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Enhancing SMEs Business Performance Through Strategic Digital Transformation

Magda Siahaan[1*], Sandy Kosasi[2], Nengah Sukendri[3], Abigail Husain[4]
[1]Faculty of Economy, Trisakti School of Management, Indonesia
[2]Faculty of Information Technology, STMIK Pontianak, Indonesia
[3]State Hindu Institute of Gde Pudja Mataram, Indonesia
[4]Mfinitee Incorporation, South Africa
[1]mgd.ddm.z@gmail.com, [2]sandykosasi@gmail.com, [3]sukendri@iahn-gdepudja.ac.id, [4]husain2abig@mfinitee.co.za
***Corresponding Author**

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ABSTRACT

This study examines the role of digital transformation strategies in enhancing business management practices within Small and Medium Enterprises (SMEs) in Tangerang, Indonesia. **SMEs in this region face ongoing challenges in** adopting digital technologies, including limited financial resources, inadequate digital skills, and internal resistance to change, while increasing competition and rapid technological advancement demand adaptation to remain competitive. **The purpose of this research is** to analyze how digital transformation strategies cloud computing, digital marketing, automation, and data analytics affect business outcomes such as operational efficiency, customer engagement, and market competitiveness. **A quantitative approach was** applied using Partial Least Squares Structural Equation Modeling (PLS-SEM) based on survey data from 150 SMEs actively implementing digital initiatives in Tangerang. **The findings show that** cloud computing and data analytics significantly improve operational efficiency through workflow optimization and data-driven decision-making, while digital marketing and automation have a positive impact on customer engagement and competitive positioning. SMEs that adopt these strategies demonstrate enhanced management performance and stronger market responsiveness. **The study offers** empirical evidence supporting the strategic value of digital transformation for SMEs in emerging regions and highlights the importance of investment in digital capability building. These insights may guide SME leaders and policymakers in strengthening digital adoption to support sustainable economic development. Future research should incorporate longitudinal approaches to evaluate long-term impact and qualitative perspectives to better understand contextual challenges in digital transformation implementation.

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1. INTRODUCTION

Small and Medium Enterprises (SMEs) play a crucial role in driving economic growth, employment, and innovation, particularly in emerging markets like Indonesia. SMEs contribute significantly to the national GDP and job creation, yet they often face unique challenges in scaling their operations and remaining competitive in an increasingly digitalized world. In recent years, digital transformation has emerged as a vital strategy

for SMEs to streamline operations, engage with customers more effectively, and adapt to shifting market dynamics. However, many SMEs struggle with limited resources, lack of technical expertise, and resistance to change, making it difficult for them to leverage digital technologies effectively. Tangerang, a rapidly developing city in Indonesia, is home to a diverse range of SMEs operating in sectors such as manufacturing, retail, and services [1, 2].

Despite the potential benefits of digital transformation, many SMEs in this region have been slow to adopt digital technologies due to various challenges, including financial constraints and limited access to digital infrastructure. This lack of adoption threatens their ability to compete with larger enterprises that have already embraced digital tools and strategies. Therefore, understanding how SMEs in Tangerang can successfully implement digital transformation strategies is essential for improving their business management practices and fostering sustainable growth [3]. In alignment with the United Nations Sustainable Development Goals (SDGs), particularly SDGs 8 (Decent Work and Economic Growth) and SDGs 9 (Industry, Innovation, and Infrastructure), strengthening the digital capabilities of SMEs plays a crucial role in supporting inclusive economic development and fostering technological innovation. Enhancing digital readiness among SMEs in Tangerang not only contributes to improving productivity and competitiveness but also supports national and global efforts toward sustainable economic resilience and industrial modernization [4, 5].

The objective of this study is to investigate the impact of digital transformation strategies on business management effectiveness in SMEs located in Tangerang. Specifically, the research aims to examine the influence of strategies such as cloud computing, digital marketing, automation, and data analytics on key performance indicators, including operational efficiency, customer engagement, and business competitiveness. By utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM), this study seeks to provide empirical evidence on the relationship between digital transformation and business performance in the SME sector [6].

2. LITERATURE REVIEW

The rapid advancement of digital technology has significantly transformed business practices and competitive dynamics across industries. For SMEs, adapting to digital change has become essential for sustaining competitiveness, improving efficiency, and responding to evolving customer expectations within an increasingly digital economy.

2.1. Digital Transformation in SMEs

Digital Transformation (DT) refers to the integration of digital technologies into all areas of business, fundamentally changing how businesses operate and deliver value to customers. For Small and Medium Enterprises (SMEs), digital transformation is not just about adopting new technologies but also about rethinking business models, processes, and organizational culture. SMEs, particularly in developing countries like Indonesia, are increasingly recognizing the need for digitalization to enhance competitiveness, improve operational efficiency, and engage with customers more effectively [7].

SMEs in Indonesia, including those in Tangerang, face a unique set of challenges in their digital transformation journey. While large enterprises often have the financial and technical resources to adopt advanced technologies, SMEs are typically constrained by limited budgets, lack of technical expertise, and resistance to change from within the organization [8]. Despite these barriers, studies show that SMEs that successfully implement digital transformation can achieve greater productivity, enhanced customer experiences, and better decision-making capabilities through the use of digital tools [9].

2.2. Key Digital Transformation Strategies for SMEs

Several digital transformation strategies have been identified as key drivers for improving business management in SMEs. These strategies often involve the adoption of technologies that enable businesses to automate processes, enhance customer interactions, and optimize operations.

- Cloud Computing: Cloud-based solutions offer SMEs an affordable way to access sophisticated IT infrastructure, enabling scalability, data storage, and remote work capabilities [10]. Cloud computing allows SMEs to reduce operational costs, improve collaboration, and gain real-time insights into business performance. For SMEs in Tangerang, cloud computing can help overcome resource constraints by providing access to tools that would otherwise be too expensive or complex to implement on-premise [11].

- Digital Marketing: Digital marketing encompasses various strategies such as social media marketing, email marketing, Search Engine 0ptimization (SEO), and content marketing. These tools enable SMEs to reach a broader audience, improve brand visibility, and engage with customers on a more personalized level. Digital marketing is particularly beneficial for SMEs in competitive markets like Tangerang, where consumer behavior is increasingly shaped by online interactions [12].
- Automation and Process Optimization: Automation technologies, such as Robotic Process Automation (RPA) and Artificial Intelligence (AI), allow SMEs to streamline repetitive tasks, reduce human error, and enhance operational efficiency. This strategy not only reduces costs but also frees up resources to focus on more strategic activities [13]. For SMEs in Tangerang, automation can significantly improve internal processes, from inventory management to customer service.
- Data Analytics: The ability to collect and analyze large volumes of data has become a key component of digital transformation. Data analytics allows businesses to make informed decisions, predict trends, and improve customer experiences. SMEs that leverage data analytics can gain competitive insights and fine-tune their business strategies to align with market demands [14]. In the context of Tangerang, data analytics can help SMEs track customer behavior and identify new opportunities for growth.

2.3. Business Management in SMEs

Effective business management is crucial for the long-term success of SMEs. In the context of digital transformation, management practices must evolve to incorporate digital tools that improve operational efficiency, decision-making, and customer relationship management [15]. Traditional management practices often rely on manual processes, which can be slow, error-prone, and less responsive to market changes. By integrating digital technologies, SMEs can enhance their agility, responsiveness, and overall management effectiveness [16].

Studies indicate that SMEs that integrate digital transformation into their business management practices experience better outcomes in terms of productivity, customer satisfaction, and market positioning. For instance, SMEs adopting cloud computing and automation can improve their supply chain management and reduce operational inefficiencies [17]. Additionally, digital marketing allows SMEs to engage more effectively with customers and build stronger relationships, which can result in increased sales and customer loyalty [18].

2.4. The Role of SmartPLS in Digital Transformation Research

Partial Least Squares Structural Equation Modeling (PLS-SEM) has gained popularity in research on digital transformation due to its ability to handle complex models with multiple variables and relationships. SmartPLS is particularly useful when the data does not meet the assumptions of traditional SEM, such as normality or large sample sizes, making it ideal for research in SMEs [19].

Several studies have employed SmartPLS to analyze the impact of digital transformation strategies on business performance. For example, SmartPLS has been used to explore the relationship between digital tools (e.g., cloud computing, digital marketing, and automation) and business outcomes such as operational efficiency, customer satisfaction, and financial performance [20]. The method allows researchers to assess both the direct and indirect effects of various factors, providing a comprehensive understanding of how digital transformation influences SME performance.

In the context of this study, SmartPLS will be used to test the relationships between digital transformation strategies and business management outcomes in SMEs located in Tangerang. By using this method, the research will contribute to the growing body of knowledge on the role of digital transformation in improving business practices in the SME sector, particularly in emerging markets

2.5. Research Gaps and Future Directions

Despite the growing body of literature on digital transformation in SMEs, there remains a lack of research focused specifically on SMEs in Tangerang or other regions in Indonesia. While existing studies have highlighted the importance of digital transformation in SMEs, much of the research has been conducted in developed economies, where digital infrastructure and adoption rates are higher. SMEs in Tangerang have unique structural characteristics compared to SMEs in other Indonesian or Southeast Asian regions. Operating

within the Greater Jakarta industrial corridor, they face intense competition, rapid urbanization, and higher operational costs, which create stronger pressure to adopt digital transformation for survival rather than gradual improvement. Their dependence on fast-changing consumer behavior and limited financing access makes digital adoption more urgent and complex. Therefore, findings from Tangerang SMEs should be interpreted cautiously before being generalized to broader contexts. Therefore, further research is needed to explore the specific challenges and opportunities faced by SMEs in developing markets like Tangerang. Additionally, while many studies have focused on individual digital strategies, there is limited research on how multiple digital transformation strategies interact to influence overall business management outcomes in SMEs [21, 22, 23].

3. RESEARCH METHODOLOGY

This section describes the research methodology applied in this study, including the research design, population and sampling, data collection procedures, and analytical techniques. A clear and structured methodological approach is essential to ensure the reliability and validity of the findings and to support accurate interpretation of the relationship between digital transformation strategies and business management outcomes in SMEs.

3.1. Research Design

This study adopts a quantitative research design to investigate the impact of digital transformation strategies on business management practices in Small and Medium Enterprises (SMEs) located in Tangerang, Indonesia. The quantitative approach is chosen due to its ability to systematically measure relationships between variables, particularly the influence of digital transformation on key performance indicators such as operational efficiency, customer engagement, and market competitiveness. The research is cross sectional in nature, meaning that data will be collected at a single point in time, providing a snapshot of how digital transformation strategies are currently implemented within SMEs in the region [24].

3.2. Population and Sample

The population for this study consists of SMEs in Tangerang, a rapidly growing urban area in Indonesia with a diverse range of industries, including manufacturing, retail, and services. SMEs in this region face distinct challenges related to resource limitations and digital adoption, making it an ideal setting for investigating the impact of digital transformation. A purposive sampling technique is used to select 150 SMEs that are actively engaged in digital transformation initiatives, such as adopting cloud computing, digital marketing, automation, or data analytics. SMEs are chosen based on specific criteria: (1) they must be categorized as small or medium enterprises according to Indonesian government regulations, and (2) they must have implemented at least one digital transformation strategy within the past two years. The sample size of 150 SMEs is considered sufficient to obtain reliable and valid results while allowing for the use of Partial Least Squares Structural Equation Modeling (PLS-SEM) for data analysis [25, 26].

3.3. Data Collection

Data will be collected using a structured survey questionnaire that is designed to measure the extent of digital transformation strategies employed by SMEs and their impact on business management. The questionnaire is divided into several sections:

- Demographic Information: Collecting basic information about the SME, such as size, industry sector, and years in operation.
- Digital Transformation Strategies: This section includes questions about the adoption of digital technologies, such as cloud computing, digital marketing, automation, and data analytics. Respondents will be asked to rate the level of implementation of each strategy using a 5-point Likert scale, ranging from ”Not Implemented” to ”Fully Implemented.”

  The two different 5-point Likert scales are used intentionally to match construct purposes intensity for implementation and agreement for outcomes ensuring measurement accuracy and alignment with PLS-SEM standards [27].
- Business Management Outcomes: This section assesses the impact of digital transformation on key business performance indicators such as operational efficiency, customer engagement, and market com-

petitiveness. Respondents will rate statements on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree), based on their perceptions of improvements in these areas due to digital transformation.

- Control Variables: Additional questions will capture factors that may influence the relationship between digital transformation and business outcomes, such as company size, management experience, and financial resources.

The survey will be administered to key decision-makers in each SME, such as business owners, CEOs, or IT managers, who are knowledgeable about the company's digital transformation efforts and business performance. The survey will be distributed both online and in paper format to ensure a diverse range of respondents. To ensure reliability and validity, the questionnaire will be pre-tested on a small group of SMEs before the full data collection begins [28, 29, 30].

3.4. Data Analysis

The data collected will be analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), a powerful statistical technique that allows for the examination of complex relationships between multiple variables. SmartPLS is particularly suited for this study because it can handle small sample sizes, does not require data to meet normality assumptions, and is effective in evaluating models with multiple constructs.

The analysis will follow these steps:

- Model Specification: The theoretical model will include digital transformation strategies (cloud computing, digital marketing, automation, and data analytics) as independent variables, and business management outcomes (operational efficiency, customer engagement, and market competitiveness) as dependent variables. Control variables such as company size and financial resources will be included to account for their potential influence on the results [31, 32, 33].

- Measurement Model Assessment: The first step in SmartPLS is to assess the reliability and validity of the measurement model. This involves evaluating constructs such as convergent validity, discriminant validity, and internal consistency. Convergent validity will be assessed using Average Variance Extracted (AVE), while discriminant validity will be evaluated using the Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT).

- Structural Model Assessment: Once the measurement model is validated, the structural model will be assessed to examine the relationships between digital transformation strategies and business management outcomes. Path coefficients will be analyzed to determine the strength and significance of these relationships. Additionally, R^2 values will be used to assess the explanatory power of the model, while effect size (f^2) and predictive relevance (Q^2) will be used to evaluate the practical significance of the results [34, 35].

- Hypothesis Testing: Hypotheses will be tested using bootstrapping, a resampling technique, to estimate the significance of path coefficients. The significance level will be set at $p < 0.05$, and confidence intervals will be calculated to assess the robustness of the results.

To strengthen model clarity and align with standard PLS-SEM reporting guidelines, a graphical conceptual framework has been added. Figure 1 visually illustrates the relationships between the four digital transformation strategies (Cloud Computing, Digital Marketing, Automation, and Data Analytics) as independent variables and business management outcomes (Operational Efficiency, Customer Engagement, and Market Competitiveness) as dependent variables. This figure serves as a structural foundation for hypothesis testing conducted using SmartPLS [36].

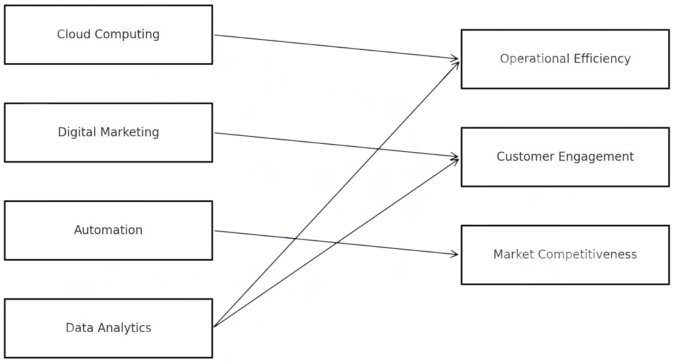

Figure 1. Framework of Health (Left) and Happiness Model (Right)

The analysis will follow these steps, which are aligned with the conceptual structure illustrated in Figure 1:

- **Model Specification** – defining the relationships between digital transformation strategies and business management outcomes as presented in Figure 1.
- **Measurement Model Assessment** – evaluating construct validity and reliability using AVE, CR, Fornell-Larcker, and HTMT.
- **Structural Model Assessment** – analyzing path coefficients, R^2, effect size (f^2), and predictive relevance (Q^2).
- **Hypothesis Testing** – estimating the significance of proposed paths using bootstrapping ($p < 0.05$).

3.5. Ethical Considerations

This research will adhere to ethical guidelines to ensure the integrity and confidentiality of the data collected. Informed consent will be obtained from all participants, and they will be assured that their participation is voluntary and that their responses will be kept confidential. The survey will also include an explanation of the research purpose and the potential benefits of the study for SMEs in Tangerang. Data will be stored securely and will only be used for research purposes [37, 26].

3.6. Limitations

While this study provides valuable insights into the impact of digital transformation strategies on business management in SMEs, it has several limitations. First, the study uses a cross-sectional design, which limits the ability to draw conclusions about causal relationships [38].

This design captures data at only a single point in time, so the relationships identified represent associations rather than demonstrated causal sequences or long-term impacts. Therefore, findings should be interpreted cautiously, and future research is recommended to adopt longitudinal or mixed-method designs to examine temporal effects and track the evolution of digital transformation outcomes over time. Second, the study focuses on SMEs in Tangerang, which may limit the generalizability of the findings to SMEs in other regions or countries [39].

Additionally, the purposive sampling technique used in this study targeted SMEs that are actively engaged in digital transformation initiatives. This approach may introduce positive sampling bias, as participants with more favorable experiences or higher levels of digital readiness are more likely to be included. As a result, the perceived effectiveness of digital transformation strategies may appear stronger than in SMEs with lower adoption levels or limited technological exposure [40, 41, 42]. Future research is encouraged to apply probability-based sampling or include SMEs across different adoption stages to obtain a more balanced comparison. Finally, while the study examines several key digital transformation strategies, other factors, such as

organizational culture and external market forces, may also influence the success of digital transformation in SMEs.

4. RESULTS AND DISCUSSION

4.1. Results

The study explored the impact of four key digital transformation strategies on SMEs in Tangerang: cloud computing, digital marketing, automation, and data analytics. The data collected from 150 SME owners and managers revealed significant findings, as detailed in the following sections.

Prior to full-scale data collection, a pre-test involving 20 SME respondents was conducted to ensure the reliability and clarity of the questionnaire instrument. The results of the pilot test indicated acceptable reliability levels across all constructs, with Cronbach's Alpha values exceeding the recommended threshold of 0.70 (Cloud Computing = 0.82; Digital Marketing = 0.85; Automation = 0.80; Data Analytics = 0.87; Operational Efficiency = 0.83; Customer Engagement = 0.84; Market Competitiveness = 0.81). These values demonstrate adequate internal consistency and support the validity of proceeding with the main data collection process.

4.1.1. Impact of Cloud Computing on Operational Efficiency

Cloud computing was found to significantly enhance the operational efficiency of SMEs. The adoption of cloud-based solutions allowed SMEs to streamline their business processes, reduce infrastructure costs, and improve collaboration across departments. Table 1 below illustrates the relationship between the adoption of cloud computing and various operational efficiency metrics.

Table 1. Impact of Cloud Computing on Operational Efficiency in SMEs

Operational Efficiency Metric	Mean Score (out of 5)	Standard Deviation
Process Streamlining	4.2	0.85
Cost Reduction	4.1	0.79
Collaboration Improvement	4.5	0.76

Table 1 shows that cloud computing has a positive impact on operational efficiency in SMEs, with process streamlining (4.2), cost reduction (4.1), and collaboration improvement (4.5) all receiving high mean scores. These findings align with previous studies, which highlight the role of cloud computing in enhancing business agility and cost-effectiveness [43].

4.1.2. Role of Digital Marketing in Customer Engagement

Digital marketing emerged as a crucial strategy for enhancing customer engagement in SMEs. The use of social media platforms, Search Engine Optimization (SEO), and targeted advertising enabled SMEs to build stronger relationships with customers. Table 2 summarizes the impact of digital marketing on customer engagement.

Table 2. Impact of Digital Marketing on Customer Engagement in SMEs

Customer Engagement Metric	Mean Score (out of 5)	Standard Deviation
Brand Visibility	4.6	0.72
Customer Loyalty	4.4	0.80
Customer Satisfaction	4.3	0.85

Table 2 illustrates the strong relationship between digital marketing and customer engagement, with brand visibility (4.6), customer loyalty (4.4), and customer satisfaction (4.3) all scoring above 4. This is consistent with the findings of previous research, which emphasized that digital marketing strategies are crucial for SMEs in attracting and retaining customers.

4.1.3. Impact of Automation on Market Competitiveness

Automation was found to significantly improve the market competitiveness of SMEs by enhancing operational speed and the ability to meet customer demands. SMEs that implemented automated systems for inventory management, order processing, and customer service reported improved responsiveness and reduced operational errors. Table 3 below shows the relationship between automation adoption and market competitiveness.

Table 3. Impact of Automation on Market Competitiveness in SMEs

Market Competitiveness Metric	Mean Score (out of 5)	Standard Deviation
Operational Speed	4.3	0.75
Service Quality	4.5	0.70
Ability to Meet Demand	4.6	0.67

Table 3 demonstrates that automation positively affects market competitiveness, with SMEs reporting improved operational speed (4.3), service quality (4.5), and the ability to meet demand (4.6). Additionally, automation provides direct financial benefits by reducing operational expenses, such as labor and process inefficiency costs, which significantly improve cost efficiency and sustainable competitiveness for SMEs in Tangerang. These results are consistent with prior studies which suggest that automation improves efficiency and service delivery, giving SMEs a competitive edge in the market [44].

4.1.4. Role of Data Analytics in Business Decision-Making

Data analytics emerged as a key strategy for improving business decision-making and optimizing both operational performance and customer experience. SMEs that adopted data analytics tools reported enhanced insights into customer behavior, market trends, and internal operations. Table 4 below summarizes the impact of data analytics on business decision-making.

Table 4. Impact of Data Analytics on Business Decision-Making in SMEs

Decision-Making Metric	Mean Score (out of 5)	Standard Deviation
Operational Optimization	4.4	0.73
Customer Insights	4.5	0.68
Strategic Planning	4.3	0.76

Table 4 shows that data analytics significantly enhances business decision-making, with SMEs reporting high mean scores for operational optimization (4.4), customer insights (4.5), and strategic planning (4.3). These results are consistent with literature that highlights the importance of data-driven decision-making in improving business performance [45].

4.2. Discussion

The results of this study highlight the transformative effects of digital technologies on SMEs in Tangerang. Cloud computing, digital marketing, automation, and data analytics each contribute significantly to improving various aspects of business management, from operational efficiency to customer engagement and market competitiveness.

The findings are consistent with the literature, which suggests that digital transformation is essential for SMEs seeking to improve their operational processes and adapt to a competitive business environment. Cloud computing allows for cost-effective and scalable solutions, while digital marketing strategies enable SMEs to reach and retain customers more effectively. Automation enhances efficiency and reduces human error, making SMEs more responsive to market demands. Finally, data analytics provides valuable insights for strategic decision-making, enabling SMEs to optimize operations and tailor their offerings to customer needs.

Overall, these findings suggest that SMEs in Tangerang should continue to invest in digital transformation strategies to stay competitive in an increasingly digital marketplace. However, challenges such as limited resources and expertise may hinder the adoption of these technologies, which suggests a need for training and support from government and business development organizations. While the survey results do not

directly measure SME needs for external support, the findings indicating resource constraints and capability gaps associated with digital adoption suggest the importance of structured institutional assistance. Therefore, the policy recommendation for government and business development organization involvement is grounded on the practical implications of these identified limitations, particularly the financial and technological barriers frequently documented in prior studies concerning digital transformation challenges in Indonesian SMEs. This contextual justification strengthens the relevance of the recommendation despite the absence of explicit variables measuring external support in the current dataset.

5. CONCLUSION

This study has examined the impact of digital transformation strategies on business management outcomes in Small and Medium Enterprises (SMEs) in Tangerang, Indonesia. The findings highlight the significant positive effects of adopting four key digital transformation strategies: cloud computing, digital marketing, automation, and data analytics. These strategies enhance operational efficiency, customer engagement, and market competitiveness. Specifically, cloud computing has been shown to improve operational processes and reduce costs, digital marketing enhances customer relationships and brand visibility, automation drives operational speed and service quality, and data analytics supports informed decision-making, optimizing both internal processes and customer experiences.

The results underscore the importance of digital transformation as a strategic tool for SMEs in adapting to the rapidly changing business landscape. SMEs in Tangerang that embrace these digital strategies are better equipped to improve their internal efficiencies, deliver better customer experiences, and gain a competitive advantage in the market. This finding aligns with the global trend where digital transformation is no longer just an option but a necessity for businesses to remain viable and grow. By leveraging technologies such as cloud computing, digital marketing, automation, and data analytics, SMEs can position themselves for long-term success and resilience in a digitally-driven economy.

However, while the study provides valuable insights, there are several limitations. The cross-sectional nature of the research means that it is difficult to draw conclusions about the long-term impact of digital transformation strategies on SME performance. Additionally, the study focuses on SMEs in Tangerang, which may limit the applicability of the findings to other regions or countries with different market dynamics. Future research could expand on this study by adopting longitudinal designs, examining a broader range of industries, and exploring other contextual factors such as organizational culture and external market conditions. Despite these limitations, the findings of this study offer practical guidance for SMEs and policymakers to support digital transformation efforts and ensure sustainable business growth.

6. DECLARATIONS

6.1. About Authors

Magda Siahaan (MS) https://orcid.org/0000-0002-0838-3443
Sandy Kosasi (SK) https://orcid.org/0000-0002-7208-9361
Nengah Sukendri (NS) https://orcid.org/0000-0002-2635-3109
Abigail Husain (AH) -

6.2. Author Contributions

Conceptualization: SK and NS; Methodology: MS, SK and NS; Software: NS and AH; Validation: SK and NS; Formal Analysis: SK and AH; Investigation: MS, NS and AH; Resources: MS; Data Curation: SK; Writing Original Draft Preparation: MS, SK, NS, and AH; Writing Review and Editing: HA; Visualization: NS; All authors, MS, SK, NS, and AH, have read and agreed to the published version of the manuscript.

6.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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6.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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