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Driving sustainable performance: Digital transformation, technological capability, and innovation in MSMEs

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Abstract

Micro, Small, And Medium Enterprises (MSMEs) play a crucial role in contemporary environmental issues. This research examines the role of digital transformation, technological capability, and innovation in driving the sustainable performance of Using data from 136 MSMEs across various sectors, the study employs Structural Equation Modelling (SEM) to evaluate relationships among variables. Results indicate that technological capability significantly enhances digital transformation and innovation, which in turn have a positive and direct impact on sustainable performance. However, technological capability does not directly influence sustainable performance, highlighting the critical mediating roles of digital transformation and innovation. Despite its contributions, this study is limited to the Solo Raya region, and the use of cross-sectional data restricts long-term causal inferences. Nevertheless, the findings offer valuable insights for policymakers and MSME leaders, emphasizing the need for strategic investments in IT infrastructure, digital skills training, and innovation processes to sustain growth. Future research should adopt a longitudinal approach and explore additional regions to validate these results. This study establishes a critical framework for understanding how technology and innovation drive sustainable MSMEs performance in a rapidly digitalizing world.

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Keywords

Sustainable performance, Digital transformation, Technological capability, Innovation, MSMEs

Introduction

Globally, climate change and rising energy consumption intensify environmental issues, with waste generation increasing annually. MSMEs play a vital economic role but significantly contribute to these challenges. In Indonesia, MSMEs generate over 62% of GDP [1], while in Latin America, they constitute 99% of industries and employ 61% of the

workforce [2]. Governments worldwide focus on supporting MSMEs through policies aimed at fostering digital and technological development.

The rapid advancement of IT is critical for MSMEs to remain competitive, improving performance, operations, market access, and customer engagement [3]. IT is foundational for innovation and digital transformation, especially in dynamic global markets [4]. The COVID-19 pandemic accelerated digital adoption, prompting MSMEs to transition online. In response, the Indonesian government aims to digitize 30 million MSMEs by 2024, leveraging platforms like Facebook, Instagram, Shopee, and Tokopedia [5]. Similarly, countries like India provide subsidies, training, and infrastructure support for MSMEs to enhance digital resilience [6]. Despite progress, MSMEs face challenges in adopting digital technologies, including budget constraints, skill gaps, and cybersecurity risks [7]. These barriers necessitate supportive policies and capacity-building initiatives to enable sustainable digital transformation [8].

This study examines how Technological Capability affects sustainable performance in MSMEs, with innovation and digital transformation as mediating variables. While prior research links IT to sustainable performance, few explore these mediators, addressing a gap in the literature [9], [10]. Grounded in Dynamic Capability Theory (DCT), the study highlights how organizations adapt to changing environments by sensing opportunities, seizing them, and reconfiguring resources [11][12].

It hypothesizes that Technological Capability positively impacts innovation, digital transformation, and sustainable performance. Innovation enhances creativity and responsiveness [13], while digital transformation optimizes operations and capitalizes on digital opportunities, collectively improving MSME performance [14]. This framework offers a comprehensive understanding of these interactions (Figure 1).

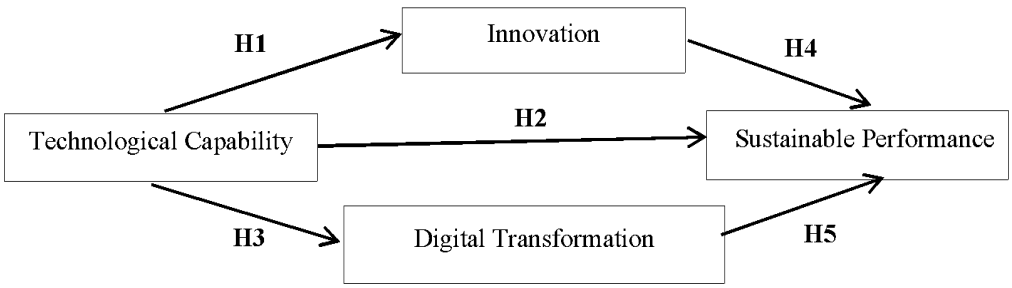

Figure 1. Schematic Diagram of the Study.

Method

This study adopts a theory-driven quantitative approach utilizing Structural Equation Modelling – Partial Least Squares (SEM-PLS). This method was chosen for its capability to handle complex models with multiple indicators, making it suitable for analyzing the relationships among technological capability, digital transformation, innovation, and sustainable performance. The study population comprises MSMEs in the Solo Raya region, with accidental sampling employed to practically access respondents [15]. The

sample size was determined using Hair's formula (n x 10), which considers the number of questionnaire indicators to ensure adequate data representation [16]. Data quality was ensured through validity and reliability testing. Discriminant validity verified that the constructs measured were distinct, while convergent validity confirmed that each indicator accurately measured its intended construct. Reliability was assessed using Cronbach's Alpha, with a threshold of ≥ 0.7 to ensure consistency among items [17]. This rigorous approach ensures the collection of valid and reliable data to support the analysis of the relationships among the main variables.

Data analysis uses SEM-PLS to examine relationships among variables, with respondent demographics including gender, age, education, domicile, and business type. Validity and reliability tests ensure data quality, with results close to 1 indicating high reliability. The study explores digital transformation, technological capability, and innovation as independent variables, sustainable performance as the dependent variable, and innovation and digital transformation as mediating variables. This structured analysis provides insights into MSMEs in Solo Raya.

Table 1 shows that 60.3% of respondents are female, 39.7% male, and 86% are aged 20-30. Most (52.9%) have a high school education, and the largest MSME sector is culinary, comprising 36% of respondents.

Table 1. Respondent Data

Characteristics	Category	Total	Percentage
Gender	Man	54	39,7%
	Woman	82	60,3%
Age	20 - 30 years	117	86%
	31 - 40 years	11	8,1%
	41 – 50 years	7	5,1%
	>50 years	1	0,8%
Last Education	Elementary School	1	0,7%
	Junior High School	6	4,4%
	Senior High School	72	52,9%
	Diploma/Bachelor's Degree	54	39,7%
	Master's Degree	1	0,7%
	Other	2	1,4%
Business type	Culinary	49	36%
	Fashion	11	8,1%
	Grocary Store	9	6,6%
	Printing	6	4,4%
	Crafts	9	6,6%
	Beauty	3	2,2%
	Services/Rental	20	14,7%
	Other	29	28%

Source: Table created by author

Result and Discussion

Measurent Model Testing

Table 2 shows that the results of the discriminant validity and convergent validity tests indicate that all items tested are valid. In the table, a Cronbach's alpha value of ≥ 0.7 is considered acceptable, ≥ 0.8 is good, and ≥ 0.9 is very good, meaning the questionnaire has good reliability. The results from cross-loading and AVE values of ≥ 0.6 indicate that the items are valid in measuring the intended constructs. Therefore, it can be concluded that all constructs in the questionnaire are considered valid and reliable.

Table 2. Convergent Validity and Reliability

Variable	Indicator	Cross Loading	Cronbach's Alpha	Rho-A	Composite Reliability	AVE
Digital transformation	DT1	0.848	0.936	0.939	0.948	0.724
	DT2	0.821				
	DT3	0.788				
	DT4	0.882				
	DT5	0.839				
	DT6	0.864				
	DT7	0.909				
Sustainable performance	SP1	0.859	0.913	0.916	0.933	0.698
	SP2	0.843				
	SP3	0.795				
	SP4	0.842				
	SP5	0.869				
	SP6	0.803				
Innovation	IN1	0.805	0.894	0.897	0.922	0.702
	IN2	0.833				
	IN3	0.874				
	IN4	0.870				
	IN5	0.806				
Technological capability	TC1	0.768	0.888	0.890	0.914	0.640
	TC2	0.794				
	TC3	0.799				
	TC4	0.836				
	TC5	0.801				
	TC6	0.800				

Source: Table created by author

Table 3 shows the results of discriminant validity testing. The results indicate that all constructs in the study meet the criteria because the constructs measured by the instrument are truly distinct from each other and do not excessively overlap. It can be concluded that discriminant validity between DT and SP, as well as IN and TC, has been fulfilled.

Table 3. Discriminant Validity

Variables	DT	SP	IN	TC
DT	0.851			
SP	0.859	0.835		
IN	0.799	0.792	0.838	
TC	0.773	0.731	0.732	0.800

Notes: DT= Digital Transformation; SP= Sustainable Performance; IN= Innovation; TC= Technological Capability
(Source: Table created by author, 2024)

The findings reveal that technological capability does not directly influence sustainable performance but significantly impacts digital transformation ($t = 14.425$, $p < 0.000$) and innovation ($t = 10.261$, $p < 0.000$). These mediating variables, in turn, significantly enhance sustainable performance (digital transformation: $t = 5.866$, $p < 0.000$; innovation: $t = 2.760$, $p = 0.006$). These results align with the Dynamic Capability Theory (DCT), which highlights the importance of an organization's ability to adapt to dynamic environments through innovation and resource reconfiguration [11]. Digital transformation enables MSMEs to expand market reach, enhance operational efficiency, and optimize customer experiences through platforms such as e-commerce and digital supply chain management [18]. Meanwhile, innovation contributes to performance by creating added value, addressing market demands, and unlocking new opportunities [19]. These findings underscore the strategic importance of investing in technology and innovation to build sustainable competitiveness in the digital era (Table 4) [2].

Table 4. Hypothesis Testing

No.	Hypothesis	Original Sample	t Statistics	p-values	Conclusion	
1.	H1: TC → IN	0.732	10.261	0.000	Supported	Direct effect
2.	H2: TC → SP	0.091	1.190	0.235	Not Supported	
3.	H3: TC → DT	0.773	14.425	0.000	Supported	
4.	H4: IN → SP	0.264	2.760	0.006	Supported	
5.	H5: DT → SP	0.578	5.866	0.000	Supported	
	Mediating Variables					
6.	H6: TC → IN → SP	0.193	2.827	0.005	Supported	Full mediation
7.	H7: TC → DT → SP	0.447	5.654	0.000	Supported	

Notes: DT= Digital Transformation; SP= Sustainable Performance; IN= Innovation; TC= Technological Capability
(Source: Table created by author, 2024)

Discussion

A study of 136 MSMEs in Solo Raya highlights the significant relationships among Technological Capability, Digital Transformation, Innovation, and Company Performance within the dynamic capability framework. Technological Capability facilitates automation, real-time data analysis, and swift market responses [20] laying the foundation for effective digital transformation [21], [22] and innovation [23], [24] This capability indirectly improves performance through these mediators.

Digital Transformation enhances operational efficiency and market reach while reducing costs through tools like e-commerce platforms and digital supply chain management. It also improves customer experience via personalized services, contributing to revenue

growth [18], [25]. Meanwhile, innovation drives performance by addressing customer needs, creating added value, and enabling new market exploration [19], [26], [27].

The findings emphasize that Technological Capability impacts performance indirectly through Digital Transformation and Innovation, highlighting the need for SMEs to integrate technology with strategy and innovation while fostering adaptive cultures. These insights align with dynamic capabilities theory, advocating continuous learning and process improvement to sustain competitiveness in the digital economy.

Conclusion

This study highlights the significant influence of Technological Capability on Digital Transformation and Innovation in MSMEs in Solo Raya. Companies with strong Technological Capability are better equipped to adopt digital transformation and drive innovation, both of which positively impact sustainable performance by improving efficiency, transforming business models, and enhancing customer value. However, Technological Capability does not directly affect sustainable performance but operates through the mediating roles of digital transformation and innovation.

This study has several limitations. The geographic focus on MSMEs in Solo Raya limits the generalizability of findings, necessitating broader regional studies [6]. Cross-sectional data restricts long-term variable analysis, suggesting the need for longitudinal research [8]. Response bias may arise due to the dominance of younger, secondary-educated participants, highlighting the need for balanced demographics. Additionally, external factors like government policies or partnerships, which may impact MSME performance, were not explored [22].

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References

1. F. Aligarh, B. Sutopo, and W. Widarjo, "The antecedents of cloud computing adoption and its consequences for MSMEs' performance: A model based on the Technology-Organization-Environment (TOE) framework," *Cogent Business and Management*, vol. 10, no. 2, 2023, doi: 10.1080/23311975.2023.2220190.
2. V. Kumar *et al.*, "Adoption of ICTs as an emergent business strategy during and following COVID-19

crisis: evidence from Indian MSMEs," *Benchmarking: An International Journal*, vol. 30, no. 6, pp. 1850–1883, Jul. 2023, doi: 10.1108/BIJ-11-2021-0685.
3. H. D. X. Trieu, P. V. Nguyen, K. T. Tran, D. Vrontis, and Z. Ahmed, "Organisational resilience, ambidexterity and performance: the roles of information technology competencies, digital transformation policies and paradoxical leadership," International Journal of Organizational Analysis, Aug. 2023, doi: 10.1108/IJOA-05-2023-3750.
4. J. Reis and N. Melão, "Digital transformation: A meta-review and guidelines for future research," Heliyon, vol. 9, no. 1, p. e12834, Jan. 2023, doi: 10.1016/j.heliyon.2023.e12834.
5. A. L. Kilay, B. H. Simamora, and D. P. Putra, "The Influence of E-Payment and E-Commerce Services on Supply Chain Performance: Implications of Open Innovation and Solutions for the Digitalization of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia," Journal of Open Innovation: Technology, Market, and Complexity, vol. 8, no. 3, p. 119, Sep. 2022, doi: 10.3390/joitmc8030119.
6. S. Panda and S. K. Rath, "How information technology capability influences organizational agility: empirical evidences from Indian banking industry," Journal of Indian Business Research, vol. 13, no. 4, pp. 564–585, Nov. 2021, doi: 10.1108/JIBR-11-2020-0364.
7. Perspectivas económicas de América Latina 2021. OECD, 2021. doi: 10.1787/2958a75d-es.
8. B. T. Mai, P. V. Nguyen, U. N. H. Ton, and Z. U. Ahmed, "Government policy, IT capabilities, digital transformation, and innovativeness in Post-Covid context: case of Vietnamese SMEs," International Journal of Organizational Analysis, vol. 32, no. 2, pp. 333–356, Jan. 2024, doi: 10.1108/IJOA-11-2022-3480.
9. V. Barba-Sánchez, A. Meseguer-Martínez, R. Gouveia-Rodrigues, and M. L. Raposo, "Effects of digital transformation on firm performance: The role of IT capabilities and digital orientation," Heliyon, vol. 10, no. 6, p. e27725, Mar. 2024, doi: 10.1016/j.heliyon.2024.e27725.
10. A. Ilmudeen, "Leveraging IT-enabled dynamic capabilities to shape business process agility and firm innovative capability: moderating role of turbulent environment," Review of Managerial Science, vol. 16, no. 8, pp. 2341–2379, Nov. 2022, doi: 10.1007/s11846-021-00501-9.
11. D. J. Teece, "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance," Strategic Management Journal, vol. 28, no. 13, pp. 1319–1350, Dec. 2007, doi: 10.1002/smj.640.
12. G. Mutongoreya, "Dynamic Capabilities in Small Firms: The Role of Practicing Accountants in Southern Africa," Open Journal of Business and Management, vol. 09, no. 04, pp. 1671–1679, 2021, doi: 10.4236/ojbm.2021.94091.
13. N. Becheikh and M. Bouaddi, "Do strategic management, innovation and social capital matter for firm performance in developing countries? Evidence from Morocco, Tunisia and Egypt," International Journal of Emerging Markets, Jun. 2024, doi: 10.1108/IJOEM-04-2023-0575.
14. K. Koo and L. Le, "IT capability and innovation," Technol Forecast Soc Change, vol. 203, p. 123359, Jun. 2024, doi: 10.1016/j.techfore.2024.123359.
15. S. Oetama, H. Susanto, W. Rizwannur, S. Tinggi Ilmu Ekonomi Sampit, and C. Author, "Effect Of Online Tracking System And Delivery Timeliness On Customer Satisfaction (Case Study On J & T Express Sampit)." [Online]. Available: http://ijstm.inarah.co.id
16. R. Dewi Rawa and N. Hidayat, "Ruang Terbuka Hijau : Sekadar Hiasan Kota Atau Sarana Berkumpul Yang Menarik?," vol. 8, no. 3, 2024.
17. S. Bahri, Metodologi Penelitian Bisnis- Lengkap dengan Teknik Pengelolaan Data SPSS. CV Andi Offshet, 2018.
18. M. K. Jardak and S. Ben Hamad, "The effect of digital transformation on firm performance: evidence from Swedish listed companies," The Journal of Risk Finance, vol. 23, no. 4, pp. 329–348, Jul. 2022, doi: 10.1108/JRF-12-2021-0199.
19. H. Boateng, S. S. Sigdel, K. S. Ofori, G. C. Agbemabiese, and R. E. Hinson, "Assessing the roles of foreign knowledge acquisition and absorptive capacity in the relationship between market orientation, innovativeness and performance," Management Research Review, vol. 46, no. 6, pp. 852–869, May 2023, doi: 10.1108/MRR-10-2021-0726.
20. D. J. Teece, G. Pisano, and A. Shuen, "Dynamic capabilities and strategic management," Strategic Management Journal, vol. 18, no. 7, pp. 509–533, Aug. 1997, doi: 10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.
21. R. Cannas, "Exploring digital transformation and dynamic capabilities in agrifood SMEs," Journal of Small Business Management, vol. 61, no. 4, pp. 1611–1637, Jul. 2023, doi: 10.1080/00472778.2020.1844494.

22. D. Ellström, J. Holtström, E. Berg, and C. Josefsson, "Dynamic capabilities for digital transformation," Journal of Strategy and Management, vol. 15, no. 2, pp. 272–286, Apr. 2022, doi: 10.1108/JSMA-04-2021-0089.
23. B. Faro, B. Abedin, D. Cetindamar, and F. Daneshgar, "Dynamic capabilities for nimbleness and resilience in a continuous digital transformation: action design research in an Australian financial services organisation," Journal of Enterprise Information Management, Jun. 2024, doi: 10.1108/JEIM-10-2023-0567.
24. C. Froehlich, L. B. Reinhardt, D. Schreiber, and L. Eberle, "Dynamic capabilities for digital transformation in an enterprise business," Benchmarking: An International Journal, May 2024, doi: 10.1108/BIJ-12-2023-0864.
25. M. Shehadeh, H. Alshurafat, and O. Arabiat, "Inverting the paradigm: digital transformation's impact on firm performance and the counterintuitive role of gender," Competitiveness Review: An International Business Journal, Mar. 2024, doi: 10.1108/CR-11-2023-0299.
26. C. Dibrell, J. B. Craig, and D. O. Neubaum, "Linking the formal strategic planning process, planning flexibility, and innovativeness to firm performance," J Bus Res, vol. 67, no. 9, pp. 2000–2007, Sep. 2014, doi: 10.1016/j.jbusres.2013.10.011.
27. A.-M. Nisula, M. Vanhala, H. Hussinki, and A. Kianto, "Role of managerial innovativeness for small Finnish firms' product and market performance," Baltic Journal of Management, vol. 18, no. 6, pp. 17–35, Dec. 2023, doi: 10.1108/BJM-05-2022-0181.