

How Can Indonesia Advance Its Economic Potential Through Digital Transformation and Business Resilience in The Local Digital Economy?

印度尼西亚如何通过数字化转型和本土数字经济中的商业韧性来释放其经济潜力？

Ali Akbar Anggara^{1*}, M. Elfan Kaukab², Ali Imron³

¹ Faculty of Economics and Business, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia

² Faculty of Economics and Business, Universitas Sains Al-Qur'an, Wonosobo, Indonesia

³ Faculty of Creative Design and Digital Business, Institut Teknologi dan Sains Nahdlatul Ulama Pekalongan, Pekalongan, Indonesia

*Correspondence: Ali Akbar Anggara; aliakbarang@ump.ac.id

Abstract. This study examines the role of digital transformation (DT) in enhancing the development of small medium enterprises (SMEs) within Indonesia's local digital economy (LDE), emphasizing the mediating role of business resilience (BR). Using a quantitative approach, data were collected from 370 SMEs owners across Indonesia through structured questionnaires and analyzed using structural equation modeling (SEM). The results reveal that DT significantly improves LDE performance both directly and indirectly through BR. Firms that integrate digital technologies with adaptive capabilities demonstrate greater ability to manage uncertainty, maintain operational continuity, and sustain long-term competitiveness. These findings extend the literature on digital transformation by integrating dynamic capability and resource-based perspectives, highlighting resilience as a key mechanism that converts digital potential into economic value. The study also offers practical implications for policymakers and small business practitioners seeking to promote resilient digitalization strategies that foster inclusive and sustainable local economic development.

Keywords: Digital transformation; Business resilience; Local digital economy.

摘要：本研究探讨数字化转型（DT）在促进泰国本地数字经济（LDE）中微型企业（SMEs）发展方面的作用，并重点分析企业韧性（BR）的中介作用。研究采用定量方法，通过结构化问卷对泰国370位微型企业所有者进行数据收集，并运用结构方程模型（SEM）进行分析。研究结果表明，数字化转型通过直接作用以及通过企业韧性的间接作用，显著提升了本地数字经济绩效。能够将数字技术与适应性能力有效结合的企业，在应对不确定性、保持运营连续性以及维持长期竞争力方面表现出更强的能力。这些发现通过整合动态能力理论与资源基础观，拓展了数字化转型相关研究，并将企业韧性视为将数字潜力转化为经济价值的重要机制。同时，本研究也为政策制定者和小微企业实践者提供了实践启示，即通过推动具有韧性的数字化战略，促进包容性和可持续的本地经济发展。

关键词：数字化转型；企业韧性；本地数字经济。

Received: 23 January 2026 **Revised:** 20 February 2026 **Accepted:** 12 March 2026 **Published:** 30 March 2026

Citation: Anggara, A. A., Kaukab, M. E., & Imron, A. (2026). How Can Indonesia Advance Its Economic Potential Through Digital Transformation and Business Resilience in The Local Digital Economy? [印度尼西亚如何通过数字化转型和本土数字经济中的商业韧性来释放其经济潜力?]. *Studies in Science of Science*, 44(3), 264–281.

1. Introduction

Business enterprises continuously seek new strategies to generate reasonable profits by modifying their products and capturing incremental gains. Such developments influence various domains, including improvements in project management processes and the advancement of digitalization (Chirumalla, 2021). These changes have substantial implications for the local digital economy by shaping regional economic dynamics, the business environment, operational processes, and financial performance, among other aspects. Beyond large-scale data initiatives, attention is increasingly directed toward information and communication technology, which demands significant resources which illustrate how rapidly the landscape has evolved (Gaglio et al., 2022). Previous studies indicate that digital transformation enables firms to disseminate the advantages of digital technologies across local economic systems by strengthening adaptability, connectivity, and value creation (Zhang et al., 2021). One approach for navigating these complex and constantly evolving environments is through the adoption of business resilience (Chen et al., 2021). Insufficient preparedness may lead to major disruptions, highlighting the necessity of developing local digital response capabilities to support sustainable development by strengthening business resilience (Adekola & Clelland, 2020). Earlier literature has emphasized the direct impact of digital transformation on connectivity, governance, and production dimensions. This study investigates how digital transformation directly influences the local digital economy and anticipates expanded technological adoption by both the private and public sectors in the near future. Local governments, entrepreneurs, and academic institutions have increasingly focused on the development of the local digital economy, with individual communities expected to become key components within highly localized digital ecosystems (Sanchis et al., 2020).

Technological insights and innovations have expanded digital opportunities, including infrastructure development, human resource capabilities, and government services that determine whether organizations or societies adopt technology and strengthen their resilience capacities (Tim et al., 2021). These developments involve inter-firm relationships, supply chain dynamics, strengthened regional IT resources, as well as digital capabilities and strategies (Sanchis et al., 2020). The advancement of the local digital economy depends significantly on business resilience to maintain long-term stability and sustainable growth. Collectively, these factors highlight the importance of business resilience as a central mechanism linking digital transformation with sustainable local economic development (Kotsios, 2023). Digital transformation (DT) is generally defined as the process through which organizations utilize digital technologies to restructure operational processes, create new forms of value, and reinforce competitiveness within rapidly evolving markets (Vial, 2021). In contrast, business resilience (BR) refers to an organization's ability to anticipate disruptions, absorb shocks, and recover while maintaining core functions and adapting to changing conditions (Linnenluecke, 2017). Meanwhile, the local digital economy (LDE) represents a network of digital interactions, transactions, and innovations that enhance productivity and promote inclusive growth within local communities (OECD, 2018). Together, these three interconnected constructs provide the conceptual foundation of this study and offer a framework for understanding how digital transformation strengthens organizational resilience and subsequently supports sustainable local digital economic development.

The COVID-19 pandemic has accelerated digitalization and triggered immediate responses across multiple sectors. The significance of adopting digital technologies to reinforce resilience has become increasingly evident, as businesses implementing electronic strategies were better positioned to connect with customers and respond to changing market demands. As a result, firms are able to navigate complex and dynamic environments through increased agility and resilience (Sulastri et al., 2021). Consequently,

embracing digital transformation while simultaneously strengthening business resilience has become a crucial strategy for addressing emerging challenges, both of which function as key drivers of sustained economic development.

A resilient future is shaped by enterprises that invest strategically and build collaborative ecosystems that encourage adaptation, innovation, and long-term survival amid uncertainty. Building upon these insights, the present study examines the case of Indonesia's SMEs to deepen understanding of how digital transformation contributes to the development of the local digital economy. In Indonesia, SMEs defined as businesses employing fewer than 15 workers represent the backbone of the national microenterprise ecosystem. According to the Ministry of Cooperative of Indonesia (Kemenkop, 2023), SMEs account for more than 80% of registered businesses and provide substantial employment opportunities within local and rural communities. Their flexibility and close proximity to community markets allow them to adopt digital tools rapidly, particularly in areas such as e-commerce, logistics, and service innovation. National digitalization initiatives further emphasize the strategic role of SMEs in promoting inclusive and resilient local economic development. Specifically, this study (1) analyzes the direct influence of DT on the LDE and (2) investigates the mediating role of BR in this relationship. Together, these perspectives offer an integrated understanding of how digitalization and organizational adaptability jointly strengthen the competitiveness and sustainability of small enterprises within emerging economies. The findings demonstrate that digital transformation significantly improves LDE performance, both directly and through the mediating role of business resilience. From a theoretical perspective, this research extends dynamic capability and resource-based perspectives by showing how business resilience acts as a mechanism that converts digital potential into sustainable economic value among SMEs. From a practical standpoint, the results highlight that strengthening both digital adoption and resilience-building initiatives can enhance the competitiveness and adaptability of small firms, particularly within emerging economies such as Indonesia.

2. Materials and Methods

The global economy has entered the digital era, and this transformation has significantly reshaped business operations and strategic practices. Southeast Asia illustrates this transformation clearly, particularly in Indonesia where the digital economy has experienced rapid expansion (Ha & Chuah, 2023). Small medium enterprises (SMEs) in Indonesia, defined as firms employing fewer than 15 workers, play a critical role in supporting this development (Chernbumroong et al., 2021). The growth of the local digital economy in Indonesia has been supported by several governmental initiatives, including the Indonesia Digital Economy and Society Development Plan and the SME Go Online Program, both of which aim to strengthen digital inclusion and improve the competitiveness of micro and small enterprises.

Despite this progress, many Indonesian SMEs remain reluctant to fully adopt digital transformation. Approximately 70% of these enterprises utilize social media platforms for communication and marketing purposes, while a smaller proportion engage in digital transactions (Kativhu et al., 2018). This limited adoption is often associated with low levels of digital literacy, resource limitations, and the perception that traditional face-to-face interaction with customers is still adequate for business growth (Yuen & Baskaran, 2023). Compared with SMEs in neighboring countries such as Malaysia and Vietnam, Indonesian SMEs continue to encounter distinctive challenges, particularly in digital readiness, infrastructure accessibility, and skills development (Chen et al., 2021; Ha & Chuah, 2023). These disparities highlight the importance of better understanding the structural barriers that limit SME participation in the local digital economy.

Existing studies have largely concentrated on SMEs, leaving limited insight into how small medium enterprises engage with digital transformation within localized economic systems. In particular, only a small number of studies have examined how digital transformation improves local digital economic outcomes through the mechanism of business resilience among SMEs in emerging economies such as Indonesia. This research gap indicates the lack of empirical evidence explaining the mechanisms through which digital transformation contributes to sustainable local economic performance through resilience among small medium enterprises. Therefore, this study seeks to address this gap by examining the mediating role of business resilience in the relationship between digital transformation and local digital economy performance.

Digital transformation has become an essential process for SMEs in Indonesia regardless of the scale of the organization. The adoption of digital technologies not only provides opportunities to achieve competitive advantages but also enables the development of new business models and market opportunities (Do et al., 2022). Previous research has predominantly focused on digital transformation within large organizations; therefore, this exploratory study attempts to narrow this gap by examining the digital transformation journey of SMEs across different industries in Indonesia. Empirical evidence derived from online surveys combined with in-depth interviews reveals a range of complexities influencing both the adoption and implementation of digital transformation in small firms (Srisathan et al., 2020). In contemporary business environments characterized by rapid technological advancements and increasing competition, maintaining long-term organizational success has become more challenging for firms of all sizes. Consequently, SMEs must adopt digital transformation as a strategic tool to enhance competitiveness and adapt to evolving market conditions. Nevertheless, undertaking digital transformation remains difficult for many Indonesian SMEs due to financial constraints, limited resources, and the challenges involved in transitioning from traditional analogue practices to digital systems.

Within the context of the digital economy, several studies have explored how digitalization influences local digital economies from various perspectives (Adeoye-Olatunde & Olenik, 2021). Researchers have also examined the consequences of this transformation by investigating how firms are affected by digital change and how local communities respond to these developments (ElMassah & Mohieldin, 2020). In addition, scholars have analyzed how digitalization stimulates innovation and enhances competitiveness in local markets. Other research has considered broader societal implications, including shifts in labor market structures, income distribution, and social inclusion (Iryna et al., 2022). Collectively, these studies demonstrate that digital transformation plays a critical role in shaping innovation capacity, competitiveness, and socio-economic outcomes within local digital economies.

H1. *Digital transformation influence local digital economy*

H2. *Digital transformation influence business resilience*

Within the dynamic environment of modern business operations, particularly among Indonesia's SMEs, the concept of business resilience emerges as an essential element for sustainable growth and adaptation. Business resilience refers to the organizational capability to respond effectively to change, thereby reducing the negative consequences of global policy shifts or economic disruptions while overcoming barriers that hinder participation in the regional digital economy (Saad et al., 2021). Through resilience, businesses are able not only to withstand adverse conditions but also to adapt and grow in challenging environments. Organizations increasingly emphasize knowledge sharing and collaboration

within communities, supported by strategic investments in digital culture, technology adoption, marketing innovation, and improvements in working environments (Sariwulan et al., 2020).

Resilience plays a crucial role in ensuring the survival and prosperity of SMEs during periods of disruption. This requires firms to become more agile by proactively addressing operational challenges rather than waiting for environmental changes to occur. Effective risk management practices are essential for minimizing the impact of disruptions while strengthening organizational competitiveness. Strategies designed to enhance resilience should consider the diverse risk profiles of firms, ensuring that resilience initiatives are properly scaled and tailored to the specific context of each organization (Leurcharusmee et al., 2022; Rittichainuwat et al., 2020). Consequently, new measurement approaches are needed to accurately evaluate resilience within such contexts. In this regard, the underlying determinants that strengthen resilience among Indonesian microenterprises should be further explored to support the development of tailored strategies that empower these businesses (Puntub & Greiving, 2022).

H3. *Business resilience influence local digital economy*

The integration of digital technologies into business services and workflows is also essential for improving organizational performance and strengthening competitive advantage. Digital transformation has been widely recognized as a factor that reshapes both organizations and economic systems (Kraus et al., 2021). At the firm level, digital transformation enhances organizational capabilities that contribute to stronger business resilience, particularly among resource-constrained SMEs operating in dynamic local digital environments. In conclusion, these findings highlight the importance of strengthening business resilience in order to support sustainable economic development within local economies. This study contributes to the existing literature by identifying the unique characteristics of Indonesian SMEs and examining their interaction with digital technologies and the local economy. Further research is recommended to support the development of effective growth and sustainability strategies as Indonesian SMEs continue to operate within an increasingly digitalized environment.

H4. *Business resilience play as mediating role in the relationship between digital transformation and business resilience*

This study employed a quantitative cross-sectional survey design to investigate the relationships among digital transformation, business resilience, and the local digital economy within Indonesia's SMEs. The selection of this design allows the examination of mediation effects and the evaluation of structural relationships using structural equation modeling (SEM). This methodological approach is consistent with previous research that examined digital transformation in small and medium-sized enterprises (Eller et al., 2020; Saad et al., 2021) and provides a rigorous framework for testing mediation relationships.

The sample consisted of 370 SMEs operating in Central Java and Yogyakarta provinces. These enterprises were selected because they play a significant role in supporting Indonesia's local digital economy and represent a business segment that is economically important yet relatively underexplored in academic literature. The initial target sample size was calculated using Yamane's (1973) formula, which suggested approximately 400 observations. However, due to practical constraints including accessibility, time limitations, and language barriers, convenience sampling was applied. Despite these limitations, the final dataset of 370 valid responses exceeded the minimum sample size recommended for SEM analysis (Hair et al., 2021), ensuring sufficient statistical power and model stability. Although the sampling method was non-probabilistic, proportional representation across major sectors including services, retail trade, and

manufacturing was maintained, which helps enhance the external validity and generalizability of the findings.

Data collection was conducted in two waves using a structured online questionnaire distributed through chambers of commerce, business associations, and digital entrepreneur networks. The first wave, conducted between March and April 2025, produced 234 valid responses, while the second wave, conducted between May and June 2025, generated an additional 136 responses through digital business forums and direct email invitations. Several quality control procedures were implemented, including attention checks and the exclusion of incomplete or duplicate responses. Statistical comparisons between the two waves using χ^2 and t-tests showed no significant differences in firm characteristics or demographic profiles ($p > 0.05$), supporting the integration of the datasets for final analysis. These procedures ensured that the data collection process was transparent, ethically sound, and replicable, thereby strengthening the reliability of the empirical results.

The main constructs examined in this study digital transformation, business resilience, and the local digital economy were measured using established scales adapted from previous research and institutional frameworks. The digital transformation (DT) scale was adapted from McKinsey & Company (2018) and consisted of nine items reflecting the level of technological integration and digital capability within business operations. Business resilience (BR) was measured using nine items derived from the Harvard Business Review framework (2020), focusing on adaptability, recovery capacity, and proactive planning. Meanwhile, the local digital economy (LDE) construct was developed based on the guidelines of the Organization for Economic Co-operation and Development (OECD, 2018) and included nine items measuring digital participation, connectivity, and contributions to the local economy. Example measurement items include: “Our business integrates digital technologies across major operations” (DT), “Our business can adapt quickly to unexpected changes” (BR), and “Digital tools have improved our connection to local customers and suppliers” (LDE). All items were measured using a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).

To ensure content validity, the questionnaire was evaluated by a panel of five experts representing disciplines such as management, industrial psychology, and human resource development. Their assessment ensured conceptual clarity, item relevance, and linguistic appropriateness. The expert review produced content validity ratios ranging between 0.80 and 1.00, indicating a strong level of agreement and confirming that the items were suitable for inclusion in the study. Before the main data collection, a pilot study was conducted with an independent sample of 30 SME owners to evaluate the clarity and reliability of the measurement instrument. The results demonstrated strong internal consistency, with Cronbach’s alpha values of 0.852 for digital transformation, 0.867 for business resilience, and 0.871 for the local digital economy. The overall reliability coefficient of 0.943 exceeded the acceptable threshold of 0.70 (Hair et al., 2010), confirming that the measurement instruments were stable and internally consistent.

Construct validity was further evaluated using confirmatory factor analysis (CFA). All standardized factor loadings exceeded 0.50, supporting the presence of convergent validity. In addition, the composite reliability ($CR > 0.70$) and average variance extracted ($AVE > 0.50$) met the criteria recommended by Fornell and Larcker (1981). These findings, together with expert validation and pilot testing, demonstrate that the measurement instruments are theoretically sound and empirically reliable. Consequently, the scales used in this study provide a solid foundation for replication and comparison in future research related to digital transformation and resilience in small enterprise contexts.

Further analysis of the measurement model was conducted using CFA following the guidelines of Fornell and Larcker (1981) and Kline (2023). The results confirmed that all observed indicators significantly

loaded on their respective latent constructs, supporting the adequacy of the measurement model. Convergent validity was confirmed through factor loadings, composite reliability, and average variance extracted, with all factor loadings exceeding 0.50, CR values above 0.70, and AVE values greater than 0.50. Discriminant validity was assessed by comparing the square roots of AVE with inter-construct correlations, and all values indicated that the constructs were statistically distinct. Variance inflation factor (VIF) diagnostics were also conducted to assess multicollinearity, with all values remaining below 5 (Hair et al., 2010). Model fit was evaluated using several indices, including χ^2/df (<3.0), GFI (>0.90), AGFI (>0.90), TLI (>0.95), CFI (>0.95), and RMSEA (<0.06). All indicators met the recommended thresholds proposed by Hu and Bentler (1999), indicating that the measurement model demonstrated satisfactory fit and strong construct validity for subsequent structural analysis.

The data were analyzed using SPSS 24 and AMOS 24. Confirmatory factor analysis (CFA) was first performed to verify construct validity, followed by structural equation modeling (SEM) to test the proposed hypotheses. Mediation analysis was conducted using the bootstrap method with 5000 resamples through the PROCESS Macro (Hayes, 2018). Prior to the analysis, the dataset was screened for missing values, outliers, and distributional normality using skewness and kurtosis thresholds of ± 2 . Multicollinearity was assessed through variance inflation factor (VIF) and tolerance values. Mediation effects were evaluated using bias-corrected bootstrap confidence intervals with a 95% confidence level. This comprehensive analytical procedure ensures that the findings of the study are transparent, statistically reliable, and capable of being replicated by future researchers.

3. Result

Table 1 summarizes the demographic and business characteristics of the 370 surveyed SMEs located in Central Java and Yogyakarta. The sample represents a wide range of industries, with 41.6% of firms operating in the service sector, 27.3% in retail trade, 19.5% in manufacturing, and 11.6% in other industries. This distribution illustrates the diversity of Indonesia's local digital economy and highlights the active involvement of SMEs across multiple economic sectors. In terms of firm size (Fs), most enterprises employed fewer than ten workers (82.7%), which is consistent with Indonesia's official classification of small medium enterprises. Concerning business duration (Le), the majority of firms had been operating for between 3 and 10 years (64.8%), suggesting moderate organizational maturity and a relatively stable market presence.

Table 1. Respondent profile.

Variable	Category	Frequency	Percentage (%)
Industry type	Services	154	41.6
	Retail trade	101	27.3
	Manufacturing	72	19.5
	Others	43	11.6
Firm size	1-5 employees	216	58.4
	6-10 employees	89	24.3
	11-15 employees	65	17.3
Length of business	<3 years	46	12.4
	3-10 years	240	64.8
	>10 years	84	22.7
Total annual revenue	<100 million IDR	110	29.8

Variable	Category	Frequency	Percentage (%)
Investment amount	100 - 250 million IDR	103	27.8
	250 - 500 million IDR	73	19.8
	500 million - 1 billion IDR	50	13.5
	> 1 billion IDR	34	9.2
	≤500 million IDR	191	51.8
	500 million - 1 billion IDR	127	34.3
	>1billion IDR	52	14.0
Product origin	Own production	166	44.8
	Outsourced	70	19.0
	Buy-and-sell (with stock)	100	27.0
	Shared/partnership basis	34	9.2

From a financial perspective, 29.8% of firms reported annual revenue below IDR 100 million, while 27.8% generated between IDR 100 million and IDR 250 million. Additionally, 19.8% reported revenue between IDR 250 million and IDR 500 million, 13.5% between IDR 500 million and IDR 1 billion, and 9.2% above IDR 1 billion. Regarding investment levels, 51.8% of the surveyed enterprises reported investment amounts of up to IDR 500 million, 34.3% reported investments between IDR 500 million and IDR 1 billion, and 14.0% reported investment amounts exceeding IDR 1 billion. These results indicate notable variation in financial capacity among SMEs. In terms of production structure (Po), 44.8% of businesses relied on internal production systems, 19.0% outsourced production activities, 27.0% conducted buy-and-sell operations with inventory, and 9.2% operated through shared or partnership-based production arrangements. Overall, these characteristics demonstrate that Indonesian SMEs in the sample exhibit substantial diversity in industry sector, firm size, operational experience, and financial capability, thereby supporting the representativeness and generalizability of the study's findings.

Table 2. Validity and Reliability Test

Constructs	Indicator	SFL	CR	AVE	α	VIF
Digital transformation	DT1	0.692	0.973	0.575	0.852	1.82
	DT2	0.670				
	DT3	0.676				
	DT4	0.736				
	DT5	0.764				
	DT6	0.772				
	DT7	0.772				
	DT8	0.711				
	DT9	0.774				
Business resilience	BR1	0.805	0.983	0.901	0.867	2.12
	BR2	0.591				
	BR3	0.553				
	BR4	0.818				
	BR5	0.819				
	BR6	0.810				
	BR7	0.782				
	BR8	0.773				
	BR9	0.815				

Constructs	Indicator	SFL	CR	AVE	α	VIF
Local digital economy	LDE1	0.765	0.978	0.821	0.871	2.46
	LDE2	0.773				
	LDE3	0.722				
	LDE4	0.825				
	LDE5	0.819				
	LDE6	0.803				
	LDE7	0.823				
	LDE8	0.760				
	LDE9	0.783				

Confirmatory factor analysis (CFA) was conducted to evaluate the reliability and validity of the measurement model, with the detailed results presented in Table 2. The analysis indicated an excellent model fit ($\chi^2 = 301.101$; $df = 208$; $\chi^2/df = 1.448$; GFI = 0.946; AGFI = 0.902; TLI = 0.986; CFI = 0.992; RMSEA = 0.033). All standardized factor loadings were greater than 0.50, confirming adequate convergent validity. The composite reliability (CR) values ranged from 0.973 to 0.983, while the average variance extracted (AVE) ranged from 0.575 to 0.901, exceeding the commonly accepted threshold of 0.50 (Fornell & Larcker, 1981). Furthermore, the square roots of the AVE values for each construct were higher than the correlations between constructs, confirming discriminant validity according to the criteria proposed by Fornell and Larcker (1981).

As reported in Table 2, all constructs demonstrated satisfactory levels of convergent and discriminant validity. The results also indicate strong internal consistency, with factor loadings, composite reliability, and average variance extracted meeting or exceeding the recommended thresholds. Multicollinearity diagnostics further confirmed the robustness of the measurement model, as all VIF values remained below the critical threshold. Overall, these findings demonstrate that the measurement model possesses strong construct validity and reliability, thereby providing a solid foundation for subsequent structural analysis.

Table 3. Means, standard deviations, and correlation coefficients of the variables.

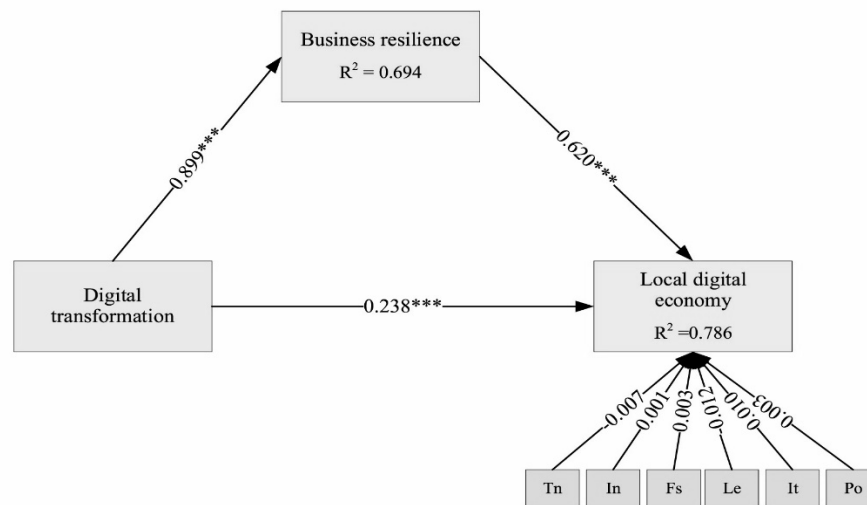
Factors	Mean	SD	1	2	3
1. Digital transformation	4.12	0.73	1		
2. Business resilience	4.02	0.80	0.830**	1	
3. Local digital economy	4.21	0.73	0.802**	0.876**	1

The structural model was examined to evaluate the hypothesized relationships among digital transformation, business resilience, and the local digital economy. The results indicated that the structural model achieved a satisfactory level of fit, consistent with the results obtained from the measurement model, suggesting that the proposed structural paths were appropriate for further mediation analysis. Table 3 presents the descriptive statistics, including the means, standard deviations, and correlation coefficients among the study variables. The correlations ranged from 0.802 to 0.876 and were statistically significant at the 0.01 level, indicating strong positive relationships among the constructs. As shown in Table 3, the variables demonstrate strong and significant positive associations, supporting their conceptual linkage while remaining empirically distinguishable.

The descriptive statistics also suggest relatively high levels of digital transformation, business resilience, and local digital economy engagement among Indonesian SMEs. Additional diagnostic tests confirmed that multicollinearity was not present and therefore did not compromise the stability of the structural model. To examine the proposed mediation framework, a bootstrap procedure with 5000 resamples was implemented

using PROCESS Macro Model 4. This analysis assessed both the overall relationship as well as the decomposed effects, including the direct and indirect pathways. The results showed that digital transformation exerts a strong overall influence on the local digital economy ($\beta = 0.796$, $p < 0.001$). The direct relationship remained statistically significant ($\beta = 0.238$, $p < 0.001$), while the indirect effect operating through business resilience was also significant and substantially larger ($\beta = 0.557$, $p < 0.001$), indicating the presence of a strong partial mediation effect.

These findings imply that digital transformation contributes to local economic development primarily through strengthening business resilience rather than solely through the implementation of digital technologies. In other words, the capability of SMEs to adapt, recover, and maintain operational stability during disruptions represents the primary mechanism through which digital transformation influences local economic outcomes. The structural model illustrating both the direct and indirect relationships is presented in Fig. 1.



Note: $***p < 0.001$.

Figure 1. Structural model illustrating the direct and indirect effects of digital transformation on the local digital economy, with business resilience acting as a mediating variable.

The noticeable reduction in the magnitude of the direct effect, combined with the stronger indirect effect, provides substantial evidence supporting the mediating role of business resilience. Furthermore, six firm-level control variables industry type, firm size, business operation duration, total annual revenue, investment level, and product origin were incorporated into the model to account for firm heterogeneity. The results indicate that none of these control variables exerted a statistically significant influence on the relationship between digital transformation and the local digital economy. This suggests that the mediation effect remains robust across firms with different characteristics.

The bootstrap analysis reported in Table 4 further confirms that business resilience functions as a critical mediator between digital transformation and the local digital economy. The indirect effect accounts for approximately 70% of the total relationship, indicating that digital adoption contributes to improvements in local digital economic outcomes primarily when enterprises possess strong adaptive capabilities. These findings demonstrate that business resilience serves as a key transmission mechanism through which digital transformation translates into local economic performance among Indonesian SMEs.

For Indonesian SMEs, this result also reflects their relatively early stage of digital maturity. Although digital technologies provide the foundation for organizational transformation, it is the firm's ability to adapt and respond to environmental changes that enables digital potential to be translated into sustained performance outcomes. Overall, the results confirm that business resilience represents an essential mechanism through which digital transformation enhances local digital economy performance among Indonesian SMEs. These findings provide empirical support for the proposed conceptual framework and establish the basis for subsequent theoretical and practical discussions.

To address potential concerns regarding endogeneity or reverse causality, the proposed model was examined using both theoretical reasoning and empirical testing. In this study, digital transformation and business resilience were conceptualized as capability-based antecedents, while the local digital economy was treated as the outcome variable. This temporal ordering and theoretical justification reduce the likelihood of reverse causation. In addition, a reversed mediation model ($LDE \rightarrow BR \rightarrow DT$) was estimated using PROCESS Macro. The bootstrapped confidence interval for the indirect effect included zero, indicating that the reversed mediation pathway was not statistically supported.

Table 4. Direct and indirect effects of DT on the LDE via BR.

Path Analysis	Effect	p-value	t
Direct effect			
Digital transformation $\rightarrow$ Local digital economy	0.238	0.041	5.753
Digital transformation $\rightarrow$ Business resilience	0.899	0.021	26.756
Business Resilience $\rightarrow$ Local digital economy	0.620	0.022	21.431
Indirect effect			
Digital transformation $\rightarrow$ Business resilience $\rightarrow$ Local digital economy	0.557	0.064	8.703

(BootLLCI = 0.05, BootULCI = 0.08), and the direct effect was likewise non-significant ($p > 0.10$), indicating that reverse causality was unlikely to occur. These findings provide further support for the proposed causal direction ($DT \rightarrow BR \rightarrow LDE$). Overall, these robustness checks strengthen confidence that the observed relationships reflect the theorized mechanism rather than reciprocal influences. Although the data are cross-sectional in nature, these tests offer reasonable support for directional interpretation while acknowledging that future longitudinal studies may provide stronger causal confirmation. Taken together, the results provide strong empirical evidence for the proposed mediation model, demonstrating that business resilience plays a crucial role in connecting digital transformation with local digital economic performance among Indonesian SMEs.

4. Discussion

This study sought to examine how digital transformation (DT) influences the local digital economy (LDE) of small medium enterprises (SMEs) in Indonesia, both directly and indirectly through business resilience (BR). The findings indicate that DT has a significant positive effect on LDE, confirming that digitalization functions as an important driver of innovation, competitiveness, and organizational agility among small firms. This result is consistent with the argument of Bican and Brem (2020), who highlighted that digital transformation reshapes conventional business models and accelerates the emergence of new value propositions, particularly within localized markets. Likewise, ElMassah and Mohieldin (2020) demonstrated

that digitalization expands inclusive opportunities for entrepreneurship and increases participation in emerging digital ecosystems. In the Indonesian context, these results are also consistent with previous studies indicating that national digital initiatives have supported technological diffusion among small enterprises and strengthened their integration into the digital economy (Tongdaeng, 2021).

Although the positive association confirms that DT contributes to local economic development, the findings also reveal ongoing disparities in digital readiness among SMEs. Many enterprises continue to encounter obstacles in adopting digital technologies due to financial limitations, inadequate digital literacy, and insufficient strategic planning capabilities. These challenges are particularly evident in service-based businesses that depend heavily on personal interaction and low-cost operational models (Putri et al., 2023; Swatdikun et al., 2024). Such findings indicate that building an inclusive digital economy requires more than technological access alone. It also requires complementary investments in skill development, managerial competencies, and institutional support. Therefore, digital transformation should be viewed as a multidimensional process that integrates technological adoption with organizational, strategic, and human resource development.

The second objective of this research was to examine the mediating role of business resilience in the relationship between DT and LDE. The results demonstrate a substantial indirect effect, indicating that BR functions as the primary mechanism through which digital transformation generates sustainable economic outcomes. This finding supports the growing consensus that resilience represents a strategic capability enabling firms to absorb disruptions, adapt to environmental changes, and maintain stable performance in uncertain conditions (Dubey et al., 2023; Wilujeng et al., 2021). Similarly, Khurana et al. (2022) and Zhang et al. (2022) showed that resilient organizations are more capable of converting technological investments into operational continuity. Such transformation ultimately strengthens long-term competitiveness, reinforcing the mediating mechanism identified in this study. For Indonesian SMEs, which often operate under resource constraints, resilience provides the flexibility required to withstand economic shocks, including disruptions caused by the COVID-19 pandemic or fluctuations in local market demand.

From a theoretical standpoint, these findings reinforce and extend the dynamic capability framework (Teece et al., 1997), which argues that firms sustain competitiveness by continually integrating, developing, and reconfiguring both internal and external competencies in response to changing environments. The mediating role of BR suggests that digital transformation alone does not automatically enhance organizational performance. Instead, firms must cultivate adaptive capabilities that enable them to reorganize digital resources effectively when facing environmental volatility. In this context, BR operates as a “conversion mechanism” that transforms digital potential into tangible economic value. The evidence presented in this study extends the application of dynamic capability theory to smaller enterprises in emerging economies, demonstrating that resilience amplifies the impact of digital transformation even among firms with limited technological capacity.

Furthermore, these results contribute to the perspective of organizational ambidexterity (O'Reilly & Tushman, 2013), which emphasizes the importance of balancing the exploitation of existing resources with the exploration of new opportunities. Incorporating resilience into digital strategies allows SMEs to efficiently utilize current assets while simultaneously exploring innovative opportunities through digital transformation. This dual orientation enables firms to maintain operational stability while fostering flexibility and experimentation two critical attributes for survival in dynamic market environments. Consistent with the resource-based view (RBV) (Barney, 1991), BR can also be interpreted as an intangible yet valuable organizational resource. Through resilience, firms utilize digital technologies not only as operational tools but also as components of broader strategic capabilities that enhance adaptability and

competitiveness. This insight is particularly relevant for Indonesian SMEs, which frequently operate under conditions of high uncertainty, limited digital infrastructure, and restricted access to skilled human capital.

The findings also carry important contextual implications. The SME sector in Indonesia plays a crucial role in supporting community-level employment, local production, and income generation. However, many enterprises remain marginal participants in national digital initiatives. The results demonstrate that when SMEs combine digital adoption with resilience-building practices such as diversifying suppliers, improving employee digital literacy, and implementing flexible financial management they achieve stronger and more sustainable local economic outcomes. This relationship suggests that resilience functions both as a protective mechanism against risks and as a catalyst for effectively leveraging digital transformation. Consequently, the findings contribute to broader policy discussions concerning inclusive digital development by emphasizing that capacity-building initiatives, public–private partnerships, and localized innovation ecosystems are essential for translating digital potential into sustainable economic value.

From a practical standpoint, the findings offer important insights for both practitioners and policymakers. For business owners and managers, digital transformation initiatives should be accompanied by strategies aimed at strengthening resilience, such as continuous learning, scenario planning, and collaborative networks with other organizations. These practices enhance organizational agility and enable firms to anticipate and respond to disruptions more effectively. For policymakers, the results highlight the importance of digital inclusion policies that extend beyond technological access to incorporate training programs, micro-financing opportunities, and digital mentoring initiatives specifically designed for micro and small enterprises. Integrating resilience development into national digital strategies can help ensure that technological progress contributes to equitable and sustainable economic growth.

Finally, from a broader perspective, these findings support global evidence indicating that small enterprises can function as key catalysts within digital ecosystems when equipped with adaptive capabilities. Research by Kraus et al. (2021) and Núñez-Ríos et al. (2022) demonstrated that resilient SMEs are better positioned to innovate, maintain operational continuity, and contribute to socio-economic stability within their communities. This study extends that body of research by demonstrating that even among small medium enterprises, the synergy between digital transformation and business resilience generates measurable economic benefits. It improves firm performance while simultaneously encouraging localized innovation diffusion and employment stability. The implication is clear: strengthening resilience among SMEs produces positive spillover effects that reinforce the broader digital economy from the grassroots level.

In summary, the direct and indirect effects identified in this study demonstrate that digital transformation and business resilience operate as mutually reinforcing drivers of sustainable development in the local digital economy. Digitalization provides the necessary tools and opportunities, while resilience ensures the adaptive capacity required to utilize these opportunities effectively. Together, they enable Indonesian SMEs to navigate market uncertainty, reduce vulnerability, and achieve long-term competitiveness. These findings contribute to theoretical advancement by integrating dynamic capability, resource-based view, and organizational ambidexterity perspectives, while also offering practical insights for policies aimed at promoting resilient and inclusive digital growth in emerging economies.

5. Conclusions and Implications

This study concludes that digital transformation (DT) and business resilience (BR) function together as essential drivers of sustainable development within Indonesia's local digital economy (LDE). The empirical findings indicate that DT improves local economic performance both directly and indirectly through the

mediating role of BR. These results reinforce the idea that technological adoption alone is not sufficient to ensure long-term success; instead, enterprises must also cultivate adaptive capabilities that allow them to respond effectively to disruptions while taking advantage of emerging digital opportunities.

From both theoretical and practical viewpoints, these findings enhance the understanding of how small medium enterprises (SMEs) in emerging economies can utilize digital technologies to strengthen competitiveness and promote local economic growth. By conceptualizing resilience as both a dynamic capability and a strategic organizational resource, this study presents a comprehensive framework that connects digital transformation with sustainable development. Ultimately, strengthening both digital transformation and organizational resilience will be crucial for ensuring that Indonesia's digital economy evolves in an inclusive and equitable manner. The study therefore emphasizes the importance of continued collaboration among policymakers, entrepreneurs, and supporting institutions to build a resilient and digitally empowered small-business ecosystem.

This study contributes to theoretical and practical understanding of how digital transformation (DT) and business resilience (BR) jointly support the development of the local digital economy (LDE) among Indonesian small medium enterprises (SMEs). From a theoretical perspective, the findings integrate the resource-based view (RBV), dynamic capability theory, and organizational ambidexterity to explain how resilience functions as a key mechanism that converts the potential of digital transformation into tangible economic outcomes. By conceptualizing resilience as both a strategic capability and an intangible organizational resource, the study extends RBV by demonstrating that resilience enhances the value of digital assets while strengthening firms' adaptability. The results also support the dynamic capability perspective, indicating that SMEs maintain competitiveness by continuously reconfiguring resources and responding to environmental changes. In addition, the findings contribute to organizational ambidexterity theory by showing that resilient firms are able to simultaneously exploit existing capabilities while exploring new digital opportunities. Within the context of Indonesian SMEs, resilience therefore emerges as a critical enabler of inclusive and sustainable digital growth.

From a practical standpoint, the findings provide useful guidance for policymakers, practitioners, and development agencies seeking to promote a resilient and inclusive digital economy. Policymakers are encouraged to strengthen digital infrastructure, expand financial support mechanisms, and implement training initiatives that improve digital literacy and resilience capabilities among SMEs, particularly in rural or underdeveloped regions. Public-private partnerships and digital mentoring networks may also play an important role in accelerating technology adoption and improving business adaptability. For business owners and managers, digital transformation should be viewed not merely as technology adoption but as a continuous strategic process that incorporates innovation, learning capability, and risk management. Implementing resilience-oriented practices such as workforce skill development, scenario planning, and flexible financial management can improve decision-making, ensure operational continuity, and expand market opportunities, thereby enabling SMEs to strengthen their role in Indonesia's evolving digital economy and contribute to sustainable local economic growth.

Despite its contributions, several limitations should be acknowledged. The study used a cross-sectional research design, which restricts the ability to draw definitive causal conclusions among the variables. Although structural equation modeling and mediation analysis provide strong statistical evidence, future research could employ longitudinal or experimental designs to capture dynamic changes in digital transformation and resilience over time. In addition, the use of self-reported survey data may introduce potential bias or perceptual inaccuracies. Future studies could incorporate objective indicators such as financial reports, digital investment records, or platform analytics to enhance the robustness of the findings.

The sample was also limited to SMEs located in Central Java and Yogyakarta, which may not fully represent the broader diversity of enterprises across Indonesia. Expanding future research to include firms from rural or less-developed regions could provide a more comprehensive understanding of how regional infrastructure, policy support, and socio-economic conditions influence digital transformation and resilience outcomes. Further research may also explore additional moderating or mediating variables such as leadership style, organizational learning, digital capability maturity, or network collaboration. Comparative studies across ASEAN or other emerging economies could also improve external validity and reveal how cultural and institutional differences shape the interaction between digital transformation and resilience. Despite these limitations, the study's rigorous methodology, validated instruments, and robust sample size strengthen the reliability of the findings and provide a solid foundation for future research on digital transformation and resilience in small enterprises.

References

- Adekola, J., & Clelland, D. (2020). Two Sides Of The Same Coin: Business Resilience And Community Resilience. *Journal Of Contingencies And Crisis Management*, 28(1), 50–60. <https://doi.org/10.1111/1468-5973.12275>
- Adeoye-Olatunde, O. A., & Olenik, N. L. (2021). Research And Scholarly Methods: Semi-Structured Interviews. *Journal Of The American College Of Clinical Pharmacy*, 4(10), 1358–1367. <https://doi.org/10.1002/Jac5.1441>
- Anggara, A. A., Aryoko, Y. P., Dewandaru, R. O., Kharismasyah, A. Y., & Fatchan, I. N. (2025). Does maintaining resources, diversification, and internationalization matter for achieving high firm performance? A sustainable competitiveness strategy for China Taipei firms. *Sustainability*, 17(4), 1576. <https://doi.org/10.3390/su17041576>
- Barney, J. (1991). Firm Resources And Sustained Competitive Advantage. *Journal Of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Bican, P. M., & Brem, A. (2020). Digital Business Model, Digital Transformation, Digital Entrepreneurship: Is There A Sustainable “Digital”? *Sustainability*, 12(13), 5239. <https://doi.org/10.3390/Su12135239>
- Chen, C.-L., Lin, Y.-C., Chen, W.-H., Chao, C.-F., & Pandia, H. (2021). Role Of Government To Enhance Digital Transformation In Small Service Business. *Sustainability*, 13(3), 1028. <https://doi.org/10.3390/Su13031028>
- Chernbumroong, S., Sureephong, P., & Janchai, W. (2021). The Conceptual Model Of Digital Transformation For Small And Medium Enterprises In Indonesia. In *Proceedings Of The 2021 Joint International Conference On Digital Arts, Media And Technology With ECTI Northern Section Conference On Electrical, Electronics, Computer And Telecommunication Engineering* (Pp. 336–339). IEEE. <https://doi.org/10.1109/ECTIDAMTNCN51128.2021.9425755>
- Chirumalla, K. (2021). Building Digitally-Enabled Process Innovation In The Process Industries: A Dynamic Capabilities Approach. *Technovation*, 105, 102256. <https://doi.org/10.1016/J.Technovation.2021.102256>
- Dewandaru, R. O., & Anggara, A. A. (2025). R&D, innovation, and firm outcomes: Market value and performance evidence from the G7 [七国集团研发与创新对企业绩效与市场价值的证据]. *Studies in Science of Science*, 43(12), 830–850.
- Do, T. D., Pham, H. A., Thalassinou, E. I., & Le, H. A. (2022). The Impact Of Digital Transformation On Performance: Evidence From Vietnamese Commercial Banks. *Journal Of Risk And Financial Management*, 15(1), 21. <https://doi.org/10.3390/Jrfm15010021>
- Dubey, R., Bryde, D. J., Dwivedi, Y. K., Graham, G., Foropon, C., & Papadopoulos, T. (2023). Dynamic Digital Capabilities And Supply Chain Resilience: The Role Of Government Effectiveness.

- International Journal Of Production Economics*, 258, 108790.
<https://doi.org/10.1016/j.ijpe.2023.108790>
- Eller, R., Alford, P., Kallmünzer, A., & Peters, M. (2020). Antecedents, Consequences, And Challenges Of Small And Medium-Sized Enterprise Digitalization. *Journal Of Business Research*, 112, 119–127.
<https://doi.org/10.1016/j.jbusres.2020.03.004>
- Elmassah, S., & Mohieldin, M. (2020). Digital Transformation And Localizing The Sustainable Development Goals (Sdgs). *Ecological Economics*, 169, 106490.
<https://doi.org/10.1016/j.ecolecon.2019.106490>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models With Unobservable Variables And Measurement Error. *Journal Of Marketing Research*, 18(1), 39–50.
<https://doi.org/10.1177/002224378101800104>
- Gaglio, C., Kraemer-Mbula, E., & Lorenz, E. (2022). The Effects Of Digital Transformation On Innovation And Productivity: Firm-Level Evidence Of South African Manufacturing Micro And Small Enterprises. *Technological Forecasting And Social Change*, 182, 121785.
<https://doi.org/10.1016/j.techfore.2022.121785>
- Ha, H., & Chuah, C. K. P. (2023). Digital Economy In Southeast Asia: Challenges, Opportunities And Future Development. *Southeast Asia: A Multidisciplinary Journal*, 23(1), 19–35.
<https://doi.org/10.1108/SEAMJ-02-2023-0023>
- Hair, J. F., Astrachan, C. B., Moises, O. I., Radomir, L., Sarstedt, M., Vaithilingam, S., & Ringle, C. M. (2021). Executing And Interpreting Applications Of PLS-SEM: Updates For Family Business Researchers. *Journal Of Family Business Strategy*, 12(3), 100392.
<https://doi.org/10.1016/j.jfbs.2020.100392>
- Hakim, M. B., Anggara, A. A., Ariefin, M. S., & Ramadhani, M. A. (2025). How does generative AI understand the phygital customer experience? A strategic retail decision-making approach using social listening methods. *Modern Economic Science*, 47(5), 126–143.
- Harvard Business Review. (2020). *The Elements Of A Resilient Company*. <https://hbr.org/2020/10/The-Elements-Of-A-Resilient-Company>
- Hayes, A. F. (2018). Partial, Conditional, And Moderated Mediation: Quantification, Inference, And Interpretation. *Communication Monographs*, 85(1), 4–40.
<https://doi.org/10.1080/03637751.2017.1352100>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff Criteria For Fit Indexes In Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55.
- Imron, A., Anggara, A. A., Shih, I.-T., Lin, C. T., & Kaukab, M. E. (2025). Extended brand value competitiveness chain model: Building brand competitiveness on SMEs in Indonesia through digital brand learning. *Modern Economic Science*, 47(4), 113–140.
- Imron, A., Kaukab, M. E., & Anggara, A. A. (2025). Does blockchain matter in Industry 4.0? A key driver of industry. *Future Economics and Business Studies*, 1(1), 67–86.
- Iryna, K., Inna, I., Marianna, S., Yevheniia, B., Iryna, N., Olena, P., Vladislav, R., Nataliya, H., Ihor, S., Olena, I., & Natalia, T. (2022). Socio-Economic Development In Conditions Of Digital Transformations: Regional Features, Strategic Analysis, And Prospects. In *Proceedings Of The 7th International Conference On Mathematics And Computers In Sciences And Industry* (Pp. 175–182). IEEE.
- Kativhu, S., Mwale, M., & Francis, J. (2018). Approaches To Measuring Resilience And Their Applicability To Small Retail Business Resilience. *Problems And Perspectives In Management*, 16(4), 275–284.
[https://doi.org/10.21511/Ppm.16\(4\).2018.23](https://doi.org/10.21511/Ppm.16(4).2018.23)
- Kaukab, M. E., Anggara, A. A., & Imron, A. (2025). Business process transformation to maintain high performance: Driving an AI-based business value project. *Current Perspective on Business Operations*, 1(1), 1–20.
- Kharismasyah, A. Y., Anggara, A. A., Fauziridwan, M., & Darmawan, A. (2026). Can generative AI improve corporate values, employee perceptions, and organizational practices? A human-centric

- case study of project management SMEs in Indonesia [生成式人工智能能否改善企业价值观、员工认知与组织实践？一项关于印度尼西亚项目管理型中小企业的人本导向案例研究]. *Studies in Science of Science*, 44(2), 175–200.
- Khurana, I., Dutta, D. K., & Ghura, A. S. (2022). Smes And Digital Transformation During A Crisis: The Emergence Of Resilience As A Second-Order Dynamic Capability In An Entrepreneurial Ecosystem. *Journal Of Business Research*, 150, 623–641. <https://doi.org/10.1016/j.jbusres.2022.06.048>
- Kline, R. B. (2023). *Principles And Practice Of Structural Equation Modeling* (5th Ed.). Guilford Publications.
- Kotsios, P. (2023). Business Resilience Skills For Smes. *Journal Of Innovation And Entrepreneurship*, 12(1), 37. <https://doi.org/10.1186/S13731-023-00304-0>
- Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview Of The Current State Of The Art Of Research. *SAGE Open*, 11(3), 21582440211047576. <https://doi.org/10.1177/21582440211047576>
- Leurcharusmee, S., Maneejuk, P., Yamaka, W., Indonesianprasert, N., & Tuntichiranon, N. (2022). Survival Analysis Of Indonesian Micro And Small Enterprises During The COVID-19 Pandemic. *Journal Of Business Economics And Management*, 23(5), 1211–1233. <https://doi.org/10.3846/jbem.2022.17875>
- Linnenluecke, M. K. (2017). Resilience In Business And Management Research: A Review Of Influential Publications And A Research Agenda. *International Journal Of Management Reviews*, 19(1), 4–30. <https://doi.org/10.1111/ijmr.12076>
- Mckinsey & Company. (2018). *Business Resilience: A Boardroom Imperative*. <https://www.mckinsey.com/business-functions/risk/our-insights/business-resilience-a-boardroom-imperative>
- Núñez-Ríos, J. E., Sánchez-García, J. Y., Soto-Pérez, M., Olivares-Benitez, E., & Rojas, O. G. (2022). Components To Foster Organizational Resilience In Tourism Smes. *Business Process Management Journal*, 28(1), 208–235. <https://doi.org/10.1108/BPMJ-12-2020-0580>
- O'Reilly, C. A., & Tushman, M. L. (2013). Organizational Ambidexterity: Past, Present, And Future. *Academy Of Management Perspectives*, 27(4), 324–338. <https://doi.org/10.5465/amp.2013.0025>
- Office Of Small And Medium Enterprises Promotion. (2023). *White Paper On Small And Medium Enterprises And Micro Enterprises In Indonesia 2023*. <https://www.sme.go.th>
- Organization For Economic Co-Operation And Development. (2018). *Going Digital In Regions And Cities*. <https://www.oecd.org/cfe/regions-cities/going-digital-in-regions-and-cities-9789264293017-en.htm>
- Putri, S. O., Yahya, A. S., Attahira, A., Nabilasari, L. S., & Tamaela, V. (2023). Digital Economy Growth In Singapore And Indonesia Following The Post-COVID-19 Pandemic. *Journal Of Eastern European And Central Asian Research*, 10(4), 557–568. <https://doi.org/10.15549/Jeccar.V10i4.1366>
- Saad, M. H., Hagelaar, G., Van Der Velde, G., & Omta, S. W. F. (2021). Conceptualization Of Smes' Business Resilience: A Systematic Literature Review. *Cogent Business & Management*, 8(1), 1938347. <https://doi.org/10.1080/23311975.2021.1938347>
- Sanchis, R., Canetta, L., & Poler, R. (2020). A Conceptual Reference Framework For Enterprise Resilience Enhancement. *Sustainability*, 12(4), 1464. <https://doi.org/10.3390/su12041464>
- Sariwulan, T., Suparno, S., Disman, D., Ahman, E., & Suwatno, S. (2020). Entrepreneurial Performance: The Role Of Literacy And Skills. *Journal Of Asian Finance, Economics And Business*, 7(11), 269–280.
- Srisathan, W. A., Ketkaew, C., & Naruetharadhol, P. (2020). The Intervention Of Organizational Sustainability In The Effect Of Organizational Culture On Open Innovation Performance. *Cogent Business & Management*, 7(1), 1717408. <https://doi.org/10.1080/23311975.2020.1717408>
- Suciati, S., Silitonga, L. M., & Anggara, A. A. (2026). Gender and AI in flipped classrooms: Unpacking the impact of chatbots on engagement, self-efficacy, writing performance and technology affinity. *SAGE Open*, 16(1), 21582440261420014.

- Sulastri, H., Disman, M., & Heny, H. (2021). Smes Resilience During The COVID-19 Pandemic: A Case Study In Indonesia. *Proceedings Of The 5th Global Conference On Business, Management And Entrepreneurship*.
- Sulistiyandari, Anggara, A. A., & Liu, C.-L. (2026). Does efficiency matter in M&A? Evidence from Indonesia's industrial estate group companies [并购中的效率是否重要? 来自印度尼西亚工业园区控股公司的证据]. *Studies in Science of Science*, 44(1), 1–17.
- Sulistiyandari, Anggara, A. A., Liu, C.-L., Kaukab, M. E., & Alam, M. M. (2025). Evaluating firm value and eco-efficiency with environmental footprint model approach in the coal mining industry: Further evidence from G20 countries. *Modern Economic Science*, 47(5), 105–125.
- Suyoto, S., Darmawan, A., Bagis, F., & Anggara, A. A. (2025). Does GenAI as a personal resource improve employee performance and engagement in the workplace? *Modern Economic Science*, 47(5), 144–165.
- Swatdikun, T., Pathak, S., & Surbakti, L. P. (2024). Sustainable Small And Medium Enterprises In The Times Of COVID-19. *Progress In Disaster Science*, 22, 100327. <https://doi.org/10.1016/j.pdisas.2024.100327>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities And Strategic Management. *Strategic Management Journal*, 18(7), 509–533.
- Tim, Y., Cui, L., & Sheng, Z. (2021). Digital Resilience: How Rural Communities Leapfrogged Into Sustainable Development. *Information Systems Journal*, 31(2), 323–345. <https://doi.org/10.1111/Isj.12312>
- Tongdaeng, W. (2021). *Indonesian Smes' Response In The Digital Economy Age: A Case Study Of The Service Sector Of Community-Based Tourism In The Upper Northern Provinces (Group 2)* (Master's Thesis). National Institute Of Development Administration.
- Vial, G. (2021). Understanding Digital Transformation: A Review And A Research Agenda. In *Managing Digital Transformation* (Pp. 13–66).
- Wilujeng, S., Pratikto, H., Soetjipto, B., & Syihabudhin, S. (2021). Supply Chain Resilience As A Mediator Of The Relationship Between Entrepreneurial Resilience And SME Performance. *Uncertain Supply Chain Management*, 9(4), 1091–1098. <https://doi.org/10.5267/J.Uscm.2021.X.008>
- Yamane, S. (1973). Localization Of Amylase Activity In Digestive Organs Of Carp Determined By A Substrate Film Method. *Bulletin Of The Japanese Society Of Scientific Fisheries*, 39(5), 497–504.
- Yuen, T. M., & Baskaran, S. (2023). Going Digital For Smes: Adapting Business Models And Seizing Opportunities To Achieve Sustainable Business Performance. *International Journal Of Academic Research In Business And Social Sciences*, 13(11), 976–987. <https://doi.org/10.6007/IJARBS/V13-I11/19401>
- Zhang, T., Shi, Z.-Z., Shi, Y.-R., & Chen, N.-J. (2022). Enterprise Digital Transformation And Production Efficiency: Mechanism Analysis And Empirical Research. *Economic Research – Ekonomika Istraživanja*, 35(1), 2781–2792.
- Zhang, W., Zhao, S., Wan, X., & Yao, Y. (2021). Study On The Effect Of Digital Economy On High-Quality Economic Development In China. *PLOS ONE*, 16(9), E0257365. <https://doi.org/10.1371/Journal.Pone.0257365>