Journal of Business, Finance, and Economics (JBFE)

E-ISSN: 2746-6914
P-ISSN: 2746-6906

Research Article

ICT Usage and MSEs Growth: Evidence from Indonesia

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Abstract: This study aims to examine the influence of the level of ICT usage in a region on the MSEs growth in Indonesia using a quantitative approach. This study uses secondary provincial-level data obtained from the Statistics Indonesia (BPS) and the Financial Services Authority (OJK), which are analyzed using descriptive statistics, correlation, and panel data regression. The study findings indicate that the level of ICT usage in a region has a positive effect on the MSEs growth in Indonesia. However, there are differences in the impact between regions, where the positive effect of ICT usage on MSE growth is consistent in the west Indonesia region, but not significant in the east Indonesia region. The researcher recommends that the government and other stakeholders pay more attention to the development of ICT infrastructure in Indonesia, particularly improving ICT in eastern Indonesia to create equality in technology utilization. In addition, increasing digital literacy and training for MSEs in Indonesia is crucial so they can utilize technology optimally. Thus, it is hoped that the positive effect of ICT usage on MSEs can be felt evenly throughout Indonesia.

Keywords: Growth; ICT Usage; Indonesia; MSEs; Production.

1. Introduction

Micro and Small Enterprises (MSEs) play a crucial role in the Indonesian economy (Anshari & Almunawar, 2022). According to data from the Ministry of Cooperatives and SMEs, MSEs contribute significantly to Indonesia's Gross Domestic Product (GDP) and employ the majority of the country's workforce (Anatan & Nur, 2023). Therefore, MSEs serve as the backbone of the national economy, particularly in creating jobs, increasing the competitiveness of domestic industry, and accelerating equitable economic development at the local and national levels. Therefore, the sustainability and development of MSEs must be a primary focus of economic policy (Jitmaneeroj, 2016), including in Indonesia (Dahliah et al., 2020).

At the same time, Information and Communication Technology (ICT) has become a crucial factor in advancing economic sectors around the world (Wang et al., 2021), including Indonesia, amidst rapid technological developments (Calderon-Monge & Ribeiro-Soriano, 2024). ICT serves as an enabler for many economic sectors in various scale, including MSEs (Basit et al., 2024). ICT not only facilitates easy access to information but also opens up new opportunities in MSEs (Trinugroho et al., 2022). However, despite the enormous potential of ICT to support the MSEs growth, its use in Indonesia remains less than optimal. Issues such as suboptimal ICT development (Central Statistics Agency, 2024), low digital literacy (Susilo et al., 2020), and reliance on traditional methods remain obstacles to maximizing ICT utilization.

A study conducted by the Trinugroho et al. (2022) shows that many MSEs in Indonesia experience barriers of adopting ICT. This may impact MSEs competitiveness in local, domestic, and global market. This creates significant challenges in optimizing the role of MSEs as key drivers of the Indonesian economy. This challenge emphasizes the importance of further exploring the impact of ICT usage on MSE growth, particularly at the regional level. This research provides a clear picture of how the ICT usage in regional areas can be a

Received: September 08, 2025
Revised: September 23, 2025
Accepted: October 07, 2025
Online Available: October 09, 2025

Curr. Ver.: October 09, 2025

factor in increasing the MSEs growth in Indonesia, particularly in terms of productivity. By understanding the extent to which ICT usage in regional areas can influence MSE growth, policymakers can formulate more effective policies to increase MSE competitiveness, expand market access, and accelerate digital transformation in the MSE sector. Therefore, this research will make a positive contribution to efforts to strengthen the MSE sector in Indonesia and support the achievement of inclusive and sustainable economic growth.

2. Literature Review

2.1. *Conceptual Framework*

This study attempts to examine the influence of the level of ICT usage in a region on the MSEs growth in Indonesia. The dependent variable is MSE growth, with the independent variable being ICT usage in the region, while several relevant control variables are used: the number of MSEs, the quality of human development, financial literacy, the regional economy, income levels, the regional population, and the COVID-19 pandemic period. The conceptual framework of this study is described as follows:

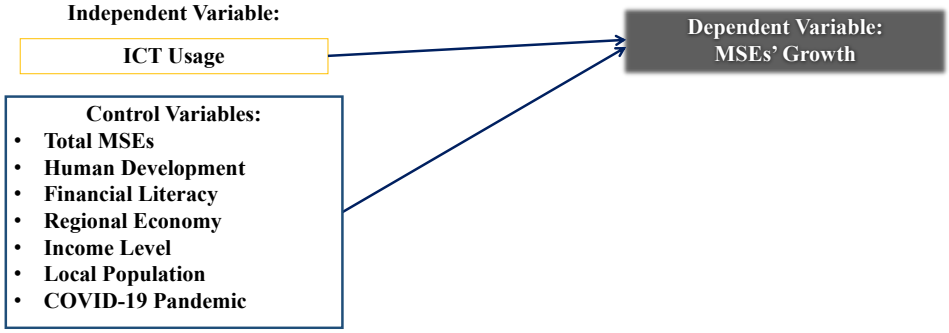

Figure 1. Conceptual Framework.

2.2 *Hypothesis Development*

ICT has become a crucial factor in advancing the economic sector for various business actors (Wang et al., 2021), including MSEs. This is inseparable from the rapid development of technology and its subsequent increase in usage (Calderon-Monge & Ribeiro-Soriano, 2024). Several prior studies already mentioned the essence of ICT adoption and capabilities for MSEs, especially in improving business competitiveness and performance (Duch-Brown et al., 2017; Hansen & Bøgh, 2021; Räisänen & Tuovinen, 2020; Sadeghi & Biancone, 2018; Zhou et al., 2019). ICT usage will open up a set of possibilities for innovation to improve the business process of MSEs by enabling technology (Trinugroho et al., 2022). In practice, consumer ICT usage can expand market size and increase demand. With easier access to products and services through digital platforms, consumers can quickly find and purchase MSE products, which in turn will encourage increased production by MSEs to meet greater demand. This increased demand will provide opportunities for MSEs to grow, increase production volume, and create broader market opportunities. This is supported by research by Duch-Brown et al. (2017) that shows the positive implication of ICT form MSEs where increased e-commerce use among consumers can increase demand for products, ultimately supporting MSE growth.

On the other hand, the ICT usage by MSEs can have a positive impact in the form of increased operational efficiency. By adopting a technology-based management system, MSEs can manage inventory (Alam et al., 2024) and distribution (Budiarto et al., 2017), reduce costs (Jawad & Mohammed, 2024), increase service speed (Ofori-Amanfo et al., 2024) and improve other business processes more efficiently. In addition, ICT usage may also support MSEs in obtaining external financing (Trinugroho et al., 2022). This support will enable MSEs to grow by responding more quickly to market demand and increase their competitiveness.

Furthermore, the ICT usage opens up opportunities for MSEs to expand their promotional and marketing reach (Wijayanto et al., 2024). Through social media, websites, and other digital platforms, MSEs can reach a wider audience, even beyond their geographic boundaries, thereby increasing visibility and sales potential. Another research by (Wardati & Mahendrawathi, 2019) revealed that MSEs that adopted ICT, such as the use of social media and e-commerce platforms, experienced an increase in the number of consumers and sales volume. Based on the support from previous empirical studies, optimal ICT usage in a region

can be expected to contribute to MSE growth. Therefore, the hypothesis proposed in this study is stated as follows:

H1. ICT usage has a positive effect on MSEs growth in Indonesia.

3. Methodology

3.1. Research Design

This research is a causality study that examines the influence of the level of ICT usage in a region on the MSEs growth using a quantitative approach. The scope of this study covers all provincial-level regions in Indonesia for the period 2016-2023. This study attempts to maximize all available observations to cover all provinces in Indonesia by using purposive sampling that only excludes the newly established province in Papua, which has incomplete data. The research data used secondary data sourced from the Central Statistics Agency (BPS) and the Financial Services Authority (OJK).

3.2. *Research Variables*

The dependent variable of this study is the MSEs growth as measured by the level of MSEs' Annual Production Growth year on year. The independent variable of this study is the ICT usage in the region as measured by the Regional ICT Development Index: Dimensions of ICT usage. This study also uses several relevant control variables, namely the Number of MSEs, Quality of Human Development, Financial Literacy, Regional Economy, Income Level, Regional Population, and the COVID-19 Pandemic Period. In detail, the operational definitions of the variables are presented as follows:

Table 1. Operationalization of Research Variables.

Variables	Acronym	Measurement	Source
Dependent			
MSEs Growth	MSE_GROWTH	MSEs Production Growth	BPS
Independent			
ICT Usage	ICT_USE	Regional ICT Development Index: Dimensions of ICT usage	BPS
Control			
Amount of MSEs	LOG_MSE	Natural logarithm of the number of UMK in the region	BPS
Human Development Quality	HDI	Human Development Index (HDI)	BPS
Financial Literacy	FINLIT	Financial Literacy Index	OJK
Regional Economy	LOG_ECO	Natural logarithm of GRDP	BPS
Income Level	LOG_REV	Natural logarithm of regional per capita income	BPS
Regional Population	LOG_POP	Natural logarithm of the regional population	BPS
COVID-19 Pandemic Period	COVID	Dummy variables: 1: Pandemic period 0: Non-pandemic period	-

3.3. *Data Analysis*

The research data analysis begins with descriptive statistical analysis to obtain a general overview of the research variables as a whole, followed by correlation analysis between the research variables. The main analysis is conducted using panel data regression to examine the effect of the level of ICT usage in a region on the MSEs growth . Subsample analysis will also be conducted using subsamples: western Indonesia consisting of the islands of Sumatra, Java, Bali, and Kalimantan; and eastern Indonesia consisting of the islands of Sulawesi, Nusa Tenggara, Maluku, and Papua. The regression equation used is stated as follows:

$$MSE\_GROWTH = a + \beta_1 ICT\_USE_{it} + \beta_2 LOG\_MSE_{it} + \beta_3 HDI_{it} + \beta_4 FINLIT_{it} + \beta_5 LOG\_ECO_{it} + \beta_6 LOG\_REV_{it} + \beta_7 LOG\_POP_{it} + e \quad (1)$$

4. Result and Discussion

4.1. *Descriptive Statistics and Correlation*

The research data analysis began with descriptive statistics to obtain a general overview of the research phenomenon. Based on the descriptive statistics obtained, the two variables analyzed in this study, namely MSE_GROWTH (MSE growth) and ICT_USE (ICT usage in the region), show an interesting picture. For the MSE_GROWTH variable, the average value (mean) of 7.361% indicates that in general, MSE growth in the studied regions shows a positive figure. The minimum value of -25.64%, which occurred during the COVID-19 pandemic, indicates a sharp decline in MSE growth in several regions along with the weakening economy during the pandemic (Kumalaningrum et al., 2023; Lu et al., 2020). On the other hand, the maximum value of 43.3% indicates that several regions have succeeded in experiencing very rapid growth, reflecting the success of MSE growth.

As for the ICT_USE variable, the average value of 4.71 indicates that ICT usage in the region is at a suboptimal level, namely at a moderate level but approaching low. The minimum value of 2.1 indicates that some regions still have very low levels of ICT usage, while the maximum value of 7.65 indicates that there are regions with quite high levels of ICT usage. Details of the descriptive statistics can be seen in the following table:

Table 2. Descriptive Statistical Analysis.

Variable	Obs	Mean	Std. Dev.	Min	Max
MSE_GROWTH	272	7,361	11,584	-25.64	43.3
ICT_USE	272	4.71	1,163	2.1	7.65
LOG_MSE	272	10,945	1.21	7,265	13,941
HDI	272	70,921	4,057	58.05	82.46
FINLIT	272	37,835	10,506	19.27	67.27
LOG_ECO	272	32.7	1,138	30,702	35,257
LOG_REV	272	17,794	.57	16,594	19,592
LOG_POP	272	15,291	1,008	13,446	17,714

Researchers also analyzed the growth trend of MSEs in Indonesia. Figure 2 illustrates the fluctuations in MSE growth in Indonesia from 2016 to 2023. MSE growth showed a stable positive trend from 2016 to 2018, with the highest figure recorded in 2018 at 12.55%. However, in 2019, there was a slight decline to 10.73%, and a sharper decline in 2020 with a negative figure of -10.93%, caused by the impact of the COVID-19 pandemic which disrupted MSE economic activity. Post-pandemic, the MSE sector began to show recovery, starting with a figure of 6.66% in 2021, and continuing to increase to 9.96% in 2022 and

10.41% in 2023, reflecting an increasingly positive recovery despite significant fluctuations throughout the period.

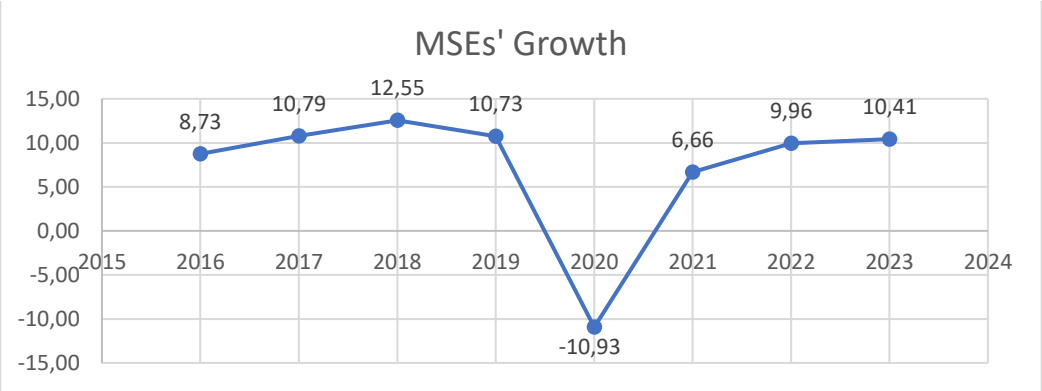

Figure 2. MSEs growth in Indonesia during research period.

The next researcher also conducted a correlation analysis between the research variables with the following results:

Table 3. Correlation Analysis.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) MSE_GROWTH	1,000								
(2) ICT_USE	0.266	1,000							
(3) LOG_MSE	-0.167	-0.246	1,000						
(4) HDI	-0.146	-0.315	0.269	1,000					
(5) FINLIT	-0.086	-0.148	0.231	0.531	1,000				
(6) LOG_ECO	-0.232	-0.261	0.640	0.447	0.343	1,000			
(7) LOG_REV	-0.031	-0.022	-0.278	0.503	0.364	0.445	1,000		
(8) LOG_POP	-0.242	-0.285	0.869	0.239	0.230	0.878	-0.032	1,000	
(9) COVID	-0.598	-0.048	-0.016	0.015	0.018	-0.002	-0.018	0.006	1,000

4.2. *Panel Data Regression Analysis*

The main analysis in this study, to test the hypothesis, used panel data regression. The best panel data regression analysis approach used was the Random Effect Model. The findings from the regression analysis indicate that the level of ICT usage in a region has a positive effect on the MSEs growth in Indonesia. The higher the level of ICT usage in a region, the greater the growth rate of MSEs in that region. This emphasizes the importance of ICT adoption as a factor that can drive MSE growth. These findings confirm that ICT contribute to improving business competitiveness and performance (Duch-Brown et al., 2017; Sadeghi and Biancone, 2018; Zhou et al., 2019; Hansen and Bøgh, 2020; R ̈ais ̈anen and Tuovinen, 2020). These findings also support that ICT can drive operational efficiency (Alam et al., 2024; Budiarto et al., 2017), reduce costs (Jawad et al., 2024), expand markets (Wijayanto et al., 2024), and obtain external financing (Trinugroho et al., 2022) that will increase MSEs competitiveness. The results of the panel data regression analysis are presented as follows:

Table 4. Panel Data Regression Analysis.

VARIABLES	(1) All Provinces	(2) West Indonesia	(3) East Indonesia
ICT_USE	1,428***	1,712***	0.787
	(0.526)	(0.525)	(1,655)
LOG_MSE	1,596	1,067	4,408
	(1,344)	(1,462)	(3,055)
HDI	-0.246	-0.336	-0.800
	(0.232)	(0.273)	(0.610)
FINLIT	0.0416	0.0930	0.111
	(0.0746)	(0.0784)	(0.231)
LOG_ECO	3,449	5,444	10:49
	(7,865)	(8.112)	(24.42)
LOG_REV	-2,868	-3,813	-15.55
	(7,635)	(7,696)	(24.74)
LOG_POP	-7,258	-8,685	-13.22
	(8,262)	(8,524)	(24.14)
COVID	-20.50***	-22.34***	-16.25***
	(1,573)	(1,649)	(3,704)
Constant	50.85**	33.08	147.7**
	(24.32)	(23.16)	(73.45)
Observations	272	192	80
Number of Provinces	34	24	10

Standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Subsample analysis conducted by geographic region found significant differences in findings. These findings revealed that the positive effect between ICT usage and MSE growth was consistent in western Indonesia. In this region, higher levels of ICT adoption can contribute directly to MSE growth, through easier access to wider markets and increased operational and marketing efficiency. Western Indonesia, which is generally more advanced in terms of infrastructure and access to technology, provides evidence that ICT can be a significant driver of MSE growth.

In the subsample of eastern Indonesia, the effect of ICT usage on MSE growth was found to be insignificant. One possible cause is the disparity between western and eastern Indonesia (Nugraha & Prayitno, 2020; Sihombing, 2019), especially in ICT infrastructure and access. Eastern Indonesia still faces various challenges, such as limited stable internet infrastructure, low levels of digital literacy, and higher access costs. These factors can hinder technology adoption among MSEs in the region, which in turn minimizes the positive impact of ICT usage on MSE growth.

These differences in influence demonstrate the importance of a more specific, context-based approach to policy formulation to support ICT adoption in less-than-optimal regions. For eastern Indonesia, more intensive efforts are needed to build digital infrastructure, improve digital literacy, and reduce the gap in technology access between regions to ensure the positive potential of ICT usage for MSE growth can be realized more evenly across Indonesia.

5. Conclusion

This study concludes that the level of ICT usage in a region has a positive effect on the MSEs growth in Indonesia. Higher ICT usage has been shown to contribute to MSE growth. However, there are differences in impact between regions, where the positive effect of ICT usage on MSE growth is consistent in the western region, but not significant in the eastern region, caused by disparities in infrastructure and technology access. Based on these conclusions, it is recommended that the government and other stakeholders pay more attention to the development of ICT infrastructure in Indonesia, particularly improving ICT in eastern Indonesia to create equality in technology utilization. Furthermore, improving digital literacy and training for MSEs in Indonesia is crucial to enable them to utilize technology optimally. Policy support that encourages ICT adoption in underdeveloped regions, such as incentives for digital infrastructure investment and outreach on the benefits of ICT, can accelerate MSE growth throughout Indonesia. With these steps, it is hoped that the positive effect of ICT usage on MSEs can be more evenly distributed across Indonesia.

Acknowledgement

This study is supported by *Program Kemitraan Masyarakat (PKM-UNS)* grant provided by Universitas Sebelas Maret number 370/UN27.22/PT.01.03/2025.

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