

Digital Transformation and Business Incubation on SME Performance in Indonesia

Digital Transformation
and Business
Incubation

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ABSTRACT

In this rapidly evolving digital era, digital transformation and business incubation have been identified as key determinants in driving improved performance SMEs in Indonesia. A quantitative study, using an explanatory approach, specifically investigated how these two aspects affect 200 SMEs in Indonesia that have actively adopted digital technology and participated in incubation programs. The information for the study was collected through an extensive survey and analyzed in depth using multiple linear regression methods. The findings suggest that digital transformation possesses a significant and positive impact on SME business performance. This impact is mainly manifested through the utilization of strategies such as the use of e-commerce, the implementation of an efficient digital management system, and the optimization of social media, which collectively contribute to increased operational efficiency and expanded market reach. Furthermore, incubation programs have also been shown to play a crucial role in improving performance, by providing relevant training, expert mentoring, and vital access to business networks. Overall, this study confirms that the synergy between digital transformation and business incubation substantially improves SME performance.

Keywords: Business Incubation, Business Performance, Digital Transformation, SMEs.

ABSTRAK

Di era digital yang terus berkembang pesat ini, transformasi digital dan inkubasi bisnis telah diidentifikasi sebagai penentu utama dalam mendorong peningkatan kinerja Usaha Kecil dan Menengah (UKM) di Indonesia. Sebuah studi kuantitatif, dengan menggunakan pendekatan eksplanatif, secara khusus menyelidiki bagaimana kedua aspek ini memengaruhi 200 UKM di Indonesia yang telah secara aktif mengadopsi teknologi digital dan berpartisipasi dalam program inkubasi. Data penelitian dikumpulkan melalui kuesioner yang komprehensif dan dianalisis secara mendalam menggunakan metode regresi linier berganda. Hasil penelitian menunjukkan bahwa transformasi digital memiliki dampak yang signifikan dan positif terhadap kinerja bisnis UKM. Dampak ini terutama diwujudkan melalui pemanfaatan strategi seperti penggunaan e-commerce, penerapan sistem manajemen digital yang efisien, dan optimalisasi media sosial, yang secara kolektif berkontribusi pada peningkatan efisiensi operasional dan perluasan jangkauan pasar. Lebih jauh, program inkubasi juga telah terbukti memainkan peran penting dalam meningkatkan kinerja, dengan memberikan pelatihan yang relevan, pendampingan ahli, dan akses penting ke jaringan

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INTRODUCTION

Digital transformation has become a global phenomenon that is significantly reshaping the business landscape. No longer a discretionary effort, digital transformation has evolved into a vital strategic imperative for all types of enterprises, including Small and Medium Enterprises (SMEs), particularly in an age marked by rapid advancements in information and communication technologies. Its influence extends beyond business performance and plays a key role in advancing the Sustainable Development Goals (SDGs). Technologies like artificial intelligence, cloud computing, and the Internet of Things play a crucial role in facilitating the realization of the SDGs, highlighting the strategic importance of digital transformation (Plekhanov et al., 2023; Ridhovan & Anggarani, 2024). In addition to optimizing business efficiency, digital transformation contributes to social equity, environmental protection, and economic development, thus reinforcing its integral role in sustainable progress (Esses et al., 2021). The SDGs, established in 2015 by 193 member states of the United Nations, represent a universal blueprint to achieve sustainability by 2030. They encompass 17 goals and 169 specific targets, each aimed at fostering inclusive and equitable global development (Wijaya et al., 2024). In this context, digital transformation emerges not only as a business enabler but also as a fundamental driver in achieving long-term developmental and sustainability outcomes.

Digital transformation can help SMEs to improve their performance, which can ultimately contribute to achieving SDGs, namely SDG 1 (Eradicating Poverty) and SDG 8 (Decent Work and Economic Growth). Then, even though Industry 4.0 technology has the potential to improve business performance, numerous studies highlight the difficulties faced by small and medium-sized enterprises (SMEs) may face during the adoption of this technology (Soni et al., 2022; Nazaruddin et al., 2024). SMEs often face constraints related to resource availability, market access, and technological capabilities, adoption of digital transformation can serve as an important mechanism for survival and achieving sustainable growth in an increasingly competitive business environment.

SMEs to increase their competitiveness in today's business, SMEs must effectively utilize information technology and enhance and apply their skills and abilities (Prasanna et al., 2019; Rodrigues et al., 2021; Yusuf et al., 2022; Nazaruddin et al., 2024). Furthermore, it is very important to improve corporate strategy by using information technology and optimizing work processes (Mrugalska & Ahmed, 2021) which involves utilizing computer systems and improving business performance in addressing market demands (Chiu & Cho, 2019; Mrugalska & Ahmed, 2021; Surya et al., 2021). The importance of information technology in business is widely recognized (Kowrdziej et al., 2013). Digitalization is a multifaceted phenomenon that encompasses various dimensions, including digital entrepreneurship, digital strategy, digital processes, and digital education (Kraus et al., 2019).

In addition to digital transformation, business incubation plays an essential part in the development and progress of small and medium-sized business (SMEs). Business incubation facilitates entry to critical resources that these firms may not have otherwise, including financial support, managerial expertise, professional networks, and opportunities for training and development. As a result, business incubation builds a stronger foundation for SMEs to start, operate, and expand their businesses more effectively. Technology and organization positively influence e-commerce adoption and SME performance (Ausat et al., 2022). Incubated firms outperform non-incubated firms due to tailored business support services. Incubated firms benefit from more employees, not incubated from the owner's experience (Zhou & Zondo, 2023). Business incubators

support the growth and development of SMEs in developing countries (Napitu et al., 2023).

While the advantages of digital transformation and business incubation have been thoroughly explored individually in existing literature, a significant research gap remains in assessing their combined impact on MSME performance, particularly in developing nations like Indonesia. Previous research by Johnson et al., (2024) has not investigated extensively the interplay between these two elements in fostering long-term competitive advantage or determining the success factors of their integration. This research aims to tackle this issue by empirically analyzing the concurrent impacts of digital transformation and business incubation on MSME performance, while also pinpointing effective strategies to enhance MSME competitiveness in the digital age. This study's primary contribution is to present a fresh conceptual framework and pertinent empirical data that bolster technology-driven MSME development policies and strategies in Indonesia.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Digital Transformation and Business Performance

Digital transformation emerges from the convergence of personal and organizational IT technologies, characterized by the influence of advanced technologies like cloud computing, social media, mobile platforms, analytics, and the Internet of Things known as SMACIT technologies (White, 2008). This transformation entails the incorporation of digital technologies into fundamental business activities within the framework of the digital economy (Liu et al., 2011), as well as the use of innovation to optimize organizational functions and expand global reach (Westerman & Bonnet, 2014). According to Hess et al. (2016), digital transformation affects organizations at three levels: the business life cycle and customer experience, internal aspects such as strategic goals and organizational structure, and the emergence of new business models. Vial & Baudoin (2019) emphasize that digital transformation changes the way organizations work, think, and provide services. It involves the adoption of instruments like online retail, social platforms, large data sets, and cloud technology to improve performance, drive innovation, and maintain competitiveness (Matt et al., 2015).

The implementation of digital technology by SMEs is influenced by several factors according to Rogers' (2003) diffusion of innovation theory, such as relative advantage, fit with business processes, complexity, trial, and observable results. From the Resource-Based View (RBV) perspective, digital technology is a strategic resource that can create competitive advantage if managed properly (Barney, 1991; Widagdo et al., 2019). Utilization of the internet is now a basic need for SMEs to grow. The use of social media allows SMEs to reach customers more widely and manage relationships effectively (Van Scheers, (2016), while e-commerce strengthens relationships with clients (Alawi et al., 2018). Platforms such as Instagram are also effective for product promotion (Hamdi et al., 2021). However, the digital transformation process is not free from challenges, such as budget constraints, lack of digital literacy, and resistance to change (Chibelushi & Costello, 2009). Based on this description, this hypothesis is used.

H1: Digital transformation has a positive impact on MSME business performance.

Business Incubation and Business Performance

Business incubation is a program designed to support the growth and development of SMEs by providing various resources, such as funding, mentoring, training, and access to a broad business network. The definition of business incubation emphasizes that business incubators not only provide structural support to SMEs but also act as catalysts in accelerating business growth through various interventions focused on the specific needs of small businesses (Stephens & Miller, 2022).

In the digital era, the function of business incubation is becoming increasingly important because digital transformation requires skills and knowledge that may not be possessed by all entrepreneurs. Business incubation can help bridge this gap by providing

access to the latest technologies and assisting SMEs in the process of digitizing their businesses. Business incubators also provide the training needed to master digital tools and implement them in business operations, which can ultimately improve the efficiency and performance of SMEs as a whole (Sari et al., 2022; Opland et al., 2022).

Business incubation helps start-ups and small businesses in their early stages. Business incubation provides the support they need to grow and succeed over time (Hackett & Dilts, 2004). Business incubation is all about helping new ventures. Business incubation offers mentorship in management, teaches entrepreneurial skills, connects people to networks, and helps them find the funding they need (Phan et al., 2005). In the small business world, incubation serves as a lifeline. Incubation lightens the burden of scarce resources and reduces the chances of failure. With mentorship and support, incubation creates a path forward. Therefore on this description, this hypothesis is proposed.

H2: Business incubation has a positive effect on MSME business performance.

Digital Performance, Business Incubation to Business Performance

SMEs business performance covers various aspects, such as achieving financial targets, customer satisfaction, operational efficiency, and continuous innovation. This definition emphasizes that business performance is not only measured from the financial aspect but also from how SMEs are able to maintain customer satisfaction and continue to innovate to stay relevant in the market (Mulyadi, 2013).

In the digital era, SMEs business performance is increasingly determined by their ability to adopt and utilize digital technology. SMEs that successfully integrate digital technology into their operations tend to be more efficient and able to offer products or services that are more in line with market needs. In addition, continuous innovation using technology is also an important factor in maintaining gaining a competitive edge and enhancing long-term company success (Johnson et al., 2024).

SME business performance in the digital era is highly dependent on their ability to utilize digital technology as a tool to improve operational efficiency, meet customer needs, and continue to innovate. Thus, measuring SME business performance must include not only the financial aspect but also their ability to adapt to technological changes and dynamic markets.

H3: The concurrent implementation of digital transformation and business incubation positively influences the performance of MSMEs.

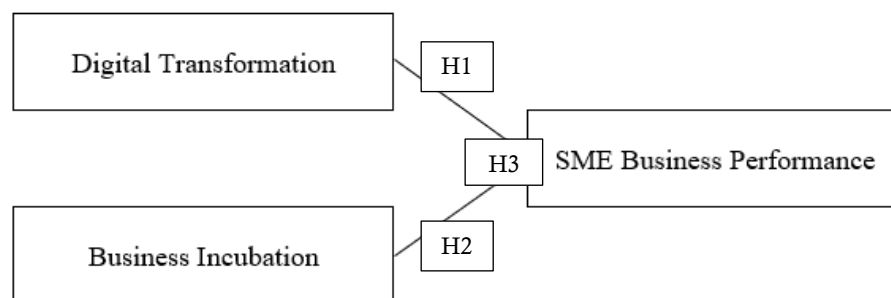


Figure 1. Research framework

The Figure 1 shows a conceptual model of the relationship between two independent variables and one dependent variable, namely Digital Transformation, Business Incubation, and MSME Business Performance. From Figure 1, it shows that Digital Transformation and Business Incubation act as factors that influence MSME business performance, namely Digital Transformation exerts a favorable influence on MSME Business Performance, and Business Incubation positively impacts MSME Business Performance.

RESEARCH METHOD

This research employs an explanatory design and a quantitative methodology. Explanatory research aims to elucidate the relationship between multiple symptoms or variables and explain the causes of an event. This study will explain the causal relationship between the independent variables (digital transformation and business incubation) and the dependent variable (SME business performance). The population in this study is all MSMEs in Indonesia that have adopted digital technology in their operational activities and participated in formal business incubation programs. The selection of Indonesia as a research location is based on the strategic role of MSMEs in the national economy, where MSMEs cover more than 99% of business units and contribute more than 60% to gross domestic product (GDP). However, most MSMEs in Indonesia still face challenges such as limited access to technology, capital, and professional support in business development. Therefore, the Indonesian context provides strong empirical relevance to evaluate the effectiveness of digital transformation and business incubation as strategies to increase MSME competitiveness (Sugiyono, 2018). MSMEs that had been using digital technology for at least two years, had taken part in a business incubation program for at least a year, and were willing to participate were included in the study's sample selection criteria. Validity, reliability, normality, multicollinearity, heteroscedasticity, multiple linear regression analysis, F test, and t test were used to test the data. While reliability evaluates the consistency of the measuring tool, validity evaluates how well the questionnaire items represent the intended variables (Sekaran, 2016). The regression model assumptions were checked using tests for heteroscedasticity, multicollinearity, and normality (Ghozali, 2017). The main analysis was conducted using multiple linear regression, namely regression with one dependent variable and two or more independent variables (Sugiyono, 2018). The regression model is written as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

where Y is the performance of SME business, α is a constant, β_1 and β_2 are the regression coefficients of each independent variable (digital transformation and business incubation), and ε is the error term. Finally, hypothesis testing is carried out through the F test to test the significance of the overall model and the t test to test the significance of the influence of each variable. The null hypothesis (H_0) is rejected if the p value < 0.05 .

RESULTS

This study involved 200 SMEs that met the inclusion criteria, namely SMEs that have implemented digital technology for at least two years and have participated in a business incubation program for at least one year. Of the 200 questionnaires distributed, all were returned and filled out, so the response rate was 100%. Below is a description of SMEs from the research sample.

Table 1. Percentage of Types of SMEs Businesses Sampled

Types of SME Businesses	Percentage
Trade Sector	35%
Service Sector	30%
Production Sector	25%
Agriculture Sector	10%

Table 1 shows a pie chart depicting the percentage of types of Small and Medium Enterprises (SMEs) based on business sectors. There are four main sectors shown. The trade sector is the sector with the largest percentage, which is 35%, indicating that most SMEs are engaged in the buying and selling of goods. Followed by the service sector which covers 30% of the total SME businesses, reflecting the important role of services in the SME economy. Furthermore, the production sector contributes 25%, which includes

manufacturing, handicrafts, and processing businesses. Finally, the agricultural sector only represents 10%, becoming the sector with the smallest contribution among the four. This data provides an overview of the structure of SME businesses in a region, where the trade and service sectors dominate economic activity. This information is useful for formulating policies and developing more targeted SME development programs based on the proportion of existing business sectors. The rest are micro businesses with less than 10 employees (20%) and medium businesses with more than 50 employees (10%). The SMEs used as samples are spread across various provinces in Indonesia, with the highest concentration in West Java (25%), DKI Jakarta (20%), East Java (15%), and other provinces (40%).

Table 2. Validity and Reliability Test

Variables	Validity	Confirmation	Cronbach's Alpha	Confirmation
Digital Transformation	> 0.34	Valid	0.89	Reliable
Business Incubation	> 0.39	Valid	0.87	Reliable
SME Business Performance	> 0.34	Valid	0.91	Reliable

Based on Table 2, the results of the validity and reliability tests, all research instruments were proven to meet the established criteria. The validity test was carried out using the Pearson Product Moment correlation, where each statement item for the three variables showed a correlation value above 0.3. The digital transformation variable has a validity value above 0.34, the business incubation variable above 0.39, and the SME business performance variable above 0.34. Thus, all items are declared valid because they are able to measure the intended theoretical construct. In addition, a reliability test was conducted to measure the internal consistency of the instrument, which was assessed through the Cronbach's Alpha value. The results showed that the digital transformation variable obtained a value of 0.89, business incubation was 0.87, and SME business performance was 0.91. All of these values far exceed the minimum threshold of 0.70, so the instrument is categorized as very reliable. This confirms that the questionnaire instrument is not only valid, but also consistent in measuring each variable accurately. Thus, this research instrument is worthy of use in further analysis to assess the influence of digital transformation and business incubation on SME business performance.

Table 3. Classical Assumption Test

Test Type	Yield Indicators	P/Criteria Value	Conclusion
Normality Test	Kolmogorov-Smirnov (p-value)	0.200 > 0.05	Normal distributed residual data
Multicollinearity Test	VIF Digital Transformation	1.723 < 10	No multicollinearity
Heteroscedasticity Test	VIF Business Incubation	1.684 < 10	No multicollinearity

Based on Table 3, the results of the classical assumption test presented in the table, it can be concluded that the regression model has met the criteria required for further analysis. The normality test using Kolmogorov-Smirnov shows a p-value of 0.200, which is greater than 0.05, indicating that the residual data is normally distributed. The multicollinearity test shows the Variance Inflation Factor (VIF) value for the Digital Transformation variable of 1.723 and Business Incubation of 1.684, both of which are far below the tolerance limit of 10, so there is no multicollinearity. The heteroscedasticity test is carried out through scatterplot analysis between the residual value and the predicted value, which shows a random distribution pattern, indicating no heteroscedasticity problems. In addition, the autocorrelation test uses the Durbin-Watson value of 1.98 which is within the normal range (1.5–2.5), indicating no autocorrelation. Thus, all classical assumptions have been met, and the regression model can be considered valid and suitable for use in hypothesis testing.

Table 4. Multiple Linear Regression Analysis

Variabel	Coefficients of Regression (β)	t-Count	Sig. (p-value)
Constant (α)	1.24	-	-
Digital Transformation (X_1)	0.45	5.87	0.000
Business Incubation (X_2)	0.38	4.96	0.000

Based on Table 4, the results of the multiple linear regression analysis in the table above, it can be concluded that the two independent variables, namely Digital Transformation (X_1) and Business Incubation (X_2), have a significant effect on SME Business Performance. First, the constant value (α) of 1.24 indicates that if Digital Transformation and Business Incubation are zero, then the baseline value of SME business performance is 1.24. Then, the regression coefficient value of Digital Transformation ($\beta = 0.45$) with a t-count of 5.87 and a significance (p-value) = 0.000, which is less than 0.05, indicates that Digital Transformation has a positive and significant effect on SME Business Performance. This means that the higher the implementation of digital transformation, the better the performance of SME businesses. Likewise with Business Incubation, which has a regression coefficient of 0.38, a t-count of 4.96, and a p-value = 0.000, indicating that Business Incubation also has a positive and significant effect on SME business performance. Overall, this model shows that both Digital Transformation and Business Incubation make significant contributions to improving SME performance.

Table 5. F Test Results

Source of Variation	(Sum of Squares)	df	(Mean Square)	F-Count	Sig. (p-value)
Back	152.34	2	76.17	45.67	< 0.001
Residual	628.76	377	1.67	0.00	0.00
Total	781.10	379	0.00	0.00	0.00

Based on Table 5 shows that the regression model used in this study is statistically significant. The F-count value of 45.67 is much greater than the F-table (with df of 2; 377), and the significance value (p-value) <0.001, which means it is smaller than 0.05. This shows that the regression model is simultaneously significant. This means that together the variables Digital Transformation and Business Incubation have a significant effect on SME Business Performance. The Regression value of 152.34 shows the variation in SME Business Performance that can be explained by the two independent variables. While the Residual of 628.76 is the remaining variation that cannot be explained by the model. Thus, this F test provides strong evidence that the regression model involving Digital Transformation and Business Incubation is able to significantly explain the variation in SME Business Performance.

Table 6. T Test Results

Independent Variables	Coefficients of Regression (β)	t-Count	Sig. (p-value)	Conclusion
Digital Transformation (X_1)	0.45	5.12	< 0.001	Significant
Business Incubation (X_2)	0.38	4.76	< 0.001	Significant

Based on Table 6, the results of the regression analysis show that digital transformation (X_1) has a positive and significant effect on SME business performance, with a regression coefficient of $\beta_1 = 0.45$, t value = 5.12, and p-value <0.001. This means that the higher the implementation of digital transformation, the better the performance of SME businesses. This shows the importance of adopting digital technology in increasing the efficiency and competitiveness of small and medium enterprises. Meanwhile, the business incubation variable (X_2) also has a positive and significant effect on SME business performance, with a regression coefficient of $\beta_2 = 0.38$, t value = 4.76, and p-value <0.001. This proves that incubation programs such as training, mentoring, and access to

business networks contribute significantly to improving business performance. Both variables are statistically proven to strengthen the competitiveness and sustainability of SME businesses in facing the challenges of the digital economy.

DISCUSSION

Based on the results of the study, it shows that digital transformation has a positive and significant impact on SME business performance. SMEs that adopt digital technology, such as the use of e-commerce, digital-based management systems, and social media, experience significant improvements in operational efficiency, market expansion, and product innovation. This shows that SMEs that adopt digital technology can achieve better business performance compared to SMEs that have not implemented digital transformation. This finding is consistent with previous studies showing that digital transformation can increase the competitiveness of SMEs by expanding market access and increasing interaction with customers (Vial & Baudoin, 2019; Matt & Rauch, 2020). In the Indonesian context, where SMEs often face limited access to markets and resources, digital transformation offers an effective solution to overcome these challenges.

Business incubation has also been shown to have a positive and significant impact on SME business performance. Business incubation programs that include training, mentoring, and access to business networks help SMEs develop innovation capacity, marketing strategies, and financial management which in turn have a positive impact on their business performance. Participation in a business incubation program provides the necessary support for SMEs to adapt to market and technological changes, and improve their ability to face increasingly fierce competition. These results are in line with research by Bergek and Norrman (2008), which states that business incubation can reduce business failure rates by providing the right support at the early stages of business development. Another interesting finding from this study is the strong synergy between digital transformation and business incubation in improving SME performance. SMEs that combine digital transformation with participation in a business incubation program show better performance compared to SMEs that only focus on one aspect. This synergy can be explained by the dynamic capability theory Teece et al. (1997) which states that companies that can integrate internal capabilities (in this case digital transformation) with external resources (business incubation) will have a stronger competitive advantage. In practice, business incubation can help SMEs optimize the use of digital technology by providing the right direction and support so that digital transformation can be carried out more effectively and efficiently.

The findings of this study highlight several important managerial implications. First, digital transformation is essential for SMEs and should be integrated into their core business strategies to enhance efficiency, foster innovation, and maintain competitiveness. To support this, the government and related institutions need to play an active role by offering training, access to digital tools, and other resources that facilitate technology adoption. Second, business incubation plays a critical role in helping SMEs navigate the challenges of the digital era. Therefore, incubation programs must be expanded and improved to provide more comprehensive and tailored support. These programs can significantly contribute to the growth and sustainability of SMEs in increasingly competitive markets. Lastly, collaboration is key to maximizing the benefits of both digital transformation and business incubation. A synergistic approach involving SMEs, government bodies, incubation service providers, and the private sector is necessary to build a strong ecosystem that fosters the development of innovative, technology-based SMEs.

CONCLUSION

This study finds that both digital transformation and participation in business incubation programs significantly improve the performance of small and medium enterprises (SMEs). The integration of these two strategies enhances operational efficiency, innovation capacity, and competitiveness. A key finding is the strong synergy

between internal digital adoption and external support mechanisms. SMEs that implement both approaches simultaneously tend to achieve better performance outcomes than those that adopt only one, underscoring the importance of a dual strategy in facing dynamic market challenges. From a practical perspective, these results highlight the need for policymakers to prioritize digital transformation in SME development agendas. This involves not only improving access to digital tools but also offering training in digital literacy and strategic technology use. Additionally, incubation programs must be modernized to align with digital era demands by incorporating relevant curricula, qualified mentors, and stronger business networks. A multi-stakeholder collaboration involving the government, private sector, financial institutions, and academia is also essential to foster a robust SME ecosystem.

Theoretically, this research contributes to the growing body of knowledge on SME development by emphasizing the combined role of internal capabilities (technology adoption) and external enablers (incubation support) in enhancing firm performance and sustainability. However, this study is limited by its focus on a specific SME context and may not capture sectoral or regional variations. Future research could employ longitudinal or comparative designs across different industries or countries to better understand contextual factors. Future studies are also encouraged to explore other moderating variables, such as digital maturity or organizational culture, to gain deeper insight into the mechanisms that link digital transformation, incubation, and SME success.

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