

The Impact of the Digital Divide on MSMEs' Productivity in Indonesia

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ABSTRACT

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Although the adoption of information and communication technology (ICT) has been rapid, gaps still exist regarding various areas of access to ICT among micro, small, and medium enterprises (MSME), which are the backbone of Indonesia's economy. This study investigates how factors of the digital divide increase productivity among MSMEs in Indonesia. Previous studies have identified digital divide factors as material access, motivational access, skill access, and usage access. In this study, the logistic regression model is used with SUSENAS 2019 data from BPS. The study finds the significance of skill and usage access to galvanize MSMEs' enthusiasm to adopt the ICT platform in their business activities. Conversely, with weak significance of motivational and material access, this study recommends more extensive endeavors of the ICT infrastructure in boosting MSMEs' productivity in the state of economic policy-making in Indonesia.

SARI PATI

Walaupun adopsi teknologi informasi dan komunikasi (TIK) telah berkembang pesat, masih terdapat kesenjangan terkait berbagai bidang akses TIK di kalangan usaha mikro, kecil, dan menengah (UMKM) yang merupakan tulang punggung perekonomian Indonesia. Studi ini menyelidiki bagaimana faktor-faktor kesenjangan digital meningkatkan produktivitas usaha UMKM di Indonesia. Berdasarkan studi sebelumnya, faktor-faktor kesenjangan digital terdiri dari akses materi, akses motivasi, akses keterampilan, dan akses penggunaan. Studi ini menggunakan model regresi logistik dengan data SUSENAS 2019 dari BPS. Studi ini menemukan bahwa akses keterampilan dan akses penggunaan meningkatkan antusiasme UMKM untuk mengadopsi platform TIK dalam aktivitas bisnis mereka. Sebaliknya, dengan signifikansi akses motivasi dan akses materi yang lemah, studi ini merekomendasikan upaya yang lebih luas terkait infrastruktur TIK untuk meningkatkan produktivitas UMKM dalam kebijakan ekonomi di Indonesia.

INTRODUCTION

The global economy has embraced digitalization. Efficient e-commerce transactions have caused global trade to shift gradually to the digital platform (UNCTAD, 2019). Extensive digitalization has taken place in Indonesia as well. As revealed by the president of Indonesia, Joko Widodo, Indonesia is currently the largest digital economy in Southeast Asia, and the value of the Indonesian digital economy is projected to be USD 133 billion in 2025 (Pratomo, 2020). Indonesia's future economy demonstrates immense potential to be digitally based.

This study aims to investigate how micro, small, and medium enterprises (MSME) in Indonesia adopt information and communication technology (ICT) and overcome the issues of the digital divide to increase their productivity. Our research question is: How does the digital divide impact productivity among MSMEs?

The application of ICT in Indonesia is extensive, especially concerning four types of technology: mobile internet, cloud technology, internet of things, and big data analytics (Das et al., 2016). Despite its widespread use, gaps still exist between those who have access to ICT and those who do not, not only in physical access such as internet infrastructure but also regarding motivation, skills, and usage access to digital technology. As this digital divide exists, the benefit of the digital economy is not yet inclusive.

In any market economy, the business sector plays a crucial role, because it provides jobs as well as goods and services. Therefore, it is important to investigate how digitalization transforms business in Indonesia. While the digital gap between large and small firms is fairly well known, we focus on the digital divide in MSMEs.

Serving as the foundation of Indonesia's economy, MSMEs play an indispensable role, since MSMEs represent more than 99% of all firms in Indonesia, 97% of employment, and 57% of total value added

(Ministry of Cooperatives and SMEs, 2019). In addition, MSMEs have demonstrated resilience during crises. When Indonesia faced a crisis in 1997-1998, MSMEs fared relatively well compared to large firms (Mourougane, 2012). Post-crisis, the number of MSMEs continued to increase and were able to attract 114 million workers in 2013, representing a nearly two-fold increase from 1997 (Badan Pusat Statistik, 2016).

Indonesia's government has realized the significance of MSMEs in Indonesia's economic growth and has introduced some strategies to promote MSMEs' growth in the digital era. Today, the Indonesian government has devoted a budget to boost capacity building and market access on the digital economic platform for MSMEs in Indonesia. Although many studies have been conducted regarding the benefit of adopting ICT for MSMEs, research provides some very slight evidence regarding the impact of the digital divide on MSMEs, especially in Indonesia.

This study will offer more empirical evidence regarding the association between digital divide factors and MSMEs' productivity in Indonesia. Although several international academic studies underscore the digital divide in some developed countries (Ghobadi & Ghobadi, 2015; Reynolds, 2021; van Dijk, 2013), there has been a lack of empirical studies that discuss the association of the digital divide and MSMEs' productivity in Indonesia. This study is expected to deliver some academic and practical contributions to the study of the digital divide in Indonesia. This research is expected to illuminate the effect of each digital divide aspect to boost MSMEs' productivity in Indonesia. In the application, this study will provide policy recommendations regarding which aspect of the digital divide should be prioritized by policymakers to advance the productivity of Indonesia's MSMEs.

Hypothesis

The hypothesis in this research addresses the digital divide theoretical framework. The rationale of the digital divide is considered due to the non-

ideal condition of uneven digital access around the world, which can present barriers to business productivity among MSMEs. This study investigates the impact of the digital divide component on MSMEs' productivity. The term digital divide became a popular topic within the public discourse in the 1990s. The digital divide is defined as the gap between those with access to ICT and those without (NTIA, 1999). As part of the challenge it presents, the digital divide is considered a disparity between different socio-economic levels regarding opportunities to access ICT (DiMaggio & Hargittai, 2001; Norris, 2003). In addition to time, the definition has gradually evolved to focus on ICT access, ICT skills, and the usage of the technology itself (Ghobadi & Ghobadi, 2015; OECD, 2001).

The digital divide presents uneven digital access, which results in the delivery of asymmetric information to economic actors in the business environment. Parts of Europe face higher diffusion rates, while other parts experience lags, despite the relatively small geographic boundaries (van Dijk, 2009). Thus, it is essential to acknowledge the lower diffusion rate as a crucial element in the importance of access and connectivity. Less access to media networks, for example, leads to structural inequality for those with different socio-economic

and education levels. As illustrated in Figure 1, this tripartite access differentiates the inequality happening among three types of populations (van Dijk, 2013). The first is the information elite with higher education and socio-economic status. This group comprises 15% of the total population who live in dense social networks, and 95% of the elites have internet access.

In this paper, the hypothesis is established based on the four components of the digital divide. Digital divides, according to previous studies, are determined according to several types of access, including material access, motivational access, skill access, and usage access (Onitsuka et al., 2018; van Deursen & van Dijk, 2014). These four components are crucial factors to measure ICT adoption to enhance their productivity (van Deursen & van Dijk, 2014). Those who have more than adequate digital access can exploit the information to advance their economic interests (Onitsuka et al., 2018).

When scrutinizing MSMEs' productivity, this study examines the extent to which broader business performance and competitiveness improve with digitalization. In the manufacturing origin, total factor productivity refers to the improvement of production per human labor capital

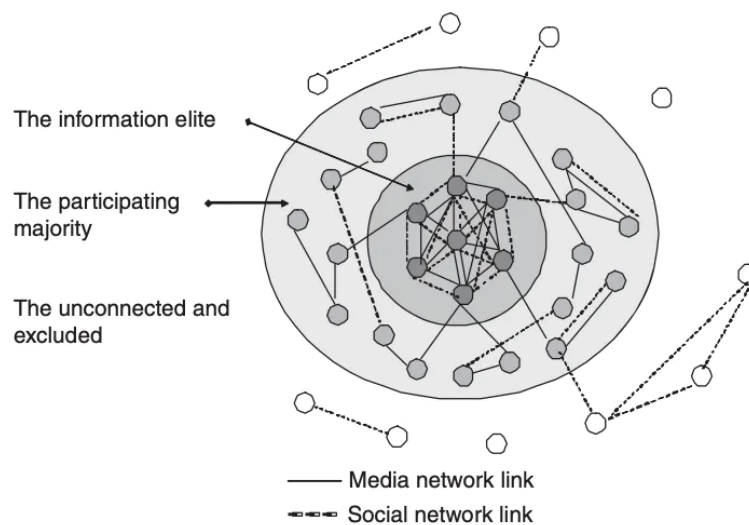


Figure 1. Potential Tripartite Sociality of the Network Society (van Dijk, J.A.G.M., 2013)

(Athukorala & Nguyen, 2022). Productivity in the manufacturing sector has a profound implication for competitiveness and cost-efficiency in the firm's operation (Autor & Salomons, 2018). Digitalization is automation that can improve MSMEs' performance by reducing transaction costs and varying business performance to meet consumers' expectations. Otherwise, business productivity is intended to make business operations more efficient with fewer operation costs in transactions (Sakudo, 2021). According to recent studies, once digitalization is diverted to its own usage to optimize business operations, MSMEs do not improve their business productivity with that automation (Ghobadi & Ghobadi, 2015). Rather, they waste resources as though no business value was added from the usage of digital technology (Wicaksono & Simangunsong, 2022). This study applies digital adoption as the conditional requirement that MSMEs can increase cost-efficiency by using digital technology.

The first hypothesis will examine the connection between material access and ICT. In Indonesia's case, spatial inequality existence has been reported to increase, which can be seen in the Gini Index, from 0.34 in 2002 to 0.41 points in 2013 (Badan Pusat Statistik, 2014). There are many possible reasons for this rise, including the presence of an archipelagic country with six major islands. Some regions in Indonesia are more accessible for trade and markets, and hence differences in rates of development across islands cannot be avoided (Vidyattama, 2010). Within the major islands, 80% of the infrastructure development of Indonesia has taken place on Java Island, where 60% of the population lives, while the other five islands have yet to establish stable electricity and internet (Badan Pusat Statistik, 2017). The gaps in the telecommunication infrastructure across Indonesia have yet to close the internet divide, as the network deployment during 2010-2012 is not significant enough to catch up with other countries of similar development with lesser inequality, such as Malaysia (Sujarwoto & Tampubolon, 2016; The World Bank, 2013).

Material access refers to physical access to a wide range of ICT technology and its supports, such as personal computers, the internet, and electricity to facilitate work. Many believe that access to ICT potentially improves the quality of life. The literature highlights significant factors that can affect technology use in developing countries, especially less developed areas. One of the factors whose role is understated is the lack of access to electricity in Indonesia (Sujarwoto & Tampubolon, 2016). As electricity is a major necessity for people to use the internet, a lack of high-quality electricity that is affordable and reliable would prevent ICT usage for productivity and economic growth (Arney & Hosman, 2016). From this perspective, we map the positive connection between material access and MSMEs' productivity as the hypothesis below:

H1: There is a positive relationship between material access and MSMEs' productivity.

The second hypothesis examines the connection between motivational access and MSMEs' productivity. Motivational access connects computers and the humans who operate them (van Deursen & van Dijk, 2014). This interaction corroborates with social, cultural, mental, and psychological natures to generate interest in using and adapting the technology (Ghobadi & Ghobadi, 2015). The factors explaining motivational access are of a social, cultural, mental, or psychological nature. A primary social explanation for this is that «the internet does not have appeal for low-income and low-educated people» (Katz & Rice, 2002).

While motivational access has been discussed elsewhere in Western references (e.g., van Dijk, 2006; van Dijk, 2006; van Deursen & van Dijk, 2014), the empirical evidence regarding motivational access in Indonesia is poor. In a study by the OECD, the primary goal of Southeast Asian economic growth is more focused on manufacturing than technological services. This requires motivational access to devote more effort to developing technology as opposed to

manufacturing technology. While the Indonesian economy has transformed some services into advanced manufacturing and technological services, the penetration of technology is still uneven (Onitsuka et al., 2018). Onitsuka et al. (2018) have researched the influence of motivational access on the digital divide in Indonesia. Their study reveals that those who control the internet can intensify digital communication to fulfil recipients' happiness and sociability (Onitsuka et al., 2018). From the literature, we generate our second hypothesis as follows:

H2: There is a positive relationship between motivational access and MSME productivity.

The third hypothesis investigates the connection between skill access and ICT adoption of MSMEs to increase their productivity. In the context of developing nations, the uneven access dimension of skill access is particularly complex. Uneven skill access can be based on the personal category (e.g., younger versus older individuals who adopt ICT), positional category (e.g., level of education or labor types), and resources (Reynolds, 2021). In uneven economic conditions and spatial development, those who face poor infrastructural resources lack the exercises and capacity building to adopt information technology (Reynolds, 2021). To some extent, UNCTAD (2019) found that uneven skill access exacerbates economic inequality in some developing countries, especially when significant trade has been shifted to e-commerce. In Indonesia, Onitsuka et al. (2018) assert that uneven skill access impedes residents from appropriating technology to improve their well-being. From that perspective, those who have more than adequate skill access can exploit the information to advance their economic interests (Onitsuka et al., 2018).

Regarding skill access, van Deursen and van Dijk (2009) define operational skills as the human capacity to operate hardware and software, while information skills refer to searching, selecting, and processing information from computer network

sources. Furthermore, strategic skills extend these skills to improve well-being (van Deursen & van Dijk, 2009). To possess those three skills, training and updating of knowledge are essential endeavors.

Education is needed to transform native abilities into useful skills required. Thus, educational attainment can reflect useful skills that increase productivity, which is the ability to produce more goods and services (Kerckhoff et al., 2001). ICT skill access is manifested through the creation of a personal website or a weblog and other forms of internet access. In this stance, the more intensive the trial-and-error exercises in formal or informal education settings, the better skill access is gained by human resources (van Dijk, 2005). This facilitates better ICT adoption to enhance business productivity (Onitsuka et al., 2018). Hence, the third hypothesis will be as follows:

H3: There is a positive relationship between skill access and MSME productivity.

The fourth hypothesis investigates the connection between usage access and ICT adoption of MSMEs to increase their productivity. Digital technology usage is marked as the ultimate goal and the final phase within the series of technological appropriation processes of usage access. It can be measured in several ways: usage time, usage applications and diversity, broadband and narrowband use, and active or creative use (van Dijk, 2005). The existing digital divide research mostly focuses on first-order effects regarding who has access to technology. In this case study, the productivity of MSMEs relates to optimizing business performance and competitiveness from digitalization (Wicaksono & Simangunsong, 2022). The findings exemplify how the adoption of digitalization can add more business value for MSMEs. Hence, the optimizing performance of digitalization for business activity and not diverting to non-business value is a key parameter to achieving productivity (Das et al., 2018).

However, the problem Indonesian MSMEs face is uneven digital technological adoption. From this perspective, the second-order effects of inequality extend into the use of technology among those who have access, and they obtain results from reaching their full potential (Riggins & Dewan, 2005). Due to the increasingly commercially accessible technologies and the fact that most participants in any social system have access to them, the second-order digital divide becomes even more relevant today (van Dijk, 2006).

Within society, ICT has contributed to the development of equipment and found new ways to use technology and information. Some of its new uses are becoming more and more profound, such that social network usage is now crucial for the communication base between businesses and their customers. In the Asia Pacific region, such use has rapidly increased regarding domestic activities and has increased for exports. The increase in usage then creates better leverage for service trade compared to goods (UNESCAP, 2016).

Based on this literature review, the fourth hypothesis will outline a positive connection between usage access and ICT adoption to enhance MSMEs' productivity:

H4: There is a positive relationship between usage access and MSME productivity.

METHODS

This study explores the most significant independent variables to affect MSMEs' productivity in Indonesia. With a quantitative study, the result is solely a measurement of the relationship parameters of the independent and dependent variables (Sekaran & Bougie, 2016). However, this study does not explore how MSMEs acquire four types of digital access (material access, motivational access, skill access, and usage access). Hence, this study does not specifically explore the process of digital knowledge acquirement by MSMEs in Indonesia. Further

detail regarding the data source and econometric modeling to investigate the hypothesis will be provided in the following paragraph.

Data

This study will utilize secondary data gathered from *Survei Sosial Ekonomi Nasional* (SUSENAS) 2019, collected by *Badan Pusat Statistik* (BPS). SUSENAS consists of a series of large-scale multipurpose socio-economic surveys with a sample size of 300,000 households spread across 514 districts/cities in all 34 provinces in Indonesia. Each survey accommodates a core questionnaire for a household roster listing the sex, age, marital status, and educational attainment and the collection of information such as health care and nutrition, technology adoption, household income and expenditures, and labor force experience.

Due to the nature of the survey, this research used categorical data consisting of binary and rank unit metrics. More elaborate explanations of the variables and descriptions of the data can be seen in Table 1. SUSENAS collected data from selected households through an interview approach in which the enumerator met with the respondent. Data on household characteristics were gathered through interviews with the head of the household, his or her spouse, or other related household members.

Econometrics Method

The method to examine the impact of the digital divide on MSMEs' productivity is logistic regression. This method is selected due to its capability to investigate the econometric relationships of the respected nature of the binary dependent variable (Allen, 2015). The dependent variable in this study is MSMEs' productivity, and the independent variable is the digital divide aspect, which consists of material access, motivational access, skills access, and usage access.

With a binary dependent variable, the interaction of independent and dependent variables is exhibited using the estimated odds ratio (Kohler & Kreuter,

Table 1. Research Variable and Description

Variables	Description
ICT Adoption to Increase Productivity (Y)	ICT adoption takes a value of 1 if the respondent uses internet to buy/sell goods and services for the last three months; 0 otherwise.
Material Access (X1)	Material access takes a value of 1 if the respondent has had a cell phone for the last three months; 0 otherwise.
Motivational Access (X2)	Motivational access takes a value of 1 if the respondent has used a cell phone for the last three months; 0 otherwise.
Skill Access (X3)	The respondent's educational attainment; 1 (elementary) - 21 (doctoral).
Usage Access (X4)	Usage access takes a value of 1 if internet use is not related to increasing productivity (social media, entertainment), 2 if the internet use is somehow related to increasing productivity (news reading, learning, email exchange), and 3 if the internet use is most related to increasing productivity (internet banking, information gathering about goods and services) in the last three months.

Source: SUSENAS, Badan Pusat Statistik

2012). In logistic regression, the odds ratio measures the ratio of success and non-success momentum (Kohler & Kreuter, 2012). In their equation, Kohler and Kreuter (2012) use the logit to apply the following form:

$$\text{Logit}(P) = \text{Log} [P/(1 - P)] \quad (1)$$

The term within the squared brackets refers to the odds of an event occurring:

$$P_i = \text{Pr}(Y = 1 | X1_i, X2_i, X3_i, X4_i) \quad (2)$$

Hence, from that derivation, the model for this study can be written as follows:

$$\text{Log} \left(\frac{P_i}{1-P_i} \right) = \text{Logit}(P_i) = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \beta_4 X4 + e \quad (3)$$

Where:

X1 = material access

X2 = motivational access

X3 = skills access

X4 = usage access

This study examines the pseudo-R-square and the P-value of the likelihood statistics score to ensure robust logistic regression. In this regression,

pseudo-R-square explains the degree of prediction of independent variables to the dependent variable (Allen, 2015). Furthermore, the overall fitness of the good logistic regression model is met when the P-value of likelihood statistics is less than 5 percent (0.05).

Furthermore, the model's fitness is fulfilled in the condition of the partial influence of independent variables on dependent variables (Long & Freese, 2001). This is examined using the Wald test. If the P-value of the Wald test score is less than 0.05, it is assumed that those independent variables have partial influences on the dependent variable.

The test then proceeds to multicollinearity. Multicollinearity is utilized to measure correlation among independent variables (Allen, 2015). If multicollinearity exists, the alternatives are to omit the variables or let the variables present whether they signify the overall estimation (Gujarati & Porter, 2008). An acceptable VIF score is up to 10 (Kohler & Kreuter, 2012).

RESULTS AND DISCUSSIONS

The model was free from multicollinearity problems, having a mean variance inflation factor (VIF) value of 1.04, which is less than 10, as displayed in Table 2.

Table 2. Multicollinearity Test

Variable	VIF	SQRT VIF	Tolerance	R-Squared
material	1.03	1.02	0.9692	0.0308
motivational	1.03	1.01	0.9750	0.0250
skill	1.05	1.03	0.9494	0.0506
usage	1.06	1.03	0.9476	0.0524
Mean VIF	1.04			

In addition, based on the result of the Wald test below, the P-value is 0.000 (less than 0.05), which suggests that the independent variables have partial influences on productivity.

Wald test

- (1) [productivity]material = 0
 - (2) [productivity]motivational = 0
 - (3) [productivity]skill = 0
 - (4) [productivity]usage = 0
- chi2 (4) = 4717.59
 Prob > chi2 = 0.0000

After the testing, we ran the logistic econometric regression as presented in Table 3.

The result of the logistic regression denotes a relationship between the digital divide and productivity. The model has a pseudo-R-square of 17.92 percent and meets the overall fitness of the good logistic regression.

We discovered that two variables were significant at the 1 percent significance level: skill access and usage access. Meanwhile, variable material and motivational access were significant at the

10 percent significance level. The variable usage access showed the largest impact on the odds of MSME adopting technology to increase productivity, meaning usage of the internet that is most related to the specific business (e.g., e-banking, getting information regarding products and services) increased the odds of productivity by a factor of 6.5 compared to the unrelated usage of the internet.

Motivational access followed, indicating that if MSMEs used cell phones in the last three months, it would increase the odds of productivity by a factor of 5.6. The number is higher compared to ownership of the cell phone itself, which represents material access, which only increases the probability by 1.4. For skill access, the increase in educational attainment would increase the odds of productivity by a factor of 1.1.

The significance of usage access in the result is consistent with the work of van Dijk (2005; 2006), which considered usage access as the final phase of the digital divide and the second-order effect of the technology (Riggins & Dewan, 2005) that became more relevant. MSMEs' productivity is greatly influenced by ICT usage. In this study, we

Table 3. Logistic regression analysis of independent variables predicting the likelihood of ICT adoption by MSME to increase productivity

Variable	Odd Ratio	Coefficient	Std Error (Odd Ratio)	P-Value
material	1.366164	0.3120068	0.2438972	0.081*
motivational	5.62963	1.728044	5.713701	0.089*
skill	1.067068	0.0649151	0.0038365	0.000***
usage	6.497674	1.871444	0.1945951	0.000***
constant	0.0000718	-9.542158	0.0000734	0.000

Notes: *p<0.1, **p<0.05, *** p<0.01, Prob > chi2 = 0.0000, Pseudo R2 = 17.92%
 Source: Author's calculation

used distinct categories of usage based on their applicability to MSMEs' productivity.

Firstly, if firms customize their Internet use for social media and entertainment purposes, we consider the usage not to be related to productivity. Second, if they utilize the internet to access information/news, for educational purposes, and for sending and receiving email, we deliberate it as somehow related to productivity. Lastly, if they employ the internet for financial transactions such as e-banking and to acquire information about goods and services, we compartmentalize this as the most related usage type. The various types of usage (van Deursen & van Dijk, 2014) indicate significant discrepancies from extensive groups of MSMEs.

We employ educational attainment to denote variable skills in this research examination, as the skill gap can also be based on assorted positional categories, for instance, the level of education (Reynolds, 2021). The gauge of the increased productivity has been slight because various levels of educational attainment range from elementary to doctoral degrees. As we gather from the results, the increase in skill access for MSME owners has a positive impact on MSMEs' productivity. This finding is also affiliated with Onitsuka et al. (2018), who find that those with higher skills can exploit information better to be more productive.

The econometric regression illustrates that material access has a weak influence on ICT adoption for economic productivity. While 10 percent has a positive correlation with ICT adoption, the significance is inferior to the social research rule of thumb regarding if it falls below 5 percent (Allen, 2005). The discussion in the literature reveals the uneven nature of the material access infrastructure as the root cause of the weak digital economic productivity in some developing countries (Arney & Hosman, 2016; The World Bank, 2013). Sujarwoto and Tampubolon (2016) present the issue of disproportionate material access to ICT infrastructure among different

provinces in Indonesia. Uneven access brings some shortcomings among the groups that already face hardships (Onitsuka et al., 2018). Based on past field studies, some wealthy households reveal their negligence in redistributing their infrastructure ICT access to those disadvantaged groups (Onitsuka et al., 2018).

Moreover, in extending the association between motivational access and the dependent variable, the empirical statistical results validate a slightly significant relationship between motivational access and ICT adoption to increase productivity in Indonesia. According to this stance, the significance of those two respective variables is at the 10 percent level, or beneath the econometric standard of 5 percent (Kohler & Kreuter, 2012). The aforementioned literature review has manifested some motivational drawbacks, specifically for those who face disadvantaged technological availability. Hence, this peculiar behavior can minimize the effect of motivational access on MSMEs' productivity in Indonesia. This research explores why those motivational drawbacks can occur among some households in Indonesia. It especially necessitates a qualitative study to investigate the drawbacks of motivational access to ICT technology.

MANAGERIAL IMPLICATIONS

In this study, the significance of some variables has managerial implications for MSMEs' business performance. Firstly, when MSMEs customize their internet use for something truly related to their business, it can indeed augment their productivity. From this stance, rather than using the internet solely as entertainment, in business use, MSMEs will be assisted to efficate activities such as bookkeeping and applied business research. This study asserts the significance of skill access toward MSMEs' productivity. Again, skill sets are part of human capital components. This result presents the implication that MSMEs not only grow upon receiving financial assistance but also experience prosperous business productivity in the endeavor to enhance human capital investment.

Furthermore, material access and motivational access have a weak impact on MSMEs' productivity. However, such unequal ICT infrastructural access detracts from the evolvement of material access to drive more inclusive adoption of ICT and increase productivity. The uneven material access leads to unequal productivity among MSMEs because those who have solid ICT infrastructure access may have more competitive advantages over those who lack material access to deliver the goods and services to customers. This study emphasizes the necessity to enhance the motivation of MSMEs to learn ICT to speed up the business process. Even though it has a weak statistical significance, it is still substantial to improve the productivity of MSMEs.

CONCLUSION

This study aims to scrutinize digital divide factors, namely material access, motivational access, skill access, and usage access, and their effect on MSMEs' productivity in Indonesia. Despite the burgeoning ICT adoption among MSMEs for their businesses, this study reveals the significant influence of skill access and usage access to ramp up the productivity of MSMEs. Furthermore, material access and motivational access have less significant effects on MSMEs' productivity.

In brief, the academic implications of this study showcase MSMEs' enthusiasm to upgrade their skill

and usage access to enhance their daily business activities. Likewise, in the applied policy-making implication, this study urges more extensive ICT infrastructure access, especially to MSMEs who have no ICT device access for their businesses. The foundation of this policy-making recommendation is rooted in the weak significance of material access and motivational access toward the productivity grasp from our aforementioned quantitative assessment. With limited government resources to avail the extensive ICT access, we advise public-private partnerships to unveil more equal distributive access to ICT infrastructure for MSMEs.

This study presents some limitations in uncovering other economic variables such as demographic and geographic variations to affect MSMEs' productivity. This research also portrays a mere cross-section of empirical evidence from excerpt data through SUSENAS 2019. In light of those limitations, future studies can apply demographic and geographic variables in this digital economics epistemology. In addition, upon enriching longitudinal studies in broader economic development substance, future studies can amplify panel data study to investigate the relationship between the digital divide and MSMEs' productivity in Indonesia. ■

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