

Digitalization and Circular Economy: Analysis of the Role and Strategy of Culinary Sector MSMEs in Salahutu District Villages

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ABSTRACT

This study aims to examine the influence of digitalization roles and strategies on the implementation of circular economy practices in micro, small, and medium enterprises (MSMEs) within the culinary sector in Tulehu Village, Salahutu District, Central Maluku. Using a quantitative approach, data were collected from 100 MSME actors through structured questionnaires and interviews, and analyzed using multiple linear regression with SPSS. The results show that the role of digitalization has a positive and significant effect on circular economy practices ($\beta = 0.2965$, $p < 0.001$), while digitalization strategies demonstrated an even greater positive and significant effect ($\beta = 0.4205$, $p < 0.001$). Together, these two variables explain 92.3% of the variance in circular economy practices, indicating a strong predictive capability. The findings confirm that technology adoption not only improves operational efficiency but also facilitates sustainable business models in line with the principles of reduce, reuse, recycle, and recovery. Strategically planned digitalization is more effective than technology adoption alone in promoting sustainability. This study contributes to the literature by integrating digital transformation with circular economy practices in the context of island-based MSMEs, and provides practical implications for policymakers and business actors in fostering sustainable local economic development.

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INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are the backbone of the Indonesian economy. Their existence not only contributes significantly to economic growth but also plays a crucial role in creating jobs and promoting equitable social welfare. Data from the Indonesian Chamber of Commerce and Industry (Kadin) in 2023 shows that the number of MSMEs has reached 66 million units, employing approximately 117 million people, or 97% of the total national workforce. This figure reflects the strategic role of MSMEs as drivers of the people's economy and supporting socio-economic stability in various regions.

In recent years, the development of digital technology has brought significant changes to the business landscape, including for MSMEs. Digital transformation opens up new opportunities to increase operational efficiency, expand market access, and improve the quality of products and services. Furthermore, the use of digital technology is also key to supporting sustainability-oriented business practices. Digitalization no longer functions merely as a promotional or transaction tool, but also as a driver of business model innovation that aligns with the concept of a circular economy, an approach that emphasizes efforts to maintain the value of resources, reduce waste, and minimize environmental impact. (Ministry of Development Planning/Bappenas, 2022; García-Quevedo et al., 2020).

The circular economy encourages businesses to shift their paradigm from a linear "take-make-dispose" model to a more regenerative and sustainable one. In the context of MSMEs, this principle can be realized through extending product life cycles, reusing raw materials, implementing collaborative consumption, and implementing product-as-a-service innovation. Digitalization plays a strategic role in strengthening the implementation of these principles, whether through the integration of technology-based management systems, the use of e-commerce platforms, or targeted digital marketing strategies. (Awan et al., 2021; Gao et al., 2023; Kaswan et al., 2023).

However, studies examining the direct link between the role and strategy of digitalization and the implementation of a circular economy in MSMEs, particularly in island regions such as Salahutu District, are still relatively limited. Most previous research has discussed digitalization and the circular economy separately, resulting in few studies examining their integration in simultaneously boosting MSME performance. Yet, integrating these two concepts has the potential to be a strategic solution to strengthen MSME competitiveness while addressing environmental sustainability challenges in island regions.

Based on this background, this research aims to answer two main questions. First, to what extent does digitalization influence the implementation of a circular economy among MSMEs in the culinary sector in Salahutu District, Central Maluku? Second, to what extent can digitalization strategies contribute to strengthening circular economy practices in the same sector? The findings of this study are expected to enrich scientific studies on digital transformation and business sustainability, while also providing practical input for MSMEs, local governments, and other stakeholders concerned with sustainable local economic development.

METHODS

This study uses a quantitative approach to examine the influence of digitalization strategies and the role of the circular economy on culinary MSMEs in Tulehu Village, Salahutu District, Central Maluku. Tulehu is a culinary MSME center in the Maluku Islands. The location was

selected based on the region's characteristics, which offer significant potential for tourism- and local resource-based economic development, but face challenges in distribution and marketing. The research lasted for three months, from May to July 2025.

The quantitative approach was chosen because it is able to provide an objective empirical picture through statistical analysis of data collected in a structured manner.

The research population is all culinary sector MSMEs operating in Salahutu District. Referring to the approach Ogston et al., (1991) For populations whose exact size is unknown, a sample size of 100 respondents was determined. Respondents were selected using purposive sampling with the following criteria:

1. MSMEs have been operating for at least two years.
2. Using or having used digital technology in business operations.
3. Willing to be a research respondent.

The data used in this study consists of:

1. Primary data, obtained directly from respondents through the distribution of questionnaires and structured interviews.
2. Secondary data, obtained from official documents, government reports, scientific publications, and relevant online sources.

The data collection technique is carried out in three stages:

1. Structured Interviews, to obtain a contextual overview regarding the implementation of digitalization and circular economy practices in MSMEs.
2. Questionnaire distribution, using a Likert scale of 1–5 to measure respondents' perceptions regarding the role of digitalization (X1), digitalization strategies (X2), and circular economy practices (Y).
3. Literature study, to strengthen the theoretical basis and support the interpretation of research results.

The research instrument was a questionnaire compiled based on variable indicators whose validity and reliability had been tested. The independent variables included:

1. The Role of Digitalization (X1): the use of technology in marketing, operational management, and business communications.
2. Digitalization Strategy (X2): planning, implementation, and evaluation of digitalization in supporting sustainability.
3. The dependent variable is Circular Economy Practices (Y), which is measured through the reduce, reuse, recycle, and recovery indicators.

Data analysis was carried out in stages using SPSS software, including:

1. Descriptive Statistics, to describe data characteristics based on average, minimum, maximum, and standard deviation values.

2. Classical Assumption Tests include normality tests (Shapiro–Wilk), multicollinearity (VIF), heteroscedasticity (Breusch–Pagan), and autocorrelation (Durbin–Watson) to ensure the feasibility of the regression model.
3. Multiple Linear Regression Analysis to test the influence of the role of digitalization (X1) and digitalization strategy (X2) on circular economy practices (Y), partially

The multiple linear regression method was chosen to measure the contribution of each independent variable to the dependent variable and to determine the significance of the relationships formed. The results of this analysis serve as the basis for formulating strategic recommendations for MSMEs and relevant stakeholders.

RESULTS AND DISCUSSION

Respondent Overview

This study involved 100 MSMEs operating in the culinary sector in Salahutu District, Central Maluku. Respondents were mostly business owners who had been operating for 2–10 years. Most MSMEs had or had previously utilized digital technologies, such as social media, e-commerce, and instant messaging apps, for both promotions and sales transactions. These characteristics indicate that respondents had experience and exposure to digital technology, making them relevant to the research focus.

Descriptive Statistical Analysis

The results of the descriptive analysis (Figure 1) show that the Role of Digitalization (X1) has an average score of 3.01 with a range of values between 1.17 to 4.33 and a standard deviation of 0.6242. Digitalization Strategy (X2) obtained an average of 2.99, with a range of 1.67 to 4.50 and a standard deviation of 0.5701. Meanwhile, Circular Economy Practices (Y) showed an average of 2.09 with a range of values between 1.38 to 2.93 and a standard deviation of 0.3244.

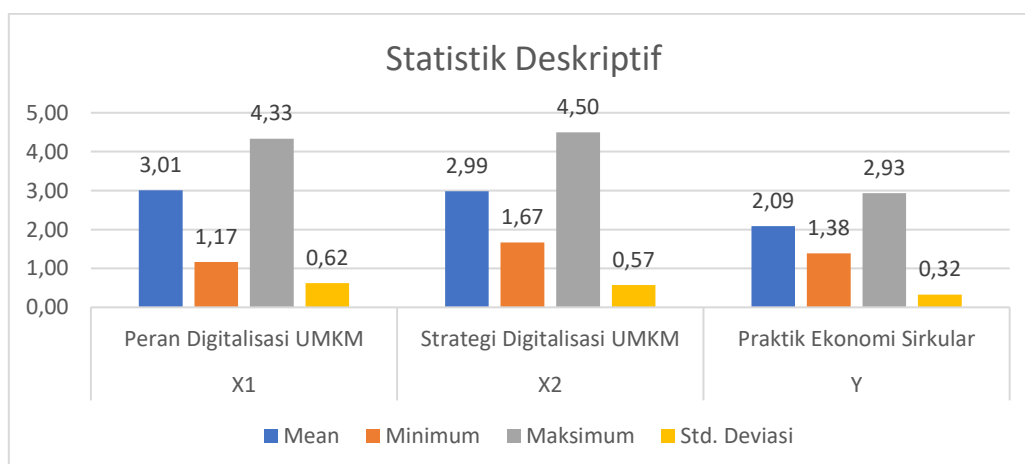


Figure 1. Descriptive Statistics Analysis Results

This data indicates that the level of digitalization adoption and implementation of circular economy principles in the culinary sector of MSMEs in Tulehu Village, Salahutu District is already underway, although there is still room for improvement, especially in integrating more targeted digitalization strategies with sustainable practices.

Classical Assumption Test

The results of the normality test using the Shapiro–Wilk method showed that all variables had a p-value > 0.05, indicating that the data were normally distributed. The multicollinearity test showed that the VIF values for all variables were < 10, indicating no multicollinearity problems. The heteroscedasticity test using the Breusch–Pagan method produced a p-value > 0.05, indicating that the model was free from heteroscedasticity. The autocorrelation test using the Durbin–Watson method produced a value of 2.078, close to 2, indicating that there was no autocorrelation in the model.

Multiple Linear Regression Analysis

The results of the multiple linear regression analysis are summarized in Table 1 below:

Table 1. Multiple linear regression test results

Variables	Coefficient	Std. Error	t-Statistic	P-Value
Constant	-0.0610	0.0638	-0.9550	0.3420
X1	0.2965	0.0147	20,2036	<0.001
X2	0.4205	0.0161	26,1656	<0.001
R-Squared	Adjusted R-Squared	F-Statistic	F-Test p-value	
0.923	0.921	580.86	<0.001	

The results of the multiple linear regression analysis (table 1) show that the Role of Digitalization (X1) has a regression coefficient of 0.2965 with a t-statistic value of 20.2036 and a p-value <0.001. This means that every 1 unit increase in the digitalization role score will increase the circular economy practice score by 0.2965 units, with a very high significance level (99.9%). Meanwhile, the Digitalization Strategy (X2) has a regression coefficient of 0.4205 with a t-statistic value of 26.1656 and a p-value <0.001, which means that every 1 unit increase in the digitalization strategy will significantly increase the circular economy practice score by 0.4205 units.

This regression model has an R-Squared of 0.923 and an Adjusted R-Squared of 0.921, indicating that both variables X1 and X2 are able to explain 92.3% of the variation in the implementation of circular economy practices, while the remaining 7.7% is influenced by other factors outside the model. The simultaneous test shows an F-Statistic value of 580.86 with a p-value <0.001, which means the model as a whole is significant.

Discussion

The Influence of Digitalization on the Circular Economy

The results of the study indicate that the Role of Digitalization (X1) has a positive and significant influence on the implementation of a circular economy in the culinary sector of MSMEs in Tulehu Village, Salahutu District. This finding aligns with the Diffusion of Innovations Theory. Lee, (2024) which emphasizes that technology adoption drives the faster spread of innovative practices. In the context of MSMEs, the use of digital technologies such as e-commerce platforms, social media, and online payment applications facilitates the implementation of sustainability principles such as reduce, reuse, recycle, and recovery. This aligns with research findings. Liu et al., (2021) which confirms that digitalization can increase supply chain efficiency, reduce waste, and accelerate innovation in environmentally friendly products.

The Impact of Digitalization Strategy on the Circular Economy

The Digitalization Strategy (X2) was also shown to have a positive and significant impact on circular economy practices, even with a greater influence than the role of digitalization. These results indicate that the existence of technology alone is not enough; a mature strategy is needed so that digitalization implementation truly supports sustainability. This strategy includes technology integration planning, business process adjustments, and continuous evaluation of environmental and economic impacts. These findings support the view Ahmadi & Ghezavati (2020) that digital strategies integrated into business models can create long-term circular value. Antikainen et al., (2018) also emphasized that digitalization plays a key role as an enabler in realizing a circular economy through the application of technologies such as the Internet of Things (IoT), data analytics, and collaborative platforms.

Overall, the results of this study indicate that the successful implementation of a circular economy in MSMEs depends not only on the level of technology adoption but also on the quality of the digital strategies designed and implemented. This provides an important message for MSMEs in the archipelago: achieving business sustainability requires combining the use of digital technology with targeted implementation strategies.

Contribution of Both Variables to the Implementation of Circular Economy

With an R-Squared of 92.3%, both variables X1 and X2 are proven to be the main factors in explaining the variation in the implementation of the circular economy in the culinary sector of MSMEs in Tulehu Village, Salahutu District. This indicates that efforts to improve circular practices must be focused on improving digital competence and technology implementation strategies. Thus, the answers to all problem formulations indicate that digitalization, both in

terms of role and strategy, is the key to the successful implementation of the circular economy in MSMEs in island regions such as Central Maluku.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the Role of Digitalization has a positive and significant effect on circular economy practices in the culinary sector of MSMEs in Salahutu District. The greater the involvement of digital technology in business operations, the higher the level of implementation of sustainability principles that include waste reduction, resource reuse, and product life cycle optimization. Digitalization strategies also have a positive and significant effect on circular economy practices, with a greater influence than the role of digitalization. This shows that the successful implementation of a circular economy requires digital planning and strategies that are directed, adaptive, and in accordance with business characteristics. Simultaneously, X1 and X2 are able to explain 92.3% of the variation in the implementation of circular economy practices (R -Squared = 0.923), while 7.7% is influenced by other factors outside the model. This shows that both variables are dominant factors in encouraging the implementation of a circular economy in MSMEs. Therefore, MSMEs need to integrate digital technology into all operational aspects to strengthen business sustainability. In addition, the government needs to develop sustainability-based MSME digitalization training and mentoring programs and provide incentives and ease of licensing for MSMEs that adopt environmentally friendly technologies.

REFERENCE

- Ahmadi, Z., & Ghezavati, V. (2020). Developing a new model for a competitive facility location problem considering sustainability using Markov chains. *Journal of Cleaner Production*, 273, 122–131. <https://doi.org/10.1016/j.jclepro.2020.122971>
- Antikainen, M., Uusitalo, T., & Kivikytö-Reponen, P. (2018). Digitalisation as an Enabler of Circular Economy. *Procedia CIRP*, 73, 45–49. <https://doi.org/10.1016/j.procir.2018.04.027>
- Asian Development Bank. (2021). *Leveraging digital technologies key to Asia's COVID-19 recovery*. <https://www.adb.org/id/news/leveraging-digital-technologies-key-asia-covid-19-recovery-ADB>
- Awan, U., Sroufe, R., & Shahbaz, M. (2021). Industry 4.0 and the circular economy: A literature review and recommendations for future research. *Business Strategy and the Environment*, 30(4), 2038–2060. <https://doi.org/10.1002/bse.2731>
- Gao, J., Siddik, A. B., Khawar Abbas, S., Hamayun, M., Masukujjaman, M., & Alam, S. S. (2023). Impact of E-Commerce and Digital Marketing Adoption on the Financial and Sustainability Performance of MSMEs during the COVID-19 Pandemic: An Empirical Study. *Sustainability (Switzerland)*, 15(2). <https://doi.org/10.3390/su15021594>
- García-Quevedo, J., Jové-Llopis, E., & Martínez-Ros, E. (2020). Barriers to the circular economy in European small and medium-sized firms. *Business Strategy and the Environment*, 29(6), 2450–2464. <https://doi.org/10.1002/bse.2513>

- Huynh, P. H. (2022). Enabling circular business models in the fashion industry: The role of digital innovation. *International Journal of Productivity and Performance Management*, 71(3), 870–895. <https://doi.org/10.1108/IJPPM-12-2020-0683>
- Kaswan, M. S., Sabale, D. B., & Rathi, R. (2023). Integrating Circular Economy aspects with Manufacturing planning: An MSME perspective. *E3S Web of Conferences*, 453, 1007. <https://doi.org/10.1051/e3sconf/202345301007>
- Kementerian Perencanaan Pembangunan/Bappenas. (2022). *Ekonomi sirkular: Peta jalan dan strategi nasional*. Bappenas.
- Layman, C. V., Sihombing, S. O., & Handoko, L. (2023). Blue Economy and the Digital Transformation of Micro Small Medium Enterprises. *Proceedings of the International Conference on Sustainable Environment, Agriculture and Tourism (ICOSEAT 2022)*, 26. https://doi.org/10.2991/978-94-6463-086-2_74
- Lee, J. W. (2024). Diffusion of innovations. In *Encyclopedia of Sport Management, Second Edition* (5th ed.). Free Press. <https://doi.org/10.4337/9781035317189.ch157>
- Liu, B., Xue, B., & Chen, X. (2021). Development of a metric system measuring infrastructure sustainability: Empirical studies of Hong Kong. *Journal of Cleaner Production*, 278, 123904. <https://doi.org/10.1016/j.jclepro.2020.123904>
- Matruty, D. J., & Faisal, M. (2025). *Pengelolaan Keuangan UMKM di Era Digital (Pendekatan Praktis dan Teknologis)* (E. Y. Nuraini & R. A. Chairunnisa (eds.); 1st ed.). Inovasi Publishing Indonesia.
- Ogston, S. A., Lemeshow, S., Hosmer, D. W., Klar, J., & Lwanga, S. K. (1991). Adequacy of Sample Size in Health Studies. In *Biometrics* (Vol. 47, Issue 1). <https://doi.org/10.2307/2532527>
- Sumter, D., de Koning, J., Bakker, C., & Balkenende, R. (2020). Circular economy competencies for design. *Sustainability (Switzerland)*, 12(4), 1561. <https://doi.org/10.3390/su12041561>
- Suprpto, W., Agustine, S., Harjanti, D., & Praptiningsih, M. (2024). Role of Dynamic Capabilities in Moderating the Influence of Entrepreneurial Alertness and Entrepreneurial Intuition on Business Opportunity Recognition in the Café Industry. *Petra International Journal of Business Studies*, 7(1), 11–18. <https://doi.org/10.9744/petraijbs.7.1.11-18>
- Ye, J., & Kulathunga, K. M. M. C. B. (2019). How does financial literacy promote sustainability in SMEs? A developing country perspective. *Sustainability (Switzerland)*, 11(10), 2990. <https://doi.org/10.3390/su11102990>
- Institute for Development of Economics and Finance (INDEF). (2024). *Peran platform digital terhadap pengembangan UMKM di Indonesia*.