

# Digital Literacy and Circular Economy: Its Impact to SMEs Performance

Nur Alam La Nafie<sup>1</sup> ✉, Enny Radjab<sup>2</sup>, Tjare Tjambolang<sup>3</sup>, Muhammad Tang<sup>4</sup>, Nanda Aminah Nabila<sup>5</sup>

<sup>1,2,3,4,5</sup> Department of Business Administration, Politeknik Negeri Ujung Pandang, Makassar 90245 Indonesia ([nuralamlanafie@poliupg.ac.id](mailto:nuralamlanafie@poliupg.ac.id))

## Abstract

The purpose of this study is to find out how digital literacy and the adoption of the circular economy affect the performance of SMEs in the F&B sector in Makassar City. Conducting the research by collecting primary data from 97 respondents through online survey were used in this study. The respondent is owner of SMEs in F&B sector in Makassar, selected based on small and medium business which using digital literacy and adoption of circular economy for operating their business. Multiple regression analysis was applied to test the hypotheses. The research results show the applying digital literacy and adoption of circular economy have a positive and significant impact on the performance of SMEs in the F&B industry. This finding might become an interesting issue to next research as some previous research indicated the applying digital literacy and circular economy would increase the SMEs performance.

**Keywords:** digital literacy, circular economy adoption, SME performance.

## INTRODUCTION

Small, and Medium Enterprises (SMEs) play an important role in driving Indonesia's economic growth. Based on data from the Cooperatives and SMEs Office (2023), number of SMEs in Makassar City is more than 19 thousand units and contribute around 61.1% to the national Gross Domestic Product (GDP) and absorb up to 97% of the total workforce. In the SME sector, Food and Beverage (F&B) is one of the most dominant and dynamic business area, because it serves the basic needs of the community and has a wide market.

However, amid rapid technological developments and awareness of the importance of environmental sustainability, SMEs in the F&B sector are faced with two main challenges, namely digitalization and sustainable business practices. SMEs that are unable to adapt to the advancement of digital technology are at risk of being left behind, while those that do not pay attention to sustainability aspects have the potential to lose the trust of consumers who are increasingly concerned about the environment (Ahmadov et al., 2025). Digital transformation is an inevitable demand. In the industrial era 4.0 and entering the era of society 5.0, digital literacy is an essential ability that must be possessed by business actors, including SMEs. Digital literacy includes the ability to access, understand, evaluate, and apply digital information for business purposes (Ng, 2012) for F&B SMEs, this can be applied in the form of the use of online ordering applications, marketing through social media, digital financial management, and online customer interaction.

On the other hand, the concept of adopting the circular economy has emerged as a new approach in the business world to create a regenerative and sustainable business system. In contrast to the linear economy which has a "take-use-throw" principle, the circular economy encourages the efficiency of resource use through the 3R principles: *reduce*, *reuse*, and *recycle*. This approach can improve cost efficiency, extend product life, and strengthen sustainability-oriented brand values (Kirchherr et al., 2017). The application of the circular economy in F&B SMEs can be realized through reducing food waste, using environmentally friendly packaging, utilizing production waste, and selecting sustainable local raw materials. This practice can be a competitive advantage, especially in the midst of increasing consumer awareness of environmental issues. However, the adoption of circular principles often faces obstacles such as technological limitations, lack of access to information, and low digital literacy (Stone, 2012). Previous studies have proven that digitalization can strengthen the implementation of the circular economy. A study by (Dey et al., 2020) shows that SME actors who utilize digital technology are better able to manage raw materials efficiently, reduce production waste, and improve logistics efficiency. Meanwhile, (Mbaeri & Okechukwu, 2023; Novela et al., 2024) found that digital literacy has a significant effect on improving the performance of SMEs in terms of increased business transaction volume, sustainable growth, and improved business strategy.

However, research related to the influence of digital literacy on the performance of SMEs in the circular economy framework, especially in the F&B sector, is still relatively limited in Indonesia. The majority of studies only discuss the impact of digitalization in general or circular practices as environmental initiatives without being directly linked to performance variables. In fact, the



combination of these two approaches is important to produce an adaptive and competitive SME business model in the era of the green and digital economy. Not many have conducted research that discusses the influence of digital literacy on business performance, especially the performance of small businesses in the F&B sector that implement circular economy practices. Therefore, this research is important to fill this gap, with the aim of analyzing how much digital literacy affects the performance of SMEs in the F&B sector that apply a circular economy approach, as well as contributing to the academic literature and practical recommendations for the development of sustainable SMEs in Indonesia.

Based on the research problems that have been presented, the research questions in this study are: does digital literacy affect the performance of SMEs in the F&B sector in Makassar City; does the adoption of the circular economy affect the performance of SMEs in the F&B sector in Makassar City; and does digital literacy and the adoption of the circular economy simultaneously affect the performance of SMEs in the F&B sector in Makassar City? The results of this study are expected to provide an overview of the digital literacy owned by SME actors, so that it can support the improvement of the performance of SMEs in the F&B sector by implementing circular economy practices. This is intended so that the results of the research can contribute to SMEs owners, not only in the F&B sector but for all business fields, especially those that carry out circular economy practices.

## LITERATURE REVIEW

From the description above, it is known that digital literacy is a topic that is starting to be discussed considering that the digital era has affected the digitization of business processes. Business digitalization is the process of changing communication, interaction, and any benefits in a business from conventional to digital in order to improve functions in each business so that it can support companies to be able to develop and survive in the midst of global competition in an optimal way.

On the other hand, the adoption of the circular economy is also a current research trend caused by business people oriented to business models that seek to extend the life cycle of existing products, raw materials, and resources so that they can be used for as long as possible. The principles of the circular economy include reducing waste and pollution, keeping products and materials used for as long as possible, and regenerating natural systems. Through the adoption of the circular economy, business actors can achieve more by using less.

Several previous studies (Novela et al., 2024) have discussed the influence of digital literacy on improving the performance of SMEs. The adoption of the circular economy in improving the performance of SMEs has been studied in several previous studies (Chakraborty et al., 2025; Dey et al., 2020; Patria et al., 2023). Then, several previous studies also discussed digital literacy and circular economy adoption (Zheng et al., 2025). The novelty of this study is in examining the relationship between the three variables above, namely the influence of digital literacy and the adoption of the circular economy on improving the performance of SMEs considering that there has been no previous research that discusses these three variables. These three variables are important to be researched, to expand the science related to the adoption of the circular economy supported by the existence of digital literacy so that it can support the improvement of SME performance.

From the above explanation, the hypotheses that will be used in this study are:

H1: digital literacy has a positive and significant effect on the performance of SMEs in the F&B sector in Makassar City.

H2: the adoption of the circular economy has a positive and significant effect on the performance of SMEs in the sector F&B in Makassar City.

H3: digital literacy and circular economy adoption have a positive and significant effect on performance SMEs in the F&B sector in Makassar City.

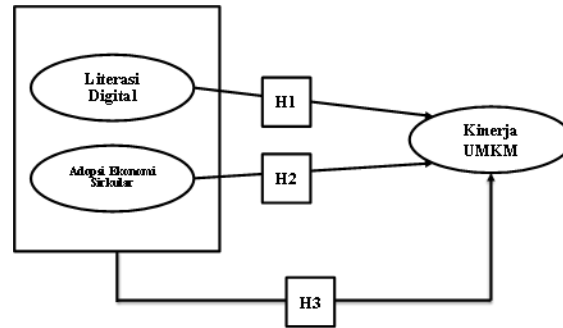


Figure 1. Thinking Framework

**METHOD**

Based on the research purposes, this research type is explanatory research because this research aims to test and analyze the influence of digital literacy and adoption of circular economy on the performance of SMEs. This study uses a survey, because the data used are primary data which will be obtained from filling out questionnaires by SME business owner in F&B sector in Makassar City. The variables in this study consist of digital literacy variables ( $X_1$ ), adoption of circular economy ( $X_2$ ), and business performance ( $Y_1$ ). The measurement of digital literacy variables will use three indicators: knowledge of digital technology ( $X_{1.1}$ ), technological capabilities ( $X_{1.2}$ ), and the use of digital technology ( $X_{1.3}$ ), variable of circular economy will be measured by using five indicators: waste reduction ( $X_{2.1}$ ), sustainable product design ( $X_{2.2}$ ), recycling and reuse ( $X_{2.3}$ ), circular business model ( $X_{2.4}$ ), and environmental awareness and commitment ( $X_{2.5}$ ), and SMEs performance will be measured by using six indicators: sales turnover ( $Y_{1.1}$ ), profitability ( $Y_{1.2}$ ), increase in working capital ( $Y_{1.3}$ ), increase in number of customers ( $Y_{1.4}$ ), and increase in number of employee ( $Y_{1.5}$ ), and operational sustainability/expanding market reach ( $Y_{1.6}$ ).

The unit of analysis of this research is SMEs in F&B sector in Makassar City. The population in this study is all owners/managers of SMEs in F&B sector in Makassar City, the number of which is unknown. According to (Hair et al., 2014) if the number of population is unknown, then the determination of the number of sample samples in this study can be done by using the number of question items in the questionnaire multiplied by 5 to 10. Therefore, the sample size of this study is 135 SMEs in F&B sector in Makassar City resulted from multiplying 27 items of questioner to 5. Nevertheless, only 97 respondents returned the filled questioner. Indicator variables measured using a five-level Likert scale 1-5 (disagree until strongly agree). The instruments used were tested for validity and reliability to measure what they wanted to measure and to know the respondents' consistency of responses. Testing the instrument's validity using the Pearson product moment correlation technique with a minimum limit of  $r = 0.05$ . Instrument reliability testing is done by calculating the reliability coefficient of Cronbach's Alpha with a minimum limit of Alpha coefficients  $> 0.6$ . Both tests use the SPSS computer program. This analysis is used to describe the research variables without generalizations. The data collected was then tabulated in a table and discussed descriptively. The data analysis technique used in this study is the SPSS analysis technique.

**RESULTS AND DISCUSSION**

After conducting the research, the results can be presented as follows. The characteristics of respondents, according to demographic characteristics, are presented in Table 1.

Tabel 1. Characteristics of Respondents

No	Variable	Classification	Number of people	Percentage (%)
1.	Gender	a. Female	28	29
		b. Male	69	71
		<b>Total</b>	<b>97</b>	<b>100</b>
2.	Business Life	a. $\leq 1$ years	31	32

	b.	1 – 3 years	33	34
	c.	4 - 6 years	19	19,6
	d.	> 6 years	14	14,4
		<b>Total</b>	<b>97</b>	<b>100</b>
3.	Monthly Sales	≤ 10 million	34	35
		11 – 50 million	41	42,3
		51 – 100 million	13	13,4
		≥ 100 million	9	9,3
		<b>Total</b>	<b>97</b>	<b>100</b>
4.	Number of employees	a. 1 – 5	62	64
		b. 6 – 10	17	17,5
		c. >10	18	18,5
		<b>Total</b>	<b>97</b>	<b>100</b>

Source: Processed Primary Data, 2025

Table 1 explains there are more male respondents than female respondents, in which 71 percent were male and 29 percent were female respondents. Based on its business life, 34 percent of respondents have been operating their business for 1-3 years, 32 percent of them has just started their business less than 1 year, 19,6 percent and 14,4 percent have done their business for 4-6 years and > 6 years respectively in F and B sector practicing circular economy. Testing the instruments validity and reliability was carried out with the Pearson Correlation and Cronbach's Alpha Coefficient. The results of testing the instruments' validity and reliability for each variable are presented in Table 2. All variables are valid because the correlation value is above 0.3 and reliable because the Cronbach's Alpha value is above 0.6.

**Table 2.** Instrument Validity and Reliability Test Results

Variable	Item	R Correlations	Cronbach's Alpha $\alpha$
Digital Literacy (X1)	X1.1	0.799	0.842
	X1.2	0.802	
	X1.3	0.758	
	X1.4	0.822	
	X1.5	0.737	
	X1.5	0.798	
	X1.7	0.848	
	X1.8	0.707	
	X1.9	0.825	
	X1.10	0.746	
	X1.11	0.734	
	X1.12	0.829	
Adoption of Circular Economy (X2)	X2.1	0.644	0.768
	X2.2	0.674	
	X2.3	0.707	
	X2.4	0.502	
	X2.5	0.791	
	X2.6	0.747	
	X2.7	0.704	
	X2.8	0.837	
	X2.9	0.579	
MSMEs Performance (Y)	Y1.1	0.838	0.901
	Y1.2	0.818	
	Y1.3	0.865	
	Y1.4	0.858	
	Y1.5	0.707	
	Y1.6	0.829	

Source: Processed Primary Data, 2025

*Multiple Regression Analysis*

The multiple regression model in this study is to examine the effect of the independent variables of digital literacy (X1) and adoption of circular economy (X2) on the dependent variable of MSMEs business performance (Y). The following is a description of the results of a multiple regression test and the output of the test results using data processing tool of the SPSS program version 26 in the form of a summary model output, and the coefficient (t test) in the following table.

**Table 3.** Results of the Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.621	0.385	0.372	2.69073

*Source: Processed Primary Data, 2025*

Based on data shown in Table 3, the value of the correlation or relationship (R) is 0.621. From the output, the coefficient of determination (R square) is 0.385, which implies that the influence of the independent variable of digital literacy and adoption of circular economy on the dependent variable MSMEs business performance is 38.5%.

**Table 4.** Results of Hypothesis Testing

Variable	Regression Coefficients (B)	t count	Sig.
Digital Literacy (X1)	0.214	3.022	0.003
Adoption of Circular Economy (X2)	0.265	3.254	0.002
Constant	2.579		
F count	29.456		
Sig	0.000		

*Source: Processed Primary Data, 2025*

Based on data analysis, Tabel 4 shows that Sig. value for the effect of variable digital literacy (X1) on MSMEs business performance (Y) is 0.003 which is smaller than 0.05 and t count value is 3.022 which is bigger than 1.98552 as t table value. This means that Hypothesis one is accepted which indicates digital literacy has positive effect on the SMEs business performance. Moreover, Sig. value for the effect of variable adoption of circular economy (X2) on SMEs business performance (Y) is 0.002 which smaller than 0.05 and t count value is 3.254 which is larger than 1.98552 as t table value. This means that Hypothesis two is accepted and indicates adoption of circular economy has positive effect on the SMEs business performance. It can be concluded that research results support the first and second hypothesis.

In addition, Table 5 also shows that digital literacy and adoption of circular economy would simultaneously affect the SMEs business performance, as the significant value for the simultaneous effect of digital literacy and adoption of circular economy on SMEs business performance is 0.000 which is smaller than 0.05 and the F count value is 29.456 which is larger than 2.70 as the value of F table. This means that Hypothesis three is accepted, digital literacy and adoption of circular economy have positive effect on SMEs business performance.

**Discussion**

The results of hypothesis testing show that digital literacy and adoption of circular economy have influence on SMEs performance. This result support several previous research (Negri et al., 2021; Patria et al., 2023; Zain et al., 2024) which stated that indicators of digital literacy has positive influence on SMEs performance, and adoption of circular economy has positive influence on SMEs performance. The research results show that the independent variables of digital literacy and adoption of circular economy can

explain the dependent variable of SMEs performance by 38.5% while the remaining 61.5% is explained by other factors not examined in this research. This is in accordance with the theory which stated that there are several factors affecting the SMEs performance, including individual characteristics of SME owners, non-individual internal characteristics and external characteristics (Nikolić et al., 2019). This means that other factors would be more dominantly influence the SMEs performance of F and B sector in Makassar City, but they are not discussed in this research. Some previous research confirmed that digital literacy and adoption of circular economy has significant influences on SMEs performance (Halim et al., 2021; Hernita et al., 2021; Klepić, 2022; Sunarti et al., 2023; Yuniawan et al., 2020). Although, in some cases, digital literacy and adoption of circular economy abilities have no direct influences on SMEs performance (Wulansari et al., 2020).

## CONCLUSION

Based on the research results, it can be concluded that digital literacy and adoption of circular economy partially have significant effect on SMEs business performance. This means that the first and second hypothesis are accepted. In addition, variables digital literacy and adoption of circular economy also show simultaneously has positive and significant influences on SMEs business performance in the F&B sector in Makassar City.

## ACKNOWLEDGMENTS

We would like to convey our sincere appreciation to Politeknik Negeri Ujung Pandang for their generous financial support which made this research possible.

## BIBLIOGRAPHY

- Ahmadov, T., Durst, S., Nguyen, Q., Foli, S., & Gerstlberger, W. (2025). Circular Economy Practices in Manufacturing SMEs: Exploration of Stakeholder Pressure, Managerial Perception, and the Mediating Role of Circular Economy Orientation. *Circ. Econ.*, 3(1), 1–29. <https://doi.org/10.55845/bkut9454>
- Chakraborty, A., De, D., & Dey, P. K. (2025). Circular Economy in Small and Medium-Sized Enterprises—Current Trends, Practical Challenges and Future Research Agenda. *Systems*, 13(3). <https://doi.org/10.3390/systems13030200>
- Dey, P. K., Malesios, C., De, D., Budhwar, P., Chowdhury, S., & Cheffi, W. (2020). Circular economy to enhance sustainability of small and medium-sized enterprises. *Business Strategy and the Environment*, 29(6), 2145–2169. <https://doi.org/10.1002/bse.2492>
- Hair, S. E., William, J. C., BlackBarry, J., Babin, R. E., & Anderson, W. (2014). *Multivariate data analysis*. Pearson.
- Halim, A., Pratikto, H., & Sophia, S. (2021). An Analysis of Human Resource Competencies and the Implications for MSME Performance. *Budapest International Research and Critics Institute Journal (BIRCI-Journal)*, 4(4), 12453–12461.
- Hernita, H., Surya, B., Perwira, I., Abubakar, H., & Idris, M. (2021). Economic business sustainability and strengthening human resource capacity based on increasing the productivity of small and medium enterprises (SMES) in Makassar city, Indonesia. *Sustainability (Switzerland)*, 13(6), 1–37. <https://doi.org/10.3390/su13063177>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127(September), 221–232. <https://doi.org/10.1016/j.resconrec.2017.09.005>
- Klepić, I. (2022). The Influence of Human Resources Competency Management on the Business Success of Small and Medium Enterprises. *Naše gospodarstvo/Our Economy*, 68(4), 12–27. <https://doi.org/10.2478/ngoe-2022-0020>
- Mbaeri, B. C., & Okechukwu, E. U. (2023). Impact of Venture Capital on the Performance of SMEs in Enugu State. *Appl. Econ. Financ.* <https://aspjournals.org/Journals/index.php/bijaefa/article/view/448>

- Negri, M., Neri, A., Cagno, E., & Monfardini, G. (2021). Circular economy performance measurement in manufacturing firms: A systematic literature review with insights for small and medium enterprises and new adopters. *Sustainability (Switzerland)*, 13(16). <https://doi.org/10.3390/su13169049>
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078.
- Nikolić, N., Jovanović, I., Nikolić, D., Mihajlović, I., & Schulte, P. (2019). Investigation of the Factors Influencing SME Failure as a Function of Its Prevention and Fast Recovery after Failure. *Entrepreneurship Research Journal*, 9(3). <https://doi.org/10.1515/erj-2017-0030>
- Novela, I., Sri, H., Sawitri, R., Riani, A. L., Istiqomah, S., Suprapti, A. R., & Harson, M. (2024). *DIGITAL LITERACY ON SME BUSINESS PERFORMANCE AND THE MEDIATING ROLE OF ENTREPRENEURIAL SKILLS*. 10(3), 847–857.
- Patria, H., Alam, M. A. F., Mulyadi, A., & Setyarko, A. (2023). CAKRAWALA – Repositori IMWI | Volume 6 , Nomor 1 , Februari 2023. *Cakrawala*, 6(1).
- Stone, I. (2012). *Upgrading Workforce Skills in Small Businesses: Reviewing international policy and experience, Report for Workshop on “Skills Development for SMEs and Entrepreneurship.”* 26.
- Sunarti, Hasanah, Oktariani, D., Akbar K, D. A., & Afif, S. (2023). The Influence of Human Resource Competence and Financial Aspects on the Performance of MSMEs in the Cirendeu Village Area, South Tangerang. *Endless: International Journal of Future Studies*, 6(2), 278–287. <https://doi.org/10.54783/endlessjournal.v6i2.176>
- Wulansari, N. A., Ranihusna, D., & Wijaya, A. P. (2020). The role of knowledge management in MSMEs business performance. *IOP Conf. Ser. Earth Environ. Sci.*, 485(1). <https://doi.org/10.1088/1755-1315/485/1/012059>
- Yuniawan, A., Harjadi, D., & Filatrovi, E. W. (2020). Testing the Relationships between Human Resource Competence, Financial Aspect and SMEs Performance. *J. Talent*, 12(2), 2295–2303. <http://www.iratde.com/index.php/jtde/article/view/943>
- Zain, R. M., Ramli, A., Zain, M. Z. M., Yekini, L. S., Musa, A., Rahim, M. N. A., Dirie, A. N., & Aziz, N. I. C. (2024). An Investigation of the Barriers and Drivers for Implementing Green Supply Chain in Malaysian Food and Beverage SMEs: A Qualitative Perspective. *WSEAS Transactions on Business and Economics*, 21, 2169–2189. <https://doi.org/10.37394/23207.2024.21.179>
- Zheng, J., Guo, M., & Lo, K. (2025). Shaping sustainability: Circular economy development through digital technology innovation. *Journal of Innovation and Knowledge*, 10(5). <https://doi.org/10.1016/j.jik.2025.100784>