

# Digital Transformation, Innovation, and Competitive Advantage: Enhancing MSME Performance in Bitung, North Sulawesi

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## ABSTRACT

Micro, small, and medium enterprises (MSMEs) serve as vital components of the Indonesian economy, particularly in Bitung City, North Sulawesi. The dynamics of global competition, shifts in consumer behavior, and digital disruption necessitate that MSMEs embrace digital transformation and innovation. This study seeks to examine how digital transformation and innovation impact the performance of MSMEs, with competitive advantage acting as a mediating factor. Utilizing a quantitative approach, the research involved surveys conducted with 113 MSME operators in Bitung. Data were analyzed using Structural Equation Modelling–Partial Least Squares (SEM-PLS). Findings indicate that digital transformation significantly enhances both competitive advantage and performance. While innovation positively influences competitive advantage, it does not have a direct effect on performance. The study confirmed that competitive advantage mediates the relationship between digital transformation and innovation in relation to MSME performance. These results highlight that digital transformation serves as the foundation, with innovation acting as a catalyst, and competitive advantage being crucial for sustainably improving the performance of MSMEs.

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## 1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) have a vital role in the Indonesian economy because they can absorb labour, create economic equity, and make a significant contribution to the Gross Domestic Product (GDP) (Kurniawati et al., 2021). In Bitung City, North Sulawesi, MSMEs also function as the backbone of the local economy, especially in the fisheries, trade, and service sectors (Katiandagho et al., 2019; Langelo et al., 2024; Wehantouw et al., 2021). However, the development of an increasingly dynamic business environment, changes in consumer behavior, and increased global competition require MSMEs to continue to adapt in order to be able to maintain performance and competitiveness (S. Syahyono, 2019; Wulandari & Koe, 2022).

One of the main challenges MSMEs face is the need to carry out digital transformation. This transformation is not only limited to technology adoption (Kawane et al., 2024), but also includes fundamental changes in business strategies (Citra Dewi et al., 2023), resource management (J. Zhang & Chen, 2024), and interactions with consumers (Toha & Habibah, 2023). Using digital technology such as e-commerce, social media, and finance-based applications can help MSMEs expand market reach, improve operational efficiency, and create innovation opportunities (Armiani

et al., 2021; Batubara, 2022). Thus, digital transformation is an important foundation in increasing the competitiveness of MSMEs in the digital economy era.

In addition to digital transformation, innovation also plays a strategic role in developing MSMEs. Innovation can be in the form of product development (Syukron et al., 2022), process improvement (Hidayat et al., 2022), or the application of management strategies (NAWANGSARI et al., 2023) that are more adaptive to market dynamics. However, previous research findings show that innovation does not always have a direct impact on performance, but is more effective when directed at strengthening competitive advantage (Putra & Darmawan, 2022; Susanti et al., 2023; Yaskun et al., 2023).

MSMEs that can develop differentiation strategies, improve product and service quality, and adapt quickly to changes in the business environment are proven to have better performance (Susanti et al., 2023; Yaskun et al., 2023). Furthermore, digital transformation has also been proven to positively and significantly influence competitive advantage and performance, while innovation plays an important role as a competitive strengthener (Octasyilva et al., 2022).

Another relevant finding is the role of competitive advantage mediation in strengthening the influence of innovation and digital transformation on performance (Rokhman et al., 2023; Susanti et al., 2023). Thus, both innovation and digital transformation will be more optimal if they are directed to create and maintain a sustainable competitive advantage.

Based on the background and gaps of the research, this study aims to analyse the influence of digital transformation and innovation on the performance of MSMEs in Bitung, taking into account the role of competitive advantage as a mediating factor. The novelty of this research lies in an integrative approach that examines the direct and indirect relationship between digital transformation, innovation, and competitive advantage to the performance of MSMEs by emphasising the local context of Bitung as a strategic area in North Sulawesi.

Thus, this research is expected to make a theoretical contribution in enriching the literature on MSME management in the digital era and provide practical implications for MSME actors and policy makers in formulating strategies to increase the competitiveness and performance of MSMEs in a sustainable manner.

## 2. RESEARCH METHOD

This study uses a quantitative approach with a survey method, and is analyzed through Structural Equation Modeling–Partial Least Squares (SEM-PLS). This method was selected due to its ability to examine the relationships among latent variables within complex datasets, even with a relatively small sample size. The research population consists of all MSMEs registered with the Trade and Industry Office of Bitung City, North Sulawesi. A purposive sampling technique was used to determine the sample based on specific criteria: MSMEs must have been in operation for a minimum of two years and possess social media accounts for marketing purposes. As a result, 113 respondents were identified as representative based on the guidelines for sample size established by Lemeshow.

The research instrument is in the form of a structured questionnaire with a five-point Likert scale, which measures four main variables: (1) Digital Transformation, (2) Innovation, (3) Competitive Advantage, and (4) MSME Performance. Data collection was carried out in April-May 2025, through the distribution of questionnaires directly to business locations and online, with explanations of the research objectives, benefits of participation, and confidentiality guarantees to increase the validity of respondents' answers.

## 3. RESULTS AND DISCUSSIONS

### Outer Model

The outer model assesses the connection between latent variables and their indicators to verify the validity and reliability of the research instrument. The evaluation focuses on three key aspects: convergent validity, discriminant validity, and construct reliability.

### Convergent Validity

The loading factor and average variance extracted (AVE) tested convergent validity. The test results showed that the loading factor value ranged from 0.747 to 0.982, which means that all indicators met

the validity criteria ( $\geq 0.70$ ) and consistently reflected the construct (Table 1). In addition, the AVE values for the variables Innovation (0.734), Competitive Advantage (0.724), Performance (0.757), and Digital Transformation (0.939) were above the minimum limit of 0.50, so that all constructs were declared valid (Table 2).

**Table 1.** Results of Outer Loading

Indicators	Innovation	Competitive Advantage	Performance	Digital Transformation	Result
CA1		0,747			Valid
CA3		0,894			Valid
CA4		0,903			Valid
DT1				0,960	Valid
DT2				0,982	Valid
DT4				0,939	Valid
DT5				0,981	Valid
DT6				0,982	Valid
I3	0,830				Valid
I5	0,883				Valid
P1			0,782		Valid
P2			0,884		Valid
P3			0,908		Valid
P6			0,902		Valid

**Table 2.** Results of AVE

Variables	Average Variance Extracted (AVE)	Keterangan
Innovation	0,734	Valid
Competitive Advantage	0,724	Valid
Performance	0,757	Valid
Digital Transformation	0,939	Valid

### Discriminant Validity

The validity of the discriminant was tested through cross-loading and correlation between constructs with the Fornell-Larcker method. The results of cross-loading showed that the indicator had a higher correlation with the original construct than with other constructs (Table 3). Meanwhile, the root of AVE ( $\sqrt{\text{AVE}}$ ) of each variable—Innovation (0.857), Competitive Advantage (0.851), Performance (0.870), and Digital Transformation (0.969)—is greater than the correlation between other constructs, so that the discriminant validity requirement is met (Table 4).

**Table 3.** Results of Cross Loading

Indicators	Innovation	Competitive Advantage	Performance	Digital Transformation	Result
CA1	0,441	<b>0,747</b>	0,434	0,309	Valid
CA3	0,742	<b>0,894</b>	0,434	0,297	Valid
CA4	0,676	<b>0,903</b>	0,469	0,435	Valid
DT1	0,335	0,417	0,409	<b>0,960</b>	Valid
DT2	0,309	0,411	0,353	<b>0,982</b>	Valid

Indicators	Innovation	Competitive Advantage	Performance	Digital Transformation	Result
DT4	0,235	0,357	0,340	<b>0,939</b>	Valid
DT5	0,287	0,394	0,378	<b>0,981</b>	Valid
DT6	0,281	0,397	0,371	<b>0,982</b>	Valid
I3	<b>0,830</b>	0,586	0,351	0,285	Valid
I5	<b>0,883</b>	0,681	0,443	0,235	Valid
P1	0,431	0,435	<b>0,782</b>	0,326	Valid
P2	0,383	0,482	<b>0,884</b>	0,341	Valid
P3	0,369	0,464	<b>0,908</b>	0,352	Valid
P6	0,441	0,428	<b>0,902</b>	0,312	Valid

**Table 4.** Results of Latent Variable

	Innovation	Competitive Advantage	Performance	Digital Transformation	AVE	$\sqrt{\text{AVE}}$	Ket
Innovation	1,000	0,742	0,467	0,300	0,734	0,857	Valid
Competitive Advantage	0,742	1,000	0,521	0,409	0,724	0,851	Valid
Performance	0,467	0,521	1,000	0,383	0,757	0,870	Valid
Digital Transformation	0,300	0,409	0,383	1,000	0,939	0,969	Valid

**Construct Reliability**

The construct's reliability was analyzed using Cronbach's Alpha and Composite Reliability (CR). The test results showed Cronbach's Alpha for Innovation (0.740), Competitive Advantage (0.808), Performance (0.892), and Digital Transformation (0.984), for a total of  $\geq 0.70$ . The CR value also met the high reliability criteria, each of 0.847, 0.887, 0.936, and 0.987 (Table 5). Thus, all constructs are declared reliable and consistent.

**Table 5.** Results of Cronbach's Alpha and Composite Reliability

Variables	Cronbach's Alpha	Composite Reliability	Keterangan
Innovation	0,740	0,847	Reliable
Competitive Advantage	0,808	0,887	Reliable
Performance	0,892	0,926	Reliable
Digital Transformation	0,984	0,987	Reliable

**Model Fit Test**

Model fit is evaluated using multiple indexes. An SRMR value of 0.062 ( $< 0.10$ ) indicates a good fit; d-ULS (0.401  $> 0.05$ ) and d-G (0.694  $> 0.05$ ) values indicate that the model does not experience significant deviations. Overall, the fit model test results prove that the research model is accurate and has good predictive capabilities.

**Table 6.** Results of Model Fit Test

	Rule of Thumb	Nilai Parameter	Keterangan
SRMR	Lebih kecil dari 0.10	0,062	Fit
d_ ULS	$> 0,05$	0,401	Fit
d_ G	$> 0,05$	0,694	Fit

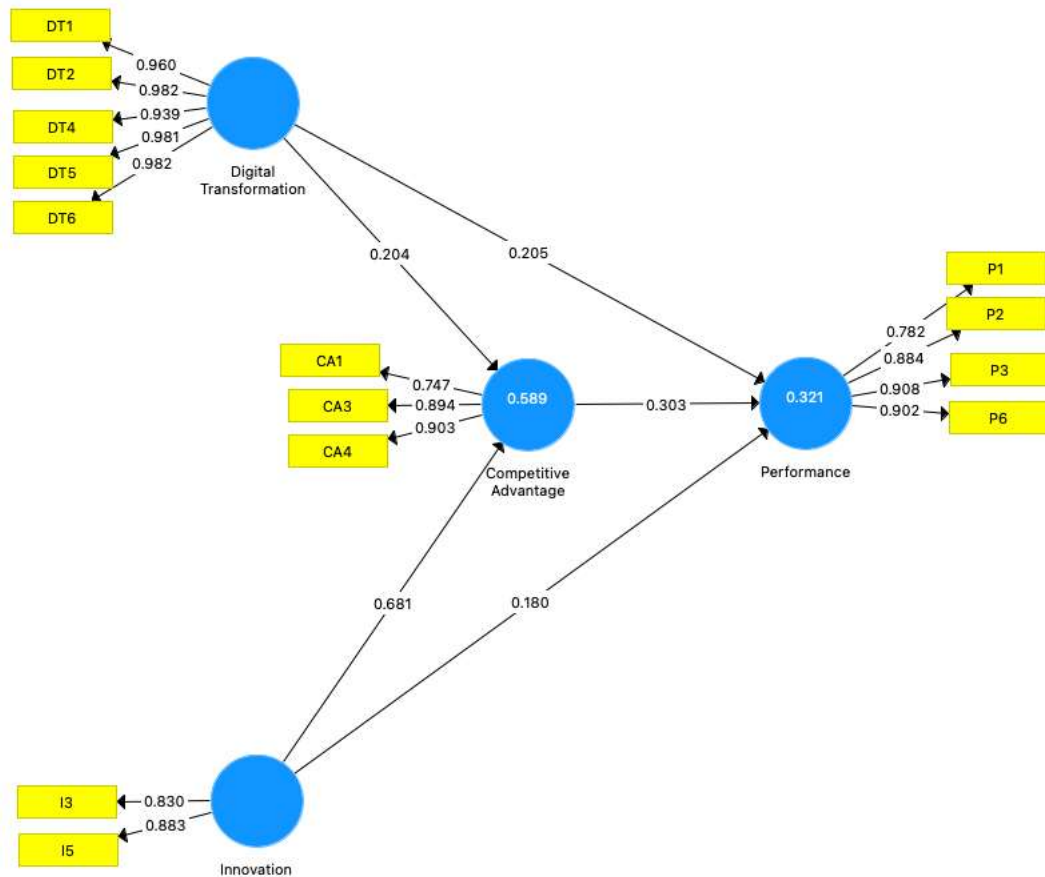


Figure 1. Measurement Model (Author's calculation)

**Inner Model  
R Square (R<sup>2</sup>)**

R-Square (R<sup>2</sup>) in SEM-PLS quantifies how much the independent variables account for variations in the dependent variables. The R<sup>2</sup> value ranges from 0 to 1, with higher values reflecting better predictive power of the model. The analysis from this study reveals that the R<sup>2</sup> for the Competitive Advantage variable stands at 0.589, indicating that the model's independent variables can explain 58.9% of the variation in Competitive Advantage. This leaves 41.1% influenced by factors outside the model. This suggests a moderate yet robust relationship between the independent variables and Competitive Advantage, warranting further exploration.

Conversely, the R<sup>2</sup> for the Performance variable is 0.302, meaning that the independent variables account for 30.2% of the variability in Performance. The remaining 69.8% is affected by external factors not captured in the model. This indicates a weak to moderate relationship between the latent variables and Performance. However, it still provides valuable insights into the factors influencing the performance of MSMEs. Overall, the R<sup>2</sup> outcomes indicate that while the model elucidates some of the variation in both Competitive Advantage and Performance, it is essential to consider additional external factors.

Table 7. R Square (R<sup>2</sup>)

Variables	R Square	R Square Adjusted
Competitive Advantage	0,808	0,887
Performance	0,892	0,926

### Effect Size ( $f^2$ )

Effect Size ( $f^2$ ) is used to evaluate each independent variable's specific contribution to the model's dependent variable. The value of  $f^2$  is calculated by comparing the change in the value of  $R^2$  after an independent variable is excluded from the model. The interpretation criteria for  $f^2$  were minor ( $<0.02$ ), medium ( $0.02-0.15$ ), and large ( $>0.35$ ). This analysis provides a deeper understanding of the relative strength of influence between latent variables. The following findings were obtained based on the analysis results (Table 8). First, the Innovation  $\rightarrow$  Competitive Advantage pathway has a relatively large  $f^2$  value of 1.027, emphasizing that Innovation is the main factor in shaping the competitive advantage of MSMEs. Second, the Innovation  $\rightarrow$  Performance track has an  $f^2$  value of 0.021 (medium category), indicating that Innovation only contributes moderately to direct performance improvement. Third, the Competitive Advantage  $\rightarrow$  Performance track produced an  $f^2$  value of 0.056 (medium category), indicating that competitive advantage is important in encouraging MSME performance. Fourth, the Digital Transformation  $\rightarrow$  Competitive Advantage pathway has an  $f^2$  value of 0.095 (medium category), indicating that digital transformation significantly contributes to strengthening competitive advantage. Finally, the Digital Transformation  $\rightarrow$  Performance pathway resulted in an  $f^2$  value of 0.052 (medium category), which means that digital transformation plays a moderate role in improving Performance directly.

Overall, these results confirm that Innovation has a dominant influence on competitive advantage, while competitive advantage and digital transformation serve as reinforcing factors that mediate the improvement of MSME performance.

**Table 8.** Results of Effect Size ( $f^2$ )

	Innovation	Competitive Advantage	Performance	Digital Transformation
Innovation		1,027	0,021	
Competitive Advantage			0,056	
Performance				
Digital Transformation		0,092	0,052	

### Significance (Hypothesis Testing)

Significance tests for relationships in PLS-SEM were conducted to assess whether the connections between latent variables in the model could be deemed statistically significant. This process typically employs the bootstrapping technique, where data is resampled to calculate the path coefficient and standard error. The outcomes are presented as either a t-statistic or a p-value. A relationship is considered significant if the p-value is below the predetermined significance threshold (0.05 in this study). Significant path coefficients indicate strong statistical support for the relationship between independent and latent dependent variables, allowing for the acceptance of the proposed hypothesis. Below are the results from the bootstrapping analysis for the direct and indirect effect research models.

**Table 9.** Results of Hypotesis Testing

Path Coefficient	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
Innovation -> Competitive Advantage	0,681	0,690	0,068	9,950	0,000
Innovation -> Performance	0,180	0,188	0,105	1,714	0,087
Competitive Advantage -> Performance	0,303	0,301	0,103	2,934	0,004
Digital Transformation -> Competitive Advantage	0,204	0,200	0,051	3,999	0,000
Digital Transformation -> Performance	0,205	0,205	0,078	2,614	0,009
Innovation -> Competitive Advantage -> Performance	0,207	0,207	0,073	2,838	0,005

Path Coefficient	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
Digital Transformation -> Competitive Advantage -> Performance	0,062	0,060	0,026	2,400	0,017

### The Impact of Innovation on Competitive Advantage

The results indicated that Innovation had a positive and significant impact on competitive advantage, with a coefficient value of 0.681, a T-Statistic of 9.950 ( $>1.96$ ), and a P-Value of 0.000 ( $<0.05$ ). This suggests that a greater level of Innovation among MSMEs correlates with a stronger competitive advantage. MSMEs that successfully implement innovations are more adaptable in responding to market dynamics through the use of technology. The use of technology, accompanied by the ability to adapt to changes in the business environment, contributes to strengthening Innovation while building a positive image of MSMEs (Ausat, 2025; Taiwo Agwu et al., 2016). Innovation can be realized in various aspects, ranging from strategy, management, technology, to marketing (Han, 2011). In addition, the ability to innovate in products, processes, and administrative systems is a determining factor that affects the competitiveness of MSMEs (Van Auken et al., 2008).

### The Influence of Innovation on Performance

The findings of the study revealed that Innovation had no significant effect on Performance, with a coefficient value of 0.180, T-Statistic of 1.714 ( $<1.96$ ), and P-Value of 0.087 ( $>0.05$ ). This means that innovative behaviour carried out by MSMEs in Bitung does not directly improve business performance. This condition can be caused by limited physical and financial resources, which hinder MSMEs' ability to innovate sustainably (Babalola et al., 2015; Sultan et al., 2021; Woschke et al., 2017). External factors also play a role, such as limited access to financial assistance (Božić & Rajh, 2016; Traboulsy, 2023), lack of support from large corporations (Chirico et al., 2024), as well as a less adaptive organizational culture (Abdul-Halim et al., 2019; Martínez-Costa et al., 2019). These obstacles ultimately reduce the potential for Innovation to make a direct contribution to improving the Performance of MSMEs.

### The Influence of Competitive Advantage on Performance

The analysis showed that competitive advantage had a positive and significant influence on Performance, with a coefficient value of 0.303, T-Stats of 2.934 ( $>1.96$ ), and P-Value of 0.004 ( $<0.05$ ). This proves that MSMEs with a strong competitive advantage tend to produce better business performance. Competitive advantage is important in increasing profitability and building customer loyalty and satisfaction in the long run. Marketing strategies such as branding, market segmentation, and promotional activities are key elements in strengthening competitive advantage and encouraging performance improvement (Rahayuningsih, 2020).

### The Influence of Digital Transformation on Competitive Advantage

The results demonstrated that digital transformation had a positive and significant impact on competitive advantage, with a coefficient value of 0.204, a T-statistic of 3.999 ( $>1.96$ ), and a P-value of 0.000 ( $<0.05$ ). These findings indicate that effective implementation of digital transformation can enhance the competitive advantage of MSMEs. Technology integration allows MSMEs to reduce operational costs while increasing productivity. Thus, digital transformation plays a role as one of the key factors in creating and maintaining competitive advantages (Rahayuningsih, 2020).

### The Influence of Digital Transformation on Performance

This study also found that digital transformation had a positive and significant effect on Performance, with a coefficient value of 0.205, T-Stats of 2.614 ( $>1.96$ ), and P-Value of 0.009 ( $<0.05$ ). MSMEs that have successfully implemented digital transformation show better Performance than those that have not. Digital transformation is driving the emergence of innovations that allow the development of new products and services more in line with market needs (Leão & da Silva, 2021; Xuan et al., 2024). In addition, integrating technology in internal and external processes improves resource efficiency and productivity (L. Jiang et al., 2025; W. Jiang & Li, 2024; C. Zhang & Deng, 2024; Zhou et al., 2025).

### **The Influence of Digital Transformation on Performance through Competitive Advantage**

The mediation analysis results revealed that digital transformation had a significant indirect effect on Performance through competitive advantage, with a coefficient value of 0.207, a T-Statistic of 2.838 ( $>1.96$ ), and a P-Value of 0.005 ( $<0.05$ ). This indicates that while digital transformation directly impacts Performance, its effect is further amplified when coupled with competitive advantage. Competitive advantage acts as a partial mediator, enhancing the influence of digital transformation on the Performance of MSMEs. In other words, the effective implementation of digital transformation not only improves operational efficiency but also expands market access and enhances business capabilities, which ultimately drives improved Performance (Korneeva et al., 2023; Lu & Shaharudin, 2024; Saputra et al., 2024)

### **The Influence of Innovation on Performance through Competitive Advantage**

Further analysis showed that Innovation had a significant indirect influence on Performance through competitive advantage, with a coefficient value of 0.062, a T-statistic of 2,400 ( $>1.96$ ), and a P-value of 0.017 ( $<0.05$ ). These results show that Innovation can impact Performance if directed to strengthen competitive advantage. Competitive advantage is a partial mediation that strengthens the relationship between Innovation and MSME performance. The use of digital technology, such as the use of online platforms, allows MSMEs to provide faster and more efficient services, thereby increasing customer satisfaction and positively impacting Performance (Korneeva et al., 2023; Lu & Shaharudin, 2024; Saputra et al., 2024)

## **4. CONCLUSION**

The results of the study show that innovation has a positive effect on competitive advantage, but does not directly improve the performance of MSMEs. This means that innovation only has an impact on performance if it is directed to strengthen competitiveness. On the other hand, competitive advantage has been proven to have a significant effect on performance, so differentiation strategies, market adaptation, and strengthening competitiveness are key factors in improving performance. Digital transformation has also been proven to improve both competitive advantage and performance through efficiency, market expansion, and the creation of innovation opportunities. Furthermore, the results of the mediation confirmed that competitive advantage strengthens the influence of innovation and digital transformation on performance. Thus, the integration of digital transformation as a foundation, innovation as a strengthener, and competitive advantage as the main determinants are effective strategies to improve the performance of MSMEs. The implications of this study emphasize the importance of digital transformation in marketing, technology-based financial management, and e-commerce. Innovation should be directed not only at products, but also at processes, management systems, and marketing strategies to strengthen competitiveness. In addition, differentiation strategies through branding, service quality, and strengthening customer relationships are key to maintaining consumer loyalty. Regarding policy, the government and stakeholders must provide an inclusive digital ecosystem through infrastructure, digital literacy, mentoring, financial support and incentives for MSMEs. Collaboration between MSMEs, large companies, financial institutions, and educational institutions must also be strengthened to create a sustainable business ecosystem. This study has limitations because it was only conducted on MSMEs in Bitung City and used a questionnaire survey that could potentially be subject to bias. The research variables are also limited to digital transformation, innovation, competitive advantage, and performance, so factors such as entrepreneurial orientation, access to financing, digital literacy, and regulatory support have not been accommodated. Therefore, further research needs to be carried out in the broader area, using mixed methods, and including additional variables so that the analysis is more comprehensive and the findings can be more generalized.

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further studied in a broader context and region. However, the contribution of this research is expected to provide practical benefits for the development of digital transformation strategies, innovation, and competitive advantages in improving the performance of MSMEs, especially in the digital era

## REFERENCES

- Abdul-Halim, H., Ahmad, N. H., Geare, A., & Thurasamy, R. (2019). Innovation Culture in SMEs: The Importance of Organizational Culture, Organizational Learning and Market Orientation. *Entrepreneurship Research Journal*, 9(3). <https://doi.org/10.1515/erj-2017-0014>
- Armiani, A., Basuki, B., & Suwarno, N. (2021). TEKNOLOGI DIGITAL MEMEDIASI DAMPAK STRATEGI BISNIS TERHADAP KINERJA UMKM DI NUSA TENGGARA BARAT. *EKUITAS (Jurnal Ekonomi Dan Keuangan)*, 5(3). <https://doi.org/10.24034/j25485024.y2021.v5.i3.4892>
- Ausat, A. M. A. (2025). In-Depth Study of the Strategic Interaction between Electronic Commerce, Innovation, and Attainment of Competitive Advantage in the Context of SMEs. *International Journal of Analysis and Applications*, 23. <https://doi.org/10.28924/2291-8639-23-2025-78>
- Babalola, O. O., Amiolemen, S. O., Adegbite, S. A., & Ojo-Emmanuel, G. (2015). Evaluation of factors influencing technological innovations of small and medium enterprises in Nigerian Industrial Estates. *International Journal of Innovation Science*, 7(1), 39–53. <https://doi.org/10.1260/1757-2223.7.1.39>
- Batubara, F. H. (2022). UTILIZATION OF DIGITAL TECHNOLOGY IN DEVELOPING MARKETING STRATEGIES FOR MSME PRODUCTS. *Jurnal Ilmiah Manajemen, Ekonomi, & Akuntansi (MEA)*, 6(3). <https://doi.org/10.31955/mea.v6i3.2569>
- Božić, L., & Rajh, E. (2016). The factors constraining innovation performance of smes in Croatia. *Economic Research-Ekonomska Istrazivanja*, 29(1), 314–324. <https://doi.org/10.1080/1331677X.2016.1168040>
- Chirico, F., Naldi, L., Hitt, M. A., Sieger, P., Sirmon, D. G., & Xu, K. (2024). Orchestrating resources with suppliers for product innovation. *Journal of Product Innovation Management*, 41(4), 735–767. <https://doi.org/10.1111/jpim.12703>
- Citra Dewi, G., Bernardus, D., Sugiyono Agus Purwono, B., & Nova Yatna, C. (2023). POST-PANDEMIC MSME BUSINESS STRATEGY: DIGITAL MARKETING INNOVATION AND TRANSFORMATION. *Jurnal Ekonomi*, 12(01).
- Han, Y.-C. (2011). Innovation: The way to enhance the core competitiveness of SMEs in the post-financial crisis era. *BMEI 2011 - Proceedings 2011 International Conference on Business Management and Electronic Information*, 1, 581–584. <https://doi.org/10.1109/ICBMEI.2011.5917003>
- Hidayat, M. S., Sudarmiatin, S., & Mukhlis, I. (2022). Internationalization of UD Aida Furniture MSMEs in Pasuruan East Java Indonesia: Its Process and Development. *JOURNAL OF ECONOMICS, FINANCE AND MANAGEMENT STUDIES*, 05(12). <https://doi.org/10.47191/jefms/v5-i12-24>
- Jiang, L., Li, B., & Zhang, M. (2025). The impact of digital transformation on the efficiency of corporate resource allocation: Internal mechanisms and external environment. *Technological Forecasting and Social Change*, 215. <https://doi.org/10.1016/j.techfore.2025.124107>
- Jiang, W., & Li, J. (2024). Digital transformation and its effect on resource allocation efficiency and productivity in Chinese corporations. *Technology in Society*, 78. <https://doi.org/10.1016/j.techsoc.2024.102638>
- Katiandagho, S., Kumenaung, A. G., & Rotinsulu, D. Ch. (2019). ANALISIS KONTRIBUSI SEKTOR PERIKANAN TERHADAP PDRB DAN PENYERAPAN TENAGA KERJA DI KOTA BITUNG. *JURNAL PEMBANGUNAN EKONOMI DAN KEUANGAN DAERAH*, 19(9). <https://doi.org/10.35794/jpekd.23440.19.9.2019>
- Kawane, T., Adu-Gyamfi, B., Cao, Y., Zhang, Y., Yamazawa, N., He, Z., & Shaw, R. (2024). Digitization as an Adaptation and Resilience Measure for MSMEs amid the COVID-19 Pandemic in Japan: Lessons from the Food Service Industry for Collaborative Future Engagements. *Sustainability (Switzerland)*, 16(4). <https://doi.org/10.3390/su16041550>
- Korneeva, E., Hönigsberg, S., & Dinter, B. (2023). Leveraging Digital Platforms Through Business Model Innovation in SMEs: A Capability Perspective. *29th Annual Americas Conference on Information Systems, AMCIS 2023*. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85192884922&partnerID=40&md5=31a6e6661bce71c9eb69c7a61bc42e0a>
- Kurniawati, E., Idris, I., Handayati, P., & Osman, S. (2021). Digital transformation of MSMEs in Indonesia during the pandemic. *Entrepreneurship and Sustainability Issues*, 9(2). [https://doi.org/10.9770/jesi.2021.9.2\(21\)](https://doi.org/10.9770/jesi.2021.9.2(21))
- Langelolo, L., Ngangi, C. R., & Rengkung, L. R. (2024). Agro Digitalization Capability Of The Umkm Sector In Bitung City In The Era Of Digital Agro Economy. *Jurnal Agroekoteknologi Terapan*, 5(1). <https://doi.org/10.35791/jat.v5i1.53993>
- Leão, P., & da Silva, M. M. (2021). Impacts of digital transformation on firms' competitive advantages: A systematic literature review. *Strategic Change*, 30(5), 421–441. <https://doi.org/10.1002/jsc.2459>
- Lu, H., & Shaharudin, M. S. (2024). Role of digital transformation for sustainable competitive advantage of SMEs: a systematic literature review. *Cogent Business and Management*, 11(1). <https://doi.org/10.1080/23311975.2024.2419489>

- Martínez-Costa, M., Jiménez-Jiménez, D., & Dine Rabeh, H. A. (2019). The effect of organisational learning on interorganisational collaborations in innovation: an empirical study in SMEs. *Knowledge Management Research and Practice*, 17(2), 137–150. <https://doi.org/10.1080/14778238.2018.1538601>
- NAWANGSARI, L. C., SISWANTI, I., & SOELTON, M. (2023). HUMAN RESOURCES MANAGEMENT STRATEGY FOR BUSINESS SUSTAINABILITY IN MSMES. *ICCD*, 5(1). <https://doi.org/10.33068/iccd.v5i1.599>
- Octasyilva, A. R. P., Yuliati, L. N., Hartoyo, H., & Soehadi, A. W. (2022). Innovativeness as the Key to MSMEs' Performances. *Sustainability (Switzerland)*, 14(11). <https://doi.org/10.3390/su14116429>
- Putra, A. R., & Darmawan, D. (2022). Competitive Advantage of MSMEs in Terms of Technology Orientation and Entrepreneurship Competence. In *ISSE International Journal of Service Science* (Vol. 2, Issue 1).
- Rahayuningsih, S. (2020). Animation media of animal husbandry thematic science learning to stimulate scientific attitude in early childhood. *International Journal of Scientific and Technology Research*, 9(2), 5879–5882. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85079884518&partnerID=40&md5=46826c0bb9ce1f967f25d88a4afd1e95>
- Rokhman, M. T. N., Ratnawati, R., & Rahayu, Y. N. (2023). RELATIONSHIP BETWEEN HUMAN CAPITAL AND MSMES PERFORMANCE WITH COMPETITIVE ADVANTAGE AS A MEDIATION. *Jurnal Aplikasi Manajemen*, 21(1). <https://doi.org/10.21776/ub.jam.2023.021.1.14>
- S. Syahyono, S. S. (2019). The Effect Of Structural Capital And Creative Innovation On Increasing Business Performance Of The Cibaduyut Shoes Fashion Industry In Bandung City. *Fair Value: Jurnal Ilmiah Akuntansi Dan Keuangan*, 1(2). <https://doi.org/10.32670/fairvalue.v1i2.1192>
- Saputra, M. H., Utomo, M. N., Ariansyah, K., Wismayanti, Y. F., & Ansyah, R. H. A. (2024). Small and medium-sized enterprises dynamic capabilities and competitive advantage: The mediating effect of digitalization. *Entrepreneurial Business and Economics Review*, 12(3), 41–67. <https://doi.org/10.15678/EBER.2024.120303>
- Sultan, A., Bhat, A., & Gautam, K. (2021). Collaboration Competency as a Driver for Improving Performance of Small-Medium Enterprises in Resource Constraint Economies: An Exploratory Study. *SCMS Journal of Indian Management*, 18(4), 57–67. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85126565735&partnerID=40&md5=8af93cc84121ff10728765dbadfe49de>
- Susanti, E., Mulyanti, R. Y., & Wati, L. N. (2023). MSMEs performance and competitive advantage: Evidence from women's MSMEs in Indonesia. *Cogent Business and Management*, 10(2). <https://doi.org/10.1080/23311975.2023.2239423>
- Syukron, S., Zarkasih, A., Nasution, S. L., Siregar, M. R., & Munthe, R. S. (2022). Strategi Pemasaran Produk Di Era Digital Pada UMKM. *COMSEP: Jurnal Pengabdian Kepada Masyarakat*, 3(2). <https://doi.org/10.54951/comsep.v3i2.282>
- Taiwo Agwu, J. N., Mercy, A., & Evawere, A. (2016). The role of ICTS in the improvement of the competitiveness of SMEs. *Asian Journal of Information Technology*, 15(18), 3414–3421. <https://doi.org/10.3923/ajit.2016.3414.3421>
- Toha, M., & Habibah, N. J. (2023). MSME EMPOWERMENT AND DEVELOPMENT PROGRAM TO INCREASE CONSUMER SATISFACTION. *Sahwahita: Community Engagement Journal*, 1(1).
- Traboulsy, O. R. (2023). The Role of Resource Acquisition in Achieving Sustainable Competitive Performance for SMEs in an Emerging Market: A Moderated Mediation Analysis. *Sustainability (Switzerland)*, 15(16). <https://doi.org/10.3390/su151612302>
- Van Auken, H., Madrid-Guijarro, A., & García-Pérez-de-Lema, D. (2008). Innovation and performance in Spanish manufacturing SMEs. *International Journal of Entrepreneurship and Innovation Management*, 8(1), 36–56. <https://doi.org/10.1504/IJEIM.2008.018611>
- Wehantouw, G. J. M., Porajouw, O. . , & Taroreh, M. L. G. (2021). PERANAN SEKTOR PERTANIAN TERHADAP PEREKONOMIAN DI KOTA BITUNG. *AGRI-SOSIOEKONOMI*, 17(2). <https://doi.org/10.35791/agrsosek.17.2.2021.33778>
- Woschke, T., Haase, H., & Kratzer, J. (2017). Resource scarcity in SMEs: effects on incremental and radical innovations. *Management Research Review*, 40(2), 195–217. <https://doi.org/10.1108/MRR-10-2015-0239>
- Wulandari, R., & Koe, W.-L. (2022). The Factors that Influence the Intention of Marketing and Technological Innovation in MSMEs. *Marketing and Management of Innovations*, 13(4). <https://doi.org/10.21272/mmi.2022.4-12>
- Xuan, T. G., Yanova, O., & Khaliev, M. (2024). Digital business transformation: impact of IT solutions on business processes and ecology. *BIO Web of Conferences*, 138. <https://doi.org/10.1051/bioconf/202413803015>
- Yaskun, M., Sudarmiatin, Hermawan, A., & Rahayu, W. P. (2023). THE EFFECT OF MARKET ORIENTATION, ENTREPRENEURIAL ORIENTATION, INNOVATION AND COMPETITIVE ADVANTAGE ON BUSINESS PERFORMANCE OF INDONESIAN MSMEs. *International Journal of Professional Business Review*, 8(4). <https://doi.org/10.26668/businessreview/2023.v8i4.1563>
- Zhang, C., & Deng, Y. (2024). How does digital transformation affect firm technical efficiency? Evidence from China. *Finance Research Letters*, 69. <https://doi.org/10.1016/j.frl.2024.106069>

- Zhang, J., & Chen, Z. (2024). Exploring Human Resource Management Digital Transformation in the Digital Age. *Journal of the Knowledge Economy*, 15(1). <https://doi.org/10.1007/s13132-023-01214-y>
- Zhou, Y., Lyu, J., & Li, L. (2025). Can digital transformation enhance labor productivity in enterprises: An analysis from the perspective of business process reengineering. *PLOS ONE*, 20(6 JUNE). <https://doi.org/10.1371/journal.pone.0325484>