Analyzing the Relationship Between Technology Adoption and Business Performance in the Digital Age in SMEs in Indonesia

[1*]Yusuf Iskandar, [2]Heliani, [3]Ujang Badru Jaman, [4]Andri Ardhiyansyah

[1] Universitas Pembangunan Jaya
*correspondence e-mail: yusuf.iskandar@upj.ac.id

Article Info	Abstract
Keywords: Technology Adoption, Business Performance, Digital Age, SMEs	Technology is becoming a crucial component of company success in Indonesia's dynamic Small and Medium-sized Enterprises (SMEs) sector. This study aimed to quantitatively examine how technology adoption and business performance in Indonesian SMEs relate to one another. To evaluate the relationships between technology adoption—including hardware, software, internet-based solutions, automation, and digital marketing strategies—and different facets of business performance, including revenue growth, profitability, market share, customer satisfaction, and employee productivity, data was gathered from a diverse sample of SMEs in a variety of sectors. A variety of statistical techniques were also used in this research. The results showed a strong positive relationship between business performance and technology use. SMEs who embraced technology more fully illustrated better company success, especially regarding automation, digital marketing tactics, and internet-based solutions. The significance of digital marketing techniques in augmenting brand awareness and customer interaction has been underscored by their emerging status as a robust predictor of business performance.

INTRODUCTION

Adopting technology in Indonesian Small and Medium-sized Enterprises (SMEs) is influenced by various factors and has significant implications for business performance. Financial and technological factors play a crucial role in SMEs' adoption of digital technology. A study conducted on traditional market SMEs in Indonesia found that financial literacy positively impacts SME financial accessibility and financial risk. Furthermore, financial accessibility, performance expectancy, effort expectancy, and social influence significantly affect SMEs' digital adoption. However, the effect of financial risk on digital adoption was found to be insignificant (Kurniasari et al., 2023).

Barriers to adopting Industry 4.0 in the Indonesian manufacturing supply chains have also been identified. These include unclear Industry 4.0 policy, higher-

risk investment, insecure data sharing, lack of expertise, and lack of incentive (Fernando et al., 2022). The Technology, Organization, Environment (TOE) model has been used to analyze technology adoption by SMEs. The outcomes of the TOE model indicate that the environmental, organizational, and technology dimensions have a direct positive and significant effect on technology adoption (Ramdani et al., 2013).

The adoption of digital technology has been found to have a positive and significant influence on the financial performance of SMEs in the food and beverage sector in Indonesia. The variables of concern in this study were digital finance, digital payments, and digital marketing. However, the moderation of financial literacy and inclusion could not strengthen the relationship between digital finance, digital payments, and digital marketing to financial performance (Sinaga et al., 2023).

The Covid-19 pandemic has also influenced SMEs' adoption of technology and social media marketing in Indonesia. The adoption of internet/e-business technology can be explained by perceived usefulness, ease of use, and cost. Furthermore, there is a link between internet/e-business technology, social media marketing, and SMEs' sustainability (Patma et al., 2021).

(SMEs) Indonesia faces various challenges, including adapting to the digital age, fierce competition, and limited resources. However, they also have several opportunities and support mechanisms to help them thrive in the country's dynamic environment.

One of the significant challenges SMEs face is the digital transformation of their businesses. The COVID-19 pandemic has accelerated the digital behavior of people and companies, and Indonesia, with its rapidly growing digital economy and FinTech sector, is no exception. FinTech plays a crucial role in helping SMEs go digital and enhance their business performance through services like venture capital financing, digital payment services, and financial arrangements. However, there are still obstacles such as technology adoption, financial literacy, digital literacy, financial inclusion, and fintech inclusion that need to be addressed (Situmorang, 2022).

Government support also plays a crucial role in the development of SMEs. For instance, in West Sumatra, government policies directly influence the internal factors of SMEs, but they do not directly affect SMEs' performance. Therefore, more intensive and focused policies are needed to improve the performance of SMEs (Rahmi & Yuzaria, 2021).

Information technology (IT) advancement has also opened up opportunities for SMEs in Indonesia to implement Mass Customization and Personalization (MCP), a business mode that allows customers to adjust some product design parameters to meet their requirements. This approach has been successful in many developed countries, and there are big opportunities to implement MCP in Indonesia, especially for creative products produced by SMEs (Widodo & Mahtarami, 2016).

Community Partnership Programs have also been implemented to support the digitalization of SMEs in Indonesia. These programs aim to educate and guide SMEs in business management and digital platforms4. A Digital Entrepreneurial Ecosystem (DEE) has been proposed to help SMEs understand the environmental conditions and existing ecosystems. This new framework integrates digital technology and digital institutions to make up the external environment, which is crucial for SMEs (Munaiseche et al., 2022).

Entrepreneurial Knowledge, Market Orientation, and Digitalization significantly affect SMEs' Entrepreneurial Competencies in Indonesia. The government is recommended to pay more attention to digitalization development for SMEs, especially during the current pandemic crisis. The supporting infrastructure for digitalization, such as easy internet access connectivity, especially in the country's remote areas, can be improved (Abidin et al., 2022).

The digital age has introduced an array of technological tools and solutions that have the potential to address some of these challenges, ranging from e-commerce platforms to data analytics, cloud computing, and digital marketing. SMEs that successfully embrace these technologies can enhance their operational efficiency, customer reach, and product or service quality, ultimately leading to improved business performance. However, the level and scope of technology adoption can vary widely among SMEs, and its impact on business performance has yet to be universally understood. This study aims to fill this knowledge gap by comprehensively analyzing the relationship between technology adoption and business performance in SMEs operating in Indonesia.

The primary research problem addressed by this study is to investigate how the adoption of technology in SMEs operating in Indonesia influences their business performance. The term 'technology adoption' encompasses various aspects, including the adoption of hardware, software, internet-based solutions, automation, and digital marketing strategies. It is essential to understand whether the degree and type of technology adoption correlate with improved business

performance metrics, such as revenue growth, profitability, market share, and customer satisfaction.

THEORETICAL FOUNDATION

Technology Adoption in SMEs

Adopting technology in Small and Medium Enterprises (SMEs) in Indonesia is influenced by several factors, including perceived usefulness, ease of use, government support, trust, and user innovativeness. A study on Fintech adoption in Indonesian SMEs found that these factors had a direct positive effect on the intention of SMEs to adopt Fintech. Interestingly, the study also found that financial literacy indirectly correlates with Fintech adoption, mediated by user innovativeness. This suggests that even SMEs with lower financial literacy can utilize financial products and services via Fintech, contributing to financial inclusion (Nugraha et al., 2022).

Barriers to technology adoption in Indonesian SMEs include limitations in human capital in managing the technical and operational aspects of Information and Communication Technology (ICT). These limitations can hinder the effective utilization of ICT, suggesting the need for strategies that combine proactive and reactive approaches to optimize resources (Muljono et al., 2021). Government incentives can also play a significant role in technology adoption. While the research on this aspect is not specific to Indonesia, a study on SMEs in Tonga found that government's policy and subsidies positively and significantly shape firms' ethics and attitudes regarding sustainability-oriented technology (SOT) implementation (Faasolo & Sumarliah, 2022).

Key determinants of technology adoption in SMEs include relative advantage, technology compatibility, technology readiness, top management support, and vendor support. However, the complexity of technology and cost concerns can act as inhibitors to technology adoption (Kumar Bhardwaj et al., 2021). The size and age of the SMEs can influence regional differences in technology adoption among SMEs in Indonesia. A study conducted in Yogyakarta, Indonesia, found no significant differences in IT acceptance based on the age of SMEs (Muafi et al., 2021).

Business Performance in SMEs

Business performance in SMEs is typically assessed through a range of metrics, including financial and non-financial indicators. Common economic

indicators include revenue growth, profitability, and return on investment. Non-financial indicators may encompass customer satisfaction, market share, and employee productivity. SMES must consider a mix of financial and non-financial metrics to gain a comprehensive understanding of performance (Iskandar et al., 2020; Jaman, 2017; Supriandi, 2022).

Technology adoption has a direct impact on business performance. Several studies suggest that businesses that effectively integrate technology into their operations experience higher revenue growth, increased profitability, and improved operational efficiency. In the Indonesian context, where SMEs play a significant role in the economy, the implications of technology adoption for business performance are of particular interest (Kurniawan et al., 2023; Supriandi & Iskandar, 2021).

Digital marketing and e-commerce have emerged as powerful tools for SMEs to enhance business performance in the digital age. Digital marketing strategies, including social media marketing, search engine optimization, and content marketing, can increase brand visibility and customer engagement. E-commerce platforms can expand market reach, drive sales, and improve customer convenience. These technologies can significantly influence the performance of SMEs in Indonesia and are worth exploring in the context of this research.

Gaps in the Literature

Despite the considerable research on technology adoption and business performance, there are notable gaps in the literature. Only some studies comprehensively analyze technology adoption in the context of Indonesian SMEs. Furthermore, there needs to be more understanding of the specific challenges and opportunities SMEs face in different regions of Indonesia, where infrastructural and economic conditions can vary significantly.

RESEARCH METHODS

This research uses a quantitative research approach. Quantitative analysis allows the collection of numerical data and statistical techniques to analyze the relationship between variables. Since this research focuses on measuring the impact of technology adoption on business performance, the quantitative approach is the most appropriate. This study uses a cross-sectional design, meaning data will be collected simultaneously. This design is suitable for examining the relationship between technology adoption and business performance among SMEs in Indonesia during a specific period, which provides a snapshot of the situation. This research

utilizes a survey strategy, specifically a questionnaire-based survey, to collect data from SMEs in Indonesia. Surveys allow for efficient data collection from large and diverse samples.

Data Collection

Sampling

The target population for this study was SMEs in Indonesia. Given the size of this population, a sample was selected to represent the population adequately. A stratified random sampling technique will ensure representation from different sectors and regions in Indonesia. The strata will be based on industry sector and geographical area. The sample size is determined using a 95% confidence level and a margin of error of 5%. The sample size calculation will also consider the size of the SME population in Indonesia. Ensuring an adequate sample size is critical to generalizing the findings. A structured questionnaire will be developed as the primary data collection instrument. The questionnaire will consist of two main sections: one focusing on technology adoption and another on business performance. The questionnaire will include closed-ended questions with answer options on a Likert scale, allowing respondents to rate their level of agreement with various statements; a total of 210 samples are involved in this study.

Data Analysis

After data collection, the collected data will be coded, cleaned, and organized for analysis. This process will involve checking for missing data, outliers, and inconsistencies. Necessary data transformations will be performed to ensure that the data meets the assumptions of the chosen statistical technique.

Statistical analysis uses the SPSS (Statistical Package for the Social Sciences) software. This will assist in performing the necessary statistical tests and generating graphical representations of the data.

RESULTS

In this section, we present the results of the quantitative analysis and then discuss the findings in the context of the research objectives. This study analyzes the relationship between technology adoption and business performance in Indonesia's Small and Medium Enterprises (SMEs).

Descriptive Statistics

We summarize vital statistics related to technology adoption and business performance in the SME sample. These statistics include means, standard deviations, and frequencies. Descriptive statistics provide an initial overview of the

data, allowing us to understand central tendencies and variations in the variables of interest.

The survey collected data on various aspects of technology adoption, such as the adoption of hardware, software, internet-based solutions, automation, and digital marketing strategies. The results show that Indonesia's average level of technology adoption among SMEs is relatively high, with an average score of 4.2 (on a scale of 1 to 5, where 1 represents low adoption and 5 represents high adoption). Internet-based solutions have the highest adoption rate among the SMEs surveyed, with an average score of 4.5. Automation and digital marketing strategies also show substantial adoption, with average scores of 4.3 and 4.4. Hardware and software adoption lagged slightly behind, with average scores of 3.9 and 4.0.

The survey collected data on various business performance metrics, including revenue growth, profitability, market share, customer satisfaction, and employee productivity. The results show that: The overall business performance of SMEs in Indonesia is on average quite strong, with an average score of 4.0 (on a scale of 1 to 5, where 1 indicates poor performance, and 5 indicates excellent performance). Revenue growth and profitability were the most positively rated performance metrics, with average scores of 4.2 and 4.3. Customer satisfaction, market share, and employee productivity also received favorable ratings, with average scores of 4.1, 4.0, and 4.0, respectively.

Inferential Statistics

In this section, we present the results of inferential statistical analysis, specifically Pearson correlation analysis and multiple regression analysis, which aim to examine the relationship between technology adoption and business performance. Pearson correlation analysis assessed the strength and direction of the relationship between technology adoption and business performance. The results show the following key findings:

A statistically significant positive correlation between overall technology adoption and overall business performance ($r = 0.754$, sig < 0.001). This indicates that SMEs with higher levels of technology adoption tend to exhibit better business performance.

When examining specific aspects of technology adoption, it was found that internet-based solutions ($r = 0.823$, sig < 0.001), digital marketing strategies ($r = 0.783$, sig < 0.001), and automation ($r = 0.692$, sig < 0.001) all showed statistically significant positive correlations with business performance. Hardware and

software adoption, although positively correlated, did not reach statistical significance.

Multiple Regression Analysis

Multiple regression analysis was used to investigate the extent to which technology adoption, when controlling for other factors, predicts business performance. The results of the multiple regression analysis show the following: Overall technology adoption significantly predicts overall business performance (F = 45.324, sig < 0.001). This indicates that technology adoption explains a significant proportion of the variance in business performance.

When examining specific aspects of technology adoption, adopting digital marketing strategies was a powerful predictor of business performance (β = 0.368, sig < 0.001). Internet-based solutions (β = 0.302, sig < 0.001) and automation (β = 0.226, sig < 0.01) also significantly predicted business performance. Although hardware and software adoption contributed positively to the model, it did not reach statistical significance.

Discussion

The results of this study provide valuable insights into the relationship between technology adoption and business performance in SMEs in Indonesia.

The findings support the existing literature that highlights a positive correlation between technology adoption and business performance in SMEs. SMEs in Indonesia that adopt technology, particularly internet-based solutions, digital marketing strategies, and automation, tend to exhibit improved business performance. These technologies enhance operational efficiency, customer reach, and product or service quality, contributing to higher revenue growth, profitability, and customer satisfaction.

One notable finding is the strong influence of digital marketing strategies on business performance. SMEs in Indonesia that invest in digital marketing practices experience a significant boost in performance. This underscores the importance of digital marketing in enhancing brand visibility, customer engagement, and market share.

The findings suggest that certain factors may moderate the relationship between technology adoption and business performance. While overall technology adoption is positively associated with business performance, the extent to which hardware and software adoption contributes is influenced by contextual factors, such as industry-specific requirements and organizational readiness. This

highlights the need for SMEs to consider the specific technologies that align with their business goals.

Policy Implications

These findings have significant policy implications. Policymakers in Indonesia can consider promoting technology adoption initiatives, particularly in digital marketing strategies, automation, and internet-based solutions, to support SME growth and competitiveness. Addressing barriers such as cost and awareness could further accelerate technology adoption among SMEs.

Limitations

It's essential to acknowledge some limitations of this study. The research employed a cross-sectional design, which provides a snapshot of the relationships at a single point in time. Future research could consider longitudinal studies to explore the long-term effects of technology adoption on business performance. Additionally, this study relied on self-reported data, which can be subject to response bias.

CONCLUSION

This research explored the complex relationship between technology adoption and business performance in Small and Medium-sized Enterprises (SMEs) in Indonesia. Through a quantitative analysis, we collected data from a diverse sample of SMEs and applied various statistical techniques to assess this relationship. The results of our study shed light on critical insights that have both practical and policy implications.

Our findings confirm the positive correlation between technology adoption and business performance. SMEs in Indonesia that embrace technology, particularly in internet-based solutions, digital marketing strategies, and automation, tend to experience improved business performance. It is noteworthy that digital marketing strategies emerged as a powerful predictor of business performance, emphasizing the role of digital marketing in enhancing brand visibility and customer engagement.

These findings have significant policy implications for Indonesia. Policymakers can consider promoting technology adoption initiatives, particularly in digital marketing, automation, and internet-based solutions, to bolster SME growth and competitiveness. By addressing barriers such as cost and awareness, policymakers can further accelerate technology adoption among SMEs, contributing to economic development and job creation.

REFERENCE

Abidin, Z. Z., Rahayu, S. M., Pamungkas, M. G. W. E. N., Handayani, S. R., & Utami, R. B. (2022). Entrepreneurial Knowledge, Market Orientation, Digitalization, and Entrepreneurial Competencies: Evidence from SMEs in Indonesia. *Journal of Economics, Finance and Accounting Studies*, *4*(2), 91–103.

Faasolo, M., & Sumarliah, E. (2022). Sustainability-oriented technology adoption in Tonga: the impact of Government's incentives and internal factors. *International Journal of Emerging Markets*.

Fernando, Y., Wahyuni-TD, I. S., Gui, A., Ikhsan, R. B., Mergeresa, F., & Ganesan, Y. (2022). A mixed-method study on the barriers of industry 4.0 adoption in the Indonesian SMEs manufacturing supply chains. *Journal of Science and Technology Policy Management*, *ahead-of-print*.

Iskandar, Y., Zulbainarni, N., & Jahroh, S. (2020). Pengaruh Karakteristik Usaha dan Wirausaha Terhadap Kinerja UMKM Industri Pengolahan Perikanan di Kabupaten Sukabumi. *Jurnal REKOMEN (Riset Ekonomi Manajemen)*, *4*(1), 1–12.

Jaman, U. B. (2017). *Perlindungan hukum terhadap usaha mikro kecil dan menengah dihubungkan dengan asas kesetaraan ekonomi dalam upaya mendorong ekonomi kerakyatan*. UIN Sunan Gunung Djati Bandung.

Kumar Bhardwaj, A., Garg, A., & Gajpal, Y. (2021). Determinants of blockchain technology adoption in supply chains by small and medium enterprises (SMEs) in India. *Mathematical Problems in Engineering*, *2021*, 1–14.

Kurniasari, F., Lestari, E. D., & Tannady, H. (2023). Pursuing Long-Term Business Performance: Investigating the Effects of Financial and Technological Factors on Digital Adoption to Leverage SME Performance and Business Sustainability—Evidence from Indonesian SMEs in the Traditional Market. *Sustainability*, *15*(16), 12668.

Kurniawan, -, Maulana, A., & Iskandar, Y. (2023). The Effect of Technology Adaptation and Government Financial Support on Sustainable Performance of MSMEs during the COVID-19 Pandemic. *Cogent Business & Management*, *10*(1), 2177400.

Muafi, M., Gusaptono, R. H., Effendi, M. I., & Novrido, C. (2021). The information technology (IT) adoption process and e-readiness to use within Yogyakarta Indonesian small medium enterprises (SME). *International Journal of Information and Communication Technology Research to Use within Yogyakarta Indonesian Small Medium Enterprises (SME)*, *2*(1), 29–37.

Muljono, W., Setiyawati, S., Sudarsana, S., & Setiawati, P. P. (2021). Barriers to ICT

Adoption by SMEs in Indonesia: how to bridge the digital disparity? *Jurnal Aplikasi Manajemen*, *19*(1), 69–81.

Munaiseche, M., Saroinsong, T., Rumambi, H. D., Kondoj, M. A. S., Rangkang, J., & Kumaat, A. (2022). Similarity Check: The Concept of Digital Entrepreneurial Ecosystem for SMEs in North Sulawesi, Indonesia. *American Journal of Industrial and Business Management*, *12*(3).

Nugraha, D. P., Setiawan, B., Nathan, R. J., & Fekete-Farkas, M. (2022). FinTech adoption drivers for innovation for SMEs in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(4), 208.

Patma, T. S., Wardana, L. W., Wibowo, A., Narmaditya, B. S., & Akbarina, F. (2021). The impact of social media marketing for Indonesian SMEs sustainability: Lesson from Covid-19 pandemic. *Cogent Business & Management*, *8*(1), 1953679.

Rahmi, E., & Yuzaria, D. (2021). The government support model on the development of smes in West Sumatera Province. Indonesia. *IOP Conference Series: Earth and Environmental Science*, *757*(1), 12005.

Ramdani, B., Chevers, D., & Williams, D. A. (2013). SMEs' adoption of enterprise applications: A technology-organisation-environment model. *Journal of Small Business and Enterprise Development*, *20*(4), 735–753.

Sinaga, K. A. S., Irene, J., & Christanti, R. (2023). Digital Adoption and Financial Performance: Evidence From Indonesian SMEs in Food and Beverage Sector. *Return: Study of Management, Economic and Bussines*, *2*(04), 423–434.

Situmorang, S. H. (2022). The Challenges of FinTech Inclusion and Digitization of SMEs in Indonesia. In *FinTech Development for Financial Inclusiveness* (pp. 118–134). IGI Global.

Supriandi, S. (2022). *Pengaruh Modal Sosial, Kapabilitas Finansial, Orientasi Kewirausahaan Terhadap Daya Saing Bisnis Berkelanjutan Serta Implikasinya Pada Kinerja Umkm Industri Kuliner Di Kota Sukabumi*. Nusa Putra.

Supriandi, S., & Iskandar, Y. (2021). Faktor-Faktor Yang Mempengaruhi Minat Berwirausaha: Sebuah Studi Literatur. *Senmabis: Conference Series*, *1*(1), 96–107.

Widodo, I. D., & Mahtarami, A. (2016). Mass Customization and Personalization Prospects in Developing Country: Indonesian Context. *IOP Conference Series: Materials Science and Engineering*, *105*(1), 12046.