment enables SMEs to integrate digital technologies into their operations and adapt to the growing digital business needs. It suggests that the government and related parties need to continue developing a conducive external environment to encourage SMEs to undergo digital transformation.
2. H2: External Factors (EF) Positively Affect Digital Innovation (DI) External factors also have a positive and significant effect on digital innovation, with a path coefficient of 0.267, T Statistics of 3.933, and a P Value of 0.000. Since the P Value is less than 0.05, H2 is accepted. This indicates that a strong external environment, such as supporting regulations, access to technology, and digital experience, can encourage SMEs to innovate in their digital products, processes, or services. SMEs with adequate access to external factors are more likely to develop new solutions, such as digitizing products, optimizing operations, or exploring new ways to serve customers. This highlights the crucial role of the external environment in creating an innovative climate that supports the long-term sustainability of SMEs.
3. H3: Digital Transformation (DT) Positively Affects Digital Innovation (DI) The analysis shows that digital transformation has a positive and significant impact on digital innovation, with a path coefficient of 0.549, T Statistics of 8.412, and a P Value of 0.000. Since the P Value is smaller than 0.05, H3 is accepted. This suggests that adopting digital transformation in SMEs increases their chances of innovating. The digital transformation process, such as the implementation of information systems and the use of digital data in decision-making, provides the foundation for SMEs to develop new innovations. This reinforces that operational digitalization not only enhances efficiency but also opens opportunities for further innovation, which can improve competitiveness. Therefore, investment in digital transformation can drive SMEs to undertake innovative changes in products, services, and business models.
4. H4: Digital Transformation (DT) Positively Affects Company Performance (CP) Digital transformation shows a positive and significant impact on company performance, with a path coefficient of 0.362, T Statistics of 3.011, and a P Value of 0.003. Since the P Value is smaller than 0.05, H4 is accepted. This indicates that adopting digital transformation in SMEs significantly contributes to enhancing business performance. The implementation of digital technologies helps SMEs improve operational efficiency, reduce costs, and streamline customer interactions, which positively impacts business performance. Digitalization enables SMEs to increase competitiveness, adapt more quickly to market demands, and provide more responsive services to customers.

5. H5: Digital Innovation (DI) Positively Affects Company Performance (CP) Digital innovation has a positive and significant impact on company performance, with a path coefficient of 0.283, T Statistics of 2.232, and a P Value of 0.026. Since the P Value is smaller than 0.05, H5 is accepted. This shows that digital innovation in SMEs significantly contributes to enhancing their performance, including customer satisfaction, increased sales, and competitive advantage. Developing innovations in digital products, services, or processes allows SMEs to offer added value to customers and enter new market segments, potentially increasing revenue and profitability. This conclusion suggests that digital innovation can be a key factor in supporting the growth and sustainability of SMEs in the digital era.

V. CONCLUSION

This study examines how external factors impact the performance of SMEs in Central Java through digital transformation and innovation in the post-pandemic Covid-19 context. The analysis reveals that external factors such as government regulations, access to digital technology, digital experience, and budget availability play a crucial role in driving digital changes in SMEs. These factors positively influence digital transformation efforts, with supportive regulations ensuring SMEs can adopt technologies without legal concerns, while budget availability strengthens their ability to integrate relevant digital tools. Furthermore, the study shows that digital transformation and innovation are closely interconnected. Digital transformation provides the foundation for SMEs to create digital innovations, such as new products, efficient processes, and business models aligned with digital advancements. Both digital transformation and innovation contribute positively to SME performance, improving sales, efficiency, and customer satisfaction. The results underscore the critical role of external assistance and digital adoption in driving SME performance in the digital age, suggesting that embracing digital technologies is vital for maintaining competitiveness and responding to evolving technological trends and customer expectations.

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