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Internet Utilization and Local Government Procurement for MSEs

ABSTRAK

Penelitian ini mengkaji pengaruh tingkat utilisasi internet terhadap proporsi transaksi pemerintah daerah kepada Usaha Mikro dan Kecil (UMK) melalui E-Katalog menggunakan data panel pada 504 kabupaten/kota di Indonesia tahun 2020–2023, dengan metode *Two-Way Fixed Effect* (TWFE). Hasil estimasi menunjukkan bahwa peningkatan 1 poin persentase tingkat utilisasi internet berasosiasi dengan kenaikan 0,212 poin persentase proporsi transaksi pemda kepada UMK (signifikansi 0,05%). Analisis heterogenitas menunjukkan pengaruh signifikan di Indonesia Timur (β=0,487; p<0,05), sementara pengaruhnya tidak signifikan di Indonesia Barat (β=0,057) yang mengindikasikan dampak lebih kuat di wilayah dengan kondisi digital tertinggal. Temuan ini sejalan dengan teori ekonomi informasi dan biaya transaksi, yang menekankan peran digitalisasi dalam menurunkan hambatan informasi dan biaya. Penelitian ini menekankan pentingnya peningkatan utilisasi internet untuk mendorong pengadaan secara daring yang lebih inklusif terhadap UMK, serta perlunya kebijakan afirmatif seperti subsidi biaya berlangganan internet bagi UMK untuk memperluas akses digital dan penguatan literasi sistem digital pengadaan publik (E-Katalog) bagi UMK.

Kata kunci: utilisasi internet, Usaha Mikro dan Kecil, E-Katalog, pengadaan pemerintah daerah

Klasifikasi JEL: H11, H41, H57, H76

ABSTRACT

This study examines the effect of internet utilization on the proportion of local government procurement transactions allocated to Micro and Small Enterprises (MSEs) through E-Katalog. The dataset covers 504 districts in Indonesia over the period 2020–2023 and is estimated using a Two-Way Fixed Effects (TWFE) model. The results indicate that a one-percentage-point increase in internet utilization is associated with a 0.212-percentage-point rise in the share of local government transactions awarded to MSEs (significant at 0.05%). Heterogeneity analysis reveals a significant effect in Eastern Indonesia (β=0.487; p<0.05) but not in Western Indonesia (β=0.057), suggesting stronger impacts in digitally lagging regions. These findings are consistent with Information Economics and Transaction Cost Theory, highlighting the role of digitalization in reducing information asymmetry and transaction barriers. Overall, this study underscores the importance of expanding internet utilization among MSEs and implementing complementary affirmative policies—such as targeted digital access subsidies and strengthened digital procurement literacy—to promote more inclusive and equitable public procurement for MSEs.

Keywords: internet utilization, Micro and Small Enterprises, E-Katalog, local government procurement

JEL Classification Codes: H11, H41, H57, H76

INTRODUCTION

Micro and Small Enterprises (MSEs) play a strategic role in the Indonesian economy. According to data from the National Socio-Economic Survey (Susenas), in 2023 there were approximately 30.86 million individuals engaged in MSEs (UMK), corresponding to 7.75 million households identified as enterprise actors (see Figure 1). This figure reflects a consistent trend observed in previous years, in which micro enterprises remain the dominant form of business in Indonesia.

Figure 1: Number of Households and Individuals Operating Micro Enterprises (2021–2022) and Micro and Small Enterprises (2023)
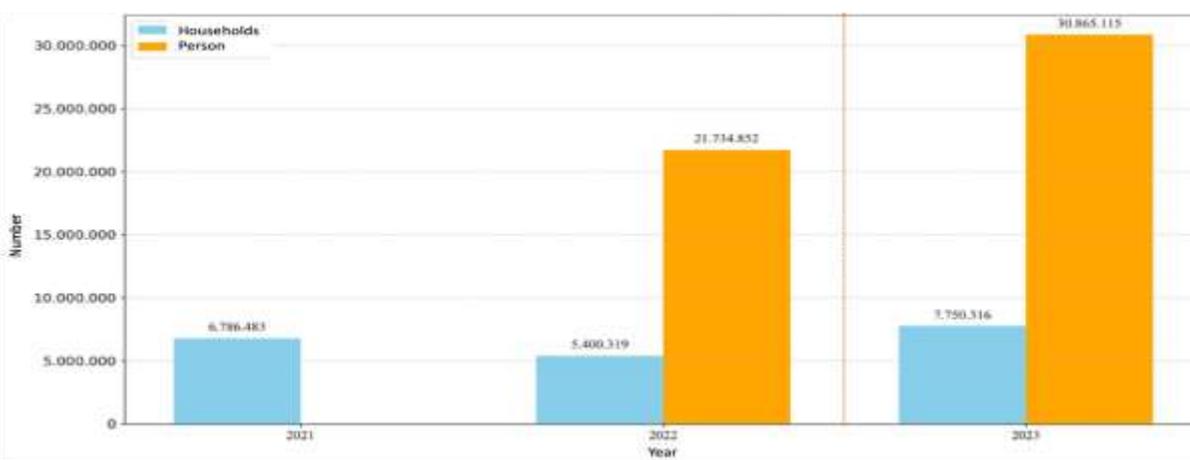
Source: Susenas (Author's calculation)

Rothenberg et al., (2016) highlight that the majority of informal actors in Indonesia come from the microenterprise sector. Similarly, La Porta and Shleifer (2014) argue that the informal sector largely consists of small businesses that are not officially registered and do not pay taxes. These businesses typically do not grow over time and rarely transition into formal enterprises. Thus, the informal sector is not regarded as a primary driver of long-term economic growth; on the contrary, the existence of this sector may actually negatively impact overall economic performance.

Given the significant potential of MSEs in Indonesia, and in order to prevent

MSEs from remaining stagnant and becoming trapped within the unproductive informal sector, the government is placing serious attention on the development of MSEs to ensure their continued growth. One key initiative has been to promote MSE participation in public procurement for goods and services. In recent years, Indonesia's public procurement system has undergone significant transformation, shifting toward a digital-based framework that integrates Information and Communication Technology (ICT) into procurement processes.

With this in mind, this study examines the effect of internet utilization on MSE participation in public procurement, with particular reference to the E-Katalog system at the district level in Indonesia. The study contributes to a relatively limited body of empirical research in developing-country contexts, including Indonesia, that investigates whether digital infrastructure and the degree of digital adoption influence MSE participation in local government procurement. Existing studies in Indonesia largely rely on self-reported survey data drawn from small samples of MSEs (Israel, 2025; Hadi et al., 2025), which limits their policy relevance—especially in the context of a relatively standardized district-level digital procurement system that must account for variation in firm characteristics (Schmitz & Wimmer, 2024; Nemec, 2025; Arosa et al., 2025).

Moreover, prior studies conducted outside Indonesia have predominantly focused on policy and regulatory mechanisms to enhance the success of Micro, Small, and Medium Enterprises (MSMEs) in securing public procurement contracts. These include partnering through horizontal networks (Reijonen et al., 2022), dividing contract values into smaller lots (Nemec, 2024), and improving the quality of procurement regulatory standards (Hoekman & Taş, 2022).

Using Two-Way Fixed Effects (TWFE) estimation based on 504 districts over the period 2020–2023, this study assesses the role of digital infrastructure and digital

utilization in shaping MSE participation in digital public procurement at the district level. In theory, improved digital access should accelerate MSE participation, as ICT reduces transaction costs. This study specifically highlights the demand-side dimension of internet utilization. It explores whether variations in internet usage are associated with the proportion of local government expenditure allocated to MSEs.

LITERATURE REVIEW

When discussing digitalization and ICT, it is important to recognize the rapid pace at which ICT utilization has evolved over time. Improved access to high-speed internet has become one of the primary driving forces behind the digitalization process, as it expands connectivity, accelerates information retrieval, and enhances the efficiency of various business activities (Kartiasih, Nachrowi Djalal, et al., 2023). According to Goldfarb and Tucker (2019), the process of digitalization did not originate with the internet itself but rather with the emergence of computers capable of performing rapid calculations. Although early computers were constrained by limited storage capacity and restricted inter-device communication, subsequent technological advances enabled greater connectivity. The emergence of the internet then significantly accelerated information flows and communication between computers, thereby fostering a wide range of digital innovations, including e-commerce platforms and the adoption of digital technologies in the public sector—commonly referred to as e-government systems.

One form of e-government implementation in the area of government procurement is the adoption of the e-procurement system, which has been introduced across all government agencies, both at the central and district levels, in Indonesia. E-procurement is an integrated, web-based communication system designed to support the implementation of some or all stages in the electronic procurement process for goods and services. This process involves a series of activities, starting from the identification of needs by the

user (in this case, the government), the search for suppliers—including both MSME and non-MSME actors—followed by procurement, negotiation, ordering, receipt of goods or services, and post-purchase evaluation (Croom & Brandon-Jones, 2007). In essence, the implementation of e-procurement aims to establish a more effective, transparent, and accountable procurement process, which ultimately improves the quality of public service delivery and mitigates corruption risks (Adjei-Bamfo et al., 2019; Costa et al., 2013; Puspita & Gultom, 2024).

The evolution of government procurement in Indonesia reflects substantial progress in line with ongoing regulatory reforms. The digital transformation of procurement processes—particularly through the adoption of e-procurement systems—has significantly enhanced the transparency, efficiency, and accessibility of procurement information. This development has also promoted greater inclusivity in the participation of business actors within

the government procurement system. At present, the selection of goods and services providers in e-procurement is predominantly conducted through the E-Katalog platform, as stipulated in Presidential Regulation Number 12 of 2021 and further reinforced by Presidential Instruction Number 2 of 2022. These regulations emphasize the importance of involving MSEs in the procurement process by mandating both central and district levels of government to allocate at least 40% of their goods and services budget to MSEs and cooperatives. Accordingly, MSE participation in public procurement is expected to contribute positively to strengthening the local economy, revitalizing regions, and optimizing the utilization of domestic resources (Karjalainen & Kemppainen, 2008; Mourougane, 2012; OECD, 2018; Reed et al., 2005).

The digitalization of procurement, particularly through the E-Katalog system, can be explained by two theoretical frameworks: Information Economics Theory and Transaction Cost

Theory. Information Economics Theory posits that economic actors do not have perfect information as assumed in neoclassical theory. This asymmetry generates search costs—that is, expenses incurred to obtain market information (Stigler, 1961; Stiglitz, 2000). Digital platforms help reduce these costs by increasing information accessibility and transparency (Goldfarb & Tucker, 2019). In the context of public procurement, e-procurement systems such as E-Katalog enable MSMEs to access tender information more easily and at a lower cost, thereby broadening participation and reducing informational barriers (Costa et al., 2013).

Meanwhile, Transaction Cost Theory highlights the costs associated with economic exchange, such as searching, negotiating, and monitoring. A key source of transaction costs is asset specificity, where firms must undertake investments tailored to particular transactions that cannot be easily redeployed elsewhere (Williamson, 2008). MSMEs often face disproportionately higher transaction costs due to limited resources and complex procedures (Di Mauro et al., 2020). E-procurement addresses these barriers by improving information flow and reducing entry costs, as seen in Indonesia's E-Katalog system, which supports fairer and more efficient access for MSMEs.

However, the successful implementation of procurement digitalization requires comprehensive readiness from both internal and external dimensions. Internal readiness refers to the institutional capacity of local governments, which play a central role in governance under Indonesia's decentralized system. In this context, local governments hold a critical responsibility to ensure that the procurement system is implemented in accordance with applicable regulatory frameworks, while also advancing inclusive procurement practices, particularly through the mandated allocation of procurement budgets to MSEs via the E-Katalog platform. This responsibility also entails adapting administrative processes and ensuring

adequate ICT infrastructure to support system implementation.

From an external perspective, the effectiveness of digital procurement adoption is influenced by the level of internet usage within the broader community, reflecting regional digital readiness. As argued by Meijer (2015), one of the main challenges in implementing technology in the public sector arises when end users do not perceive the technology as beneficial. Accordingly, public technology must not only be available but also actively adopted and trusted by its users. In the context of procurement, this implies that business actors—particularly MSMEs—must possess awareness, understanding, and trust in the E-Katalog system as a means of broadening their access to procurement opportunities. Rising levels of internet usage signal increasing digital readiness among communities, including MSE actors. Local governments operating in regions with higher internet utilization may therefore be more inclined to allocate a greater share of procurement budgets to MSEs

through the E-Katalog platform. Such dynamics not only strengthen MSME integration into the public procurement supply chain but also create incentives for local governments to further enhance transparency, inclusivity, and efficiency within the procurement system (Margetts & Dunleavy, 2013; Meijer, 2015).

Building on the discussion above, efforts to strengthen inclusive procurement implementation through the E-Katalog system—particularly in encouraging local governments to increase budget allocations to MSEs—must account for the extent of internet utilization within a region. The level of internet usage can serve as a preliminary indicator of digital readiness at the district level and provides insight into the presence of a digital divide. The digital divide refers to disparities in access to, proficiency in, and use of ICT across regions or social groups. Such disparities can impede the effective implementation of digital policy measures, particularly within public procurement frameworks (Nishijima et al., 2017). In this context,

the gap between the availability of infrastructure and its actual use becomes a crucial factor in assessing a region's readiness to adopt digital systems, such as the E-Katalog, in the government procurement process.

Figure 2: Differences in the Proportion of Villages with Stable Mobile Internet Signal Access and Internet Utilization Rates in Indonesia
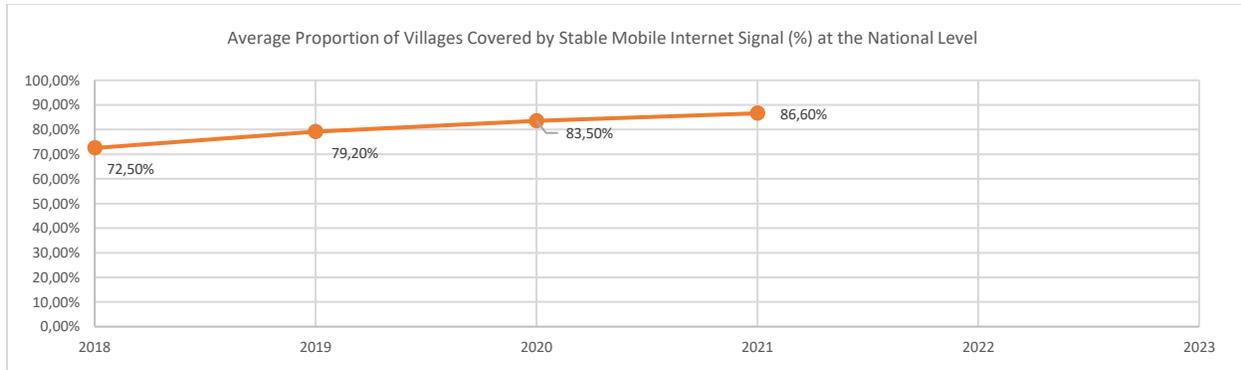
(a) The Proportion of Villages with Stable Mobile Internet Signal Access
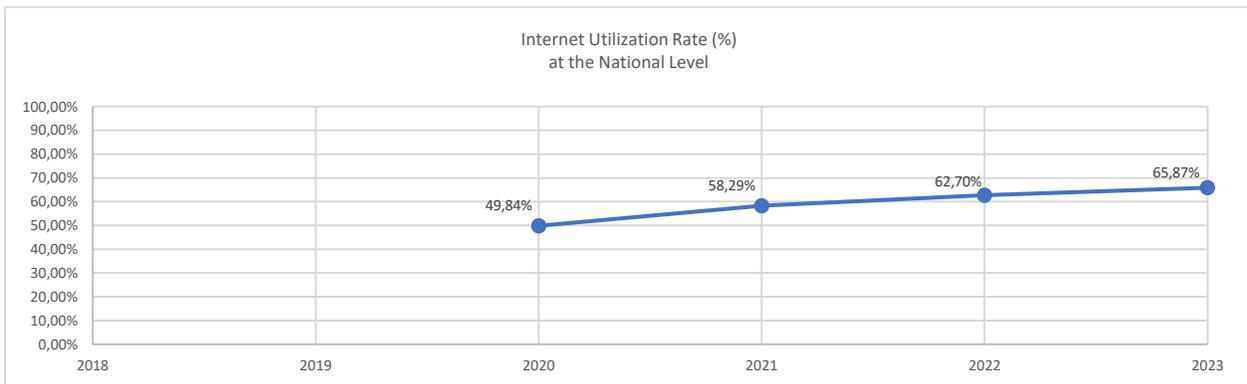
(b) Proportion of Internet Users in Indonesia

Source: Author's calculation based on SUSENAS and PODES

At the national level, Figure 2—based on data sourced from the Village Potential Survey (PODES)—shows that internet network infrastructure coverage has expanded steadily in recent years. Measured by the proportion of villages with access to stable mobile internet signals (3G/H/H+/EVDO and 4G/LTE), coverage increased from 2018 to 2021. Meanwhile, the level of internet utilization, reflected in the proportion of individual internet users, has also shown

an upward trend, particularly during the period from 2020 to 2023. However, the proportion of individuals who consistently access the internet remains lower than the proportion of villages with access to internet signals. This indicates a disparity between the availability of infrastructure and the actual level of internet usage among the community—a condition known as the digital divide.

To better understand the gap between infrastructure availability and internet utilization, a scatterplot (Figure 3) compares the proportion of villages with stable cellular signal access and individual internet users at the district level in 2021 and 2023. The diagonal line $Y = X$ serves as a reference for balanced infrastructure and utilization. Points below the line indicate lower internet usage than infrastructure coverage, while points above indicate higher usage than access.

Figure 3: Scatterplot of the Proportion of Villages with Stable Mobile Internet Signal Access and Internet Utilization Rates in Districts/Cities in Indonesia in 2023
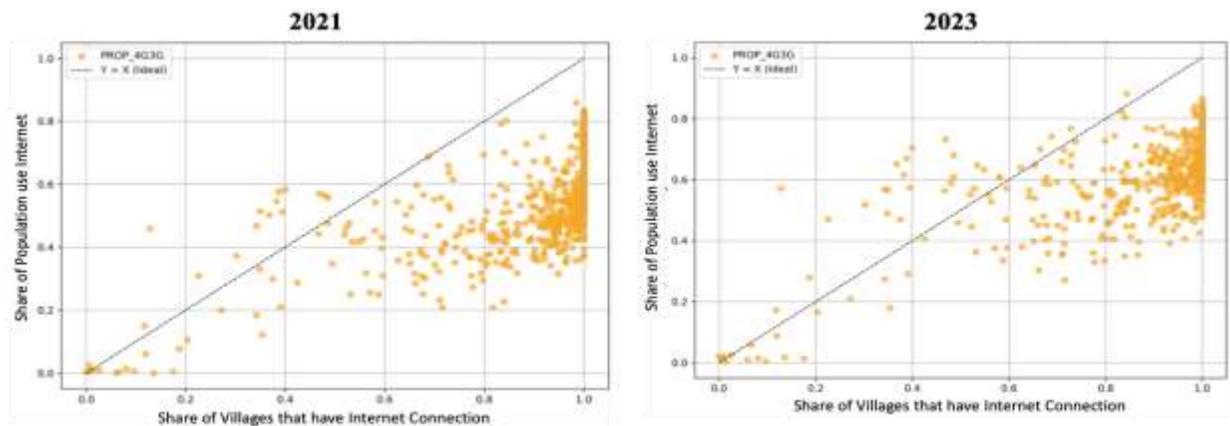
Source: Author's calculations based on SUSENAS and PODES

In 2021, the majority of districts and cities were positioned below the line, indicating suboptimal use of the existing infrastructure. In 2023, improvements were observed, with more points approaching or surpassing the line,

although most still indicated a persistent gap.

Interestingly, several regions displayed relatively high levels of internet usage despite limited signal coverage. This pattern can be attributed to the spatial distribution of the population, socio-economic capacity, and higher digital literacy in villages with internet access. This phenomenon suggests that population readiness plays a critical role in driving internet utilization and that the digital divide persists even when infrastructure is already in place.

Overall, these patterns confirm the existence of a digital divide between districts/cities in Indonesia, demonstrating that while internet infrastructure is generally well established, the ease of accessing the internet is not evenly distributed down to the household or individual level within those areas.

The level of internet utilization therefore serves as an indicator of digital readiness at both the community and local government levels, particularly in relation to the adoption of digital

systems such as the E-Katalog platform. Low levels of internet use in certain districts signal limited digital preparedness, yet they also reveal opportunities to strengthen public awareness, digital literacy, and willingness to engage with online platforms. This potential can be leveraged by local governments to support the implementation of a more inclusive and effective electronic procurement system and to increase spending allocations to MSEs (Croom & Brandon-Jones, 2007). Monitoring internet utilization thus represents a strategic measure to address digitalization barriers, particularly in optimizing the E-Katalog as a key public procurement instrument (Asogwa, 2013). Given the essential role of internet utilization in supporting the inclusivity of the E-Katalog system and the government's priority to integrate SMEs, along with the limited research on its relationship with local government transactions through the E-Katalog, this topic warrants further investigation. Accordingly, the purpose of this research is to determine whether variations in

internet utilization levels influence the extent to which local governments successfully conduct E-Katalog transactions with MSEs. The analysis focuses on district and municipal governments in Indonesia over the period 2020–2023.

RESEARCH METHODOLOGY

This study adopts a quantitative research design to analyze the extent to which internet utilization levels influence the proportion of regional government transactions directed to MSEs within the government E-Katalog system at the district/city level in Indonesia. The unit of analysis is the district, covering the period from 2020 to 2023. Accordingly, all variables employed in this research are aggregated at the district level.

The dependent variable is the proportion of local government transactions to MSEs relative to the total transactions conducted through the E-Katalog system, based on data obtained from the National Public Procurement Agency (LKPP). Meanwhile, the main independent variable is the level of internet utilization, proxied by the

percentage of individual internet users in each district, as reported by the National Socio-Economic Survey (Susenas).

The E-Katalog transaction data were aggregated at the district-government level through a structured data processing procedure. The aggregation results indicate that several districts do not have available transaction data in the E-Katalog system. Specifically, transaction data are unavailable for 14 districts/cities in both 2020 and 2021, and for 11 districts/cities in 2022. Accordingly, the final number of observations used in this study amounts to 2,017, covering the period from 2020 to 2023.

To estimate the relationship between internet utilization and MSE participation in public procurement, this study employs a TWFE estimation model. This approach controls for unobserved, time-invariant characteristics specific to each local government that may influence the relationship between internet accessibility and the success of MSE participation in the government's E-

Katalog system. Additionally, this method helps mitigate bias by incorporating both time-fixed effects and individual-fixed effects, thereby directly accounting for external variations attributable to temporal dynamics (Angrist & Pischke, 2009; Wooldridge, 2010).

The TWFE estimation technique effectively reduces the influence of time-invariant variables across all local entities, specifically district/city governments, resulting in a more accurate assessment of the relationship between internet accessibility and successful MSE participation in the government's E-Katalog system.

Based on the data, methodology, and research objectives, the empirical model is specified as follows:

$$LocalGovt\_MSEs_{it} = \alpha_0 + \beta_1 Inet_{it} + \gamma X_{it} + \delta_i + \theta_t + \varepsilon_{it}$$

where $LocalGovt\_MSEs_{it}$ denotes the proportion of local government transactions allocated to MSEs in the E-Katalog system; $Inet_{it}$ represents internet utilization; and x_{it} is a vector of control variables comprising the percentage of households with access to electricity, the percentage of households with access to financial (credit) services, the district-level Gross Regional Domestic Product (GRDP) per capita, and the proportion of limited liability companies (PT) serving as providers in the local government's E-Katalog system at the district level.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics presented in Table 1 indicate that the average proportion of local government transactions allocated to MSEs through the E-Katalog system is 37.26%, which falls slightly below the national target of 40% as mandated by Presidential Regulation No. 12 of 2021. The observed range, spanning from 0% to 100%, highlights substantial disparities across local governments in their commitment to supporting MSEs.

Meanwhile, the average internet utilization rate is 52.80%, with considerable variation across districts, reflecting the ongoing digital divide.

Table 1: Descriptive Statistics at the District/City Level for the Years 2020–2023

Variable	Obs	Mean	Std.Dev	Min.	Max.
Proportion of local government transactions for MSEs in E-Katalog (%)	2017	36.26	20.60	0.00	100.00
Internet utilization (%)	2056	52.80	16.82	0.00	88.33
Household access to credit services (%)	2056	21.38	10.31	0.00	69.81
Households with electricity as a source of lighting (%)	2056	97.21	8.48	3.24	100.00
GRDP per capita (million rupiah per year)	2056	38.81	43.42	3.96	498.61
Proportion of Limited Liability Companies (PT) as a form of business provider in E-Katalog (%)	2017	85.94	17.65	0.00	100.00
N	2056				

Source: LKPP, BPS (processed)

Similarly, access to credit remains relatively low, with an average of only 21.38% of households reporting access. In contrast, access to electricity is generally high, averaging 97.21%, although some areas still experience very limited electrification. The GRDP per capita also displays pronounced inequality, ranging from Rp3.96 million to Rp498.61 million annually. Furthermore, the dominance of providers in the form of limited liability companies (PT), averaging 85.94%, presents a significant barrier for MSEs to compete within the E-Katalog procurement ecosystem.

The Main Findings

The empirical analysis begins with an Ordinary Least Squares (OLS) regression to provide a baseline estimate of the association between internet utilization and the proportion of local government procurement transactions allocated to MSEs through the E-Katalog system. The primary objective of this initial specification is to assess the direction and magnitude of the relationship. The analysis then proceeds to use the Two-

Way Fixed Effects (TWFE) framework, incorporating controls for both time-fixed effects and individual-fixed effects. This approach is employed to mitigate potential bias arising from the unique characteristics of each district that remain constant over time (time-invariant), while simultaneously accounting for external changes attributable to temporal variations (time effects) (Angrist & Pischke, 2009; Wooldridge, 2010).

Table 2: Estimation Results with Ordinary Least Squares (OLS) and Two-Way Fixed Effects (TWFE)

	OLS (1)	TWFE (2)	TWFE (3)	TWFE (4)	TWFE (5)	TWFE (6)
Internet utilization rate (%)	0.301***	0.219*	0.240**	0.238**	0.237**	0.212*
	(7.85)	(2.48)	(2.70)	(2.65)	(2.65)	(2.53)
Household access to credit services (%)	-0.177***		-0.182*	-0.183*	-0.184*	-0.120
	(-4.70)		(-2.02)	(-2.03)	(-2.03)	(-1.41)
Households with electricity as a source of lighting (%)	-0.00192*			0.000173	0.000177	-0.0000722
	(-2.02)			(0.17)	(0.18)	(-0.08)
GRDP per capita (million rupiah per year)	-0.000652***				-0.000107	-0.000210
	(-3.90)				(-0.21)	(-0.45)
Proportion of Limited Liability Providers in E-Katalog (%)	-0.652***					-0.407***
	(-13.56)					(-14.72)
Constant	1.013***	0.134***	0.166***	0.151	0.154	0.568***
	(10.08)	(3.50)	(4.01)	(1.50)	(1.52)	(5.73)
year=2020		0	0	0	0	0
		(.)	(.)	(.)	(.)	(.)
year=2021		-0.00317	-0.00809	-0.00804	-0.00793	-0.00816
		(-0.28)	(-0.70)	(-0.70)	(-0.69)	(-0.76)
year=2022		0.112***	0.106***	0.107***	0.107***	0.0779***
		(7.52)	(7.03)	(7.03)	(7.02)	(5.43)

	OLS (1)	TWFE (2)	TWFE (3)	TWFE (4)	TWFE (5)	TWFE (6)
year=2023		0.336^{***}	0.330^{***}	0.331^{***}	0.331^{***}	0.218^{***}
		(19.01)	(18.44)	(18.41)	(18.29)	(11.74)
Observations		2017	2017	2017	2017	2017
R^2		0.644	0.645	0.645	0.645	0.690
Adjusted R^2		0.521	0.522	0.522	0.521	0.582

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's calculation

The estimation results indicate that internet utilization has a positive and statistically significant effect on the proportion of local government transactions to MSEs in the E-Katalog system across all models used. Model 1 presents the results of a regression using the Ordinary Least Squares (OLS) method, yielding a statistically significant coefficient of 0.301, indicating a positive relationship. Meanwhile, Models 2–6 employ a TWFE regression approach, ranging from models without control variables to those with fully incorporated control variables. The estimation result for Model 6, which applies the TWFE method with comprehensive control variables, indicates a coefficient of 0.212, which is lower than the result obtained from the OLS model. However, when evaluated based on the R² value, Model 6 demonstrates the highest explanatory power, with an R² of 0.690. Accordingly, the authors consider Model 6 to be the most appropriate model for producing coefficient estimates in assessing the effect of internet utilization on the proportion of local government transactions to MSEs in the E-Katalog system.

The TWFE estimate in Model 6 implies that a one-percentage-point increase in the internet utilization rate is associated with a 0.212 percentage-point increase in the share of local government procurement transactions allocated to MSEs through the E-Katalog system, holding other factors constant. Furthermore, in assessing the magnitude of the impact, an increase of one standard deviation in the internet utilization rate—equivalent to 16.82 percentage

points—is associated with a 3.5658 percentage-point increase in the proportion of local government transactions to MSEs in the E-Katalog system (0.212 × 16.82).

Discussion

The initial analysis examines the relationship between MSE ownership and individual internet usage using data from the 2023 National Socioeconomic Survey (Susenas). Through cross-tabulation, internet usage patterns were analyzed based on the status of MSE ownership.

The tabulation results (Table 3) indicate that in 2023, only 11.15% of individuals within the total population were registered as MSE owners, equivalent to approximately 30.87 million people. Meanwhile, internet usage at the individual level reached 65.87%, or approximately 182.3 million people. Notably, only 7.82% of the total population were both MSE owners and internet users, highlighting the relatively small overlap between MSE ownership and active digital engagement.

Table 3: Relationship Between MSE Ownership and Internet Utilization Level in 2023

2023	Using the Internet	Not Using the Internet	Total
Having an MSE (%)	**7.82%**	**3.33%**	**11.15%**
	21,640,498	9,225,230	30,865,728
Not Having an MSE (%)	**58.05%**	**30.80%**	**88.85%**
	160,667,524	85,256,219	245,923,743
Total (%)	**65.87%**	**34.13%**	**100.00%**
	182,308,022	94,481,449	276,789,471

Source: Susenas (author calculation)

**Table 4: Individuals Owning an MSE and Internet Utilization Rate in 2023**

2023	Using the Internet	Not Using the Internet	Total
Having an MSE (%)	21,640,498	9,225,230	30,865,728
Not Having an MSE (%)	**70.11%**	**29.89%**	**100.00%**

Source: Susenas (author calculation)

However, when focusing exclusively on MSE owners (Table 4), the data reveal that 70.11% of them—approximately 21.64 million individuals—use the internet. This finding suggests that the rate of internet utilization among MSE owners tends to be higher than that of the general population.

The following analysis highlights a positive trend in internet utilization rates at the district/city level in Indonesia. Figure 4 illustrates a consistent year-over-year increase, with a notable spike in 2021, where the rate rose from 49.84% in 2020 to 58.29%. This upward trend then continued, reaching 65.87% in 2023, reflecting sustained growth in internet access and usage at the national level.
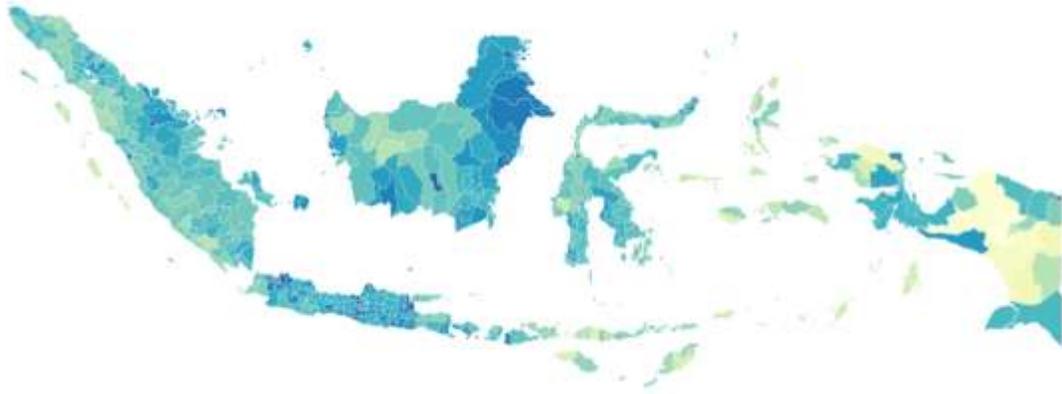
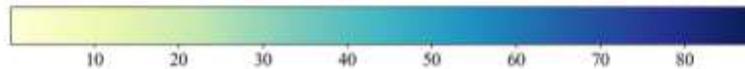**Figure 4: Trends in Internet Utilization Rates in Indonesia (2020–2023)**
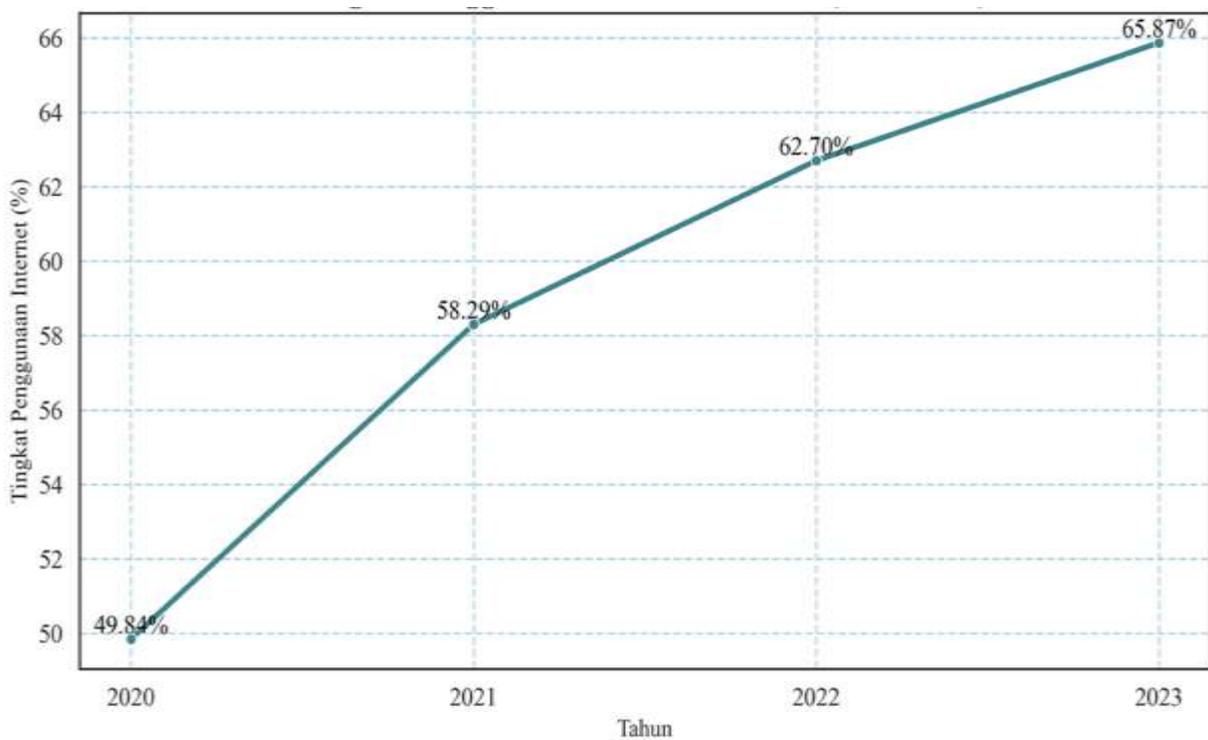
Source: Author's calculations (SUSENAS)

Figure 5: Differences in Internet Usage Levels per District in Indonesia in 2020 and 2023

(a) Map of Internet Utilization Levels per District in Indonesia in 2020

(b) Map of Internet Utilization Levels per District in Indonesia in 2023

Source: SUSENAS (author calculation)

To provide a visual, spatial overview of internet usage levels at the district/city level, Figure 5 presents a map illustrating the distribution of internet utilization levels across districts/cities in Indonesia from 2020 to 2023. The increase in internet usage is represented through a color gradient, shifting from lighter shades (yellow) in 2020 to darker shades (blue) in 2023. However, despite overall

improvements, the map also reveals a striking spatial disparity: Eastern Indonesia tends to lag behind Central and Western Indonesia in terms of internet utilization. This indicates that, although the average level of internet utilization in Indonesia has improved over time, the figure remains moderate and is accompanied by significant regional disparities.

Figure 6: District-Level Allocation of Government Transactions to MSEs through the E-Katalog in Indonesia (2020 and 2023)
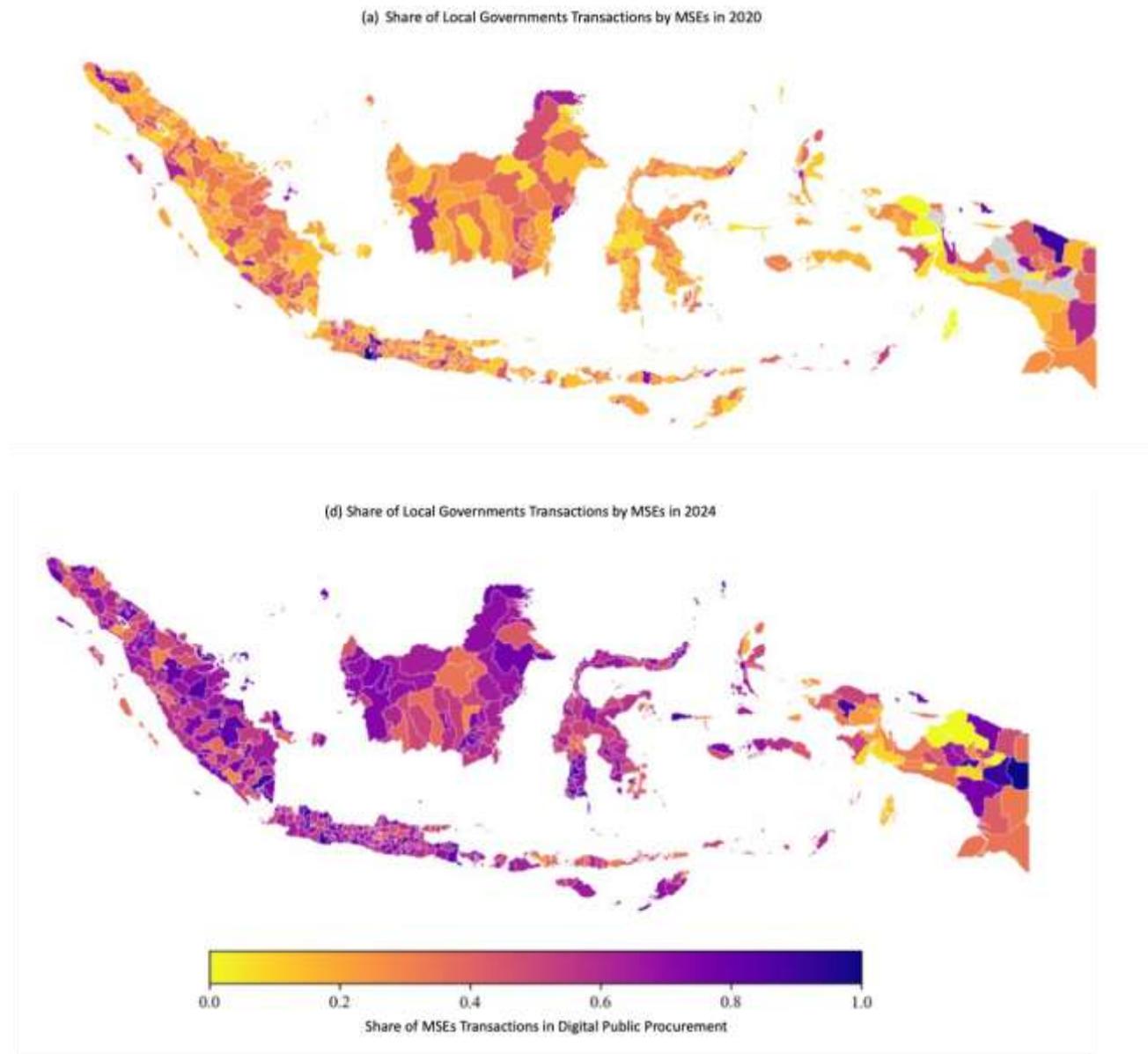
Source: LKPP (processed)

Similarly, the spatial map of the proportion of local government transactions to MSEs through the E-Katalog in 2020 and 2023 (Figure 6) indicates an improving trend. In 2020, light colors dominated the map, reflecting low MSE participation. However, from 2021 to 2023, there was a significant increase, particularly following the issuance of Presidential Regulation No. 12 of 2021 and Presidential Instruction No. 2 of 2022, which encouraged the allocation of a minimum of 40% of procurement spending to MSEs and accelerated the use of the E-Katalog. This growth peaked in the year 2023, by which point nearly all regencies/cities, including those in Eastern Indonesia, recorded a significant increase in the proportion of transactions to MSEs.

The TWFE regression results indicate that a one-percentage-point increase in internet utilization is associated with a 0.212 percentage-point increase in the proportion of local government transactions allocated to MSEs through the E-Katalog system. This coefficient is smaller than the OLS estimate of 0.301 presented in Table 2, though both estimates demonstrate a positive relationship. The reduction in magnitude suggests the presence of negative bias in the OLS estimates due to unobserved, time-invariant district characteristics that the TWFE model accounts for.

One possible explanation for this bias is that districts with better digital infrastructure and larger populations tend to exhibit higher levels of internet access (Rezki, 2023). These areas are often considered economically advantageous due to their larger market size, which can offset the costs associated with developing digital infrastructure (Buys et al., 2009).

A geographical analysis further reinforces the existence of a digital divide between Western and Eastern Indonesia (Kartiasih, Djalal Nachrowi, et al., 2023). Higher levels of digital access and internet utilization are generally observed in urban—particularly metropolitan—areas. In contrast, mountainous rural regions, remote areas, and island-based districts, especially in

Eastern Indonesia, remain relatively underdeveloped in terms of digital infrastructure and usage. This spatial inequality helps explain the negative bias observed in the OLS estimates. Western regions, which typically possess more advanced digital infrastructure and higher population density, tend to exhibit both higher internet utilization and a greater proportion of local government transactions allocated to MSEs through the E-Katalog system.

This phenomenon is further illustrated in Figure 7, which presents a scatterplot comparing district-level conditions in Indonesia between 2020 and 2023, specifically highlighting areas that occupy extreme positions—either low or high—in terms of internet utilization rates and the proportion of local government transactions to MSEs via the E-Katalog.

Figure 7: Scatterplot of Districts with Extremely Low and Extremely High Values for Internet Utilization Rates and the Proportion of Local Government Transactions for MSEs via E-Katalog (2020 and 2023).

Source: SUSENAS and LKPP (processed)

Overall, Figure 7 reveals a clear spatial pattern. In both 2020 and 2023, districts characterized by low internet utilization and low MSE procurement shares are predominantly located in Eastern Indonesia, including provinces such as Maluku and Papua. Conversely, regions with high levels of both variables are predominantly urban areas, particularly those located in Java and parts of Sumatra.

A temporal comparison indicates that the relationship between internet utilization and the proportion of local government transactions allocated to MSEs strengthened between 2020 and 2023. In 2020, there was no clear or systematic correlation between the two variables, as districts with varying levels of internet utilization displayed widely dispersed procurement outcomes. By 2023, however, the association became more consistent: districts with higher internet utilization increasingly exhibited larger procurement shares directed toward MSEs. This shift is reflected in the steeper trend line and the more clustered distribution of high-value observations in the upper-right quadrant of the scatterplot.

These findings suggest that, over time, internet utilization has become more closely linked to inclusive procurement outcomes, particularly in urban areas and on the island of Java. The strengthening relationship may reflect the maturation of digital procurement systems, improved regulatory enforcement, and growing digital literacy among business actors.

The positive relationship between internet utilization and the proportion of local government transactions to MSEs via the E-Katalog provides empirical support for Information Economics and Transaction Cost Theory. Increased internet usage enhances access to information, reduces transaction barriers, and promotes MSE participation in digital procurement systems. In turn, this encourages local governments to allocate procurement spending to MSEs in a more inclusive and efficient manner (Costa et al., 2013; Di Mauro et al., 2020; Goldfarb & Tucker, 2019; Stigler, 1961; Stiglitz, 2000; Williamson, 2005).

The findings of this study align with a broader body of previous research that

underscores the significance of ICT in enhancing the capabilities of MSEs. Although these prior studies do not directly examine the proportion of local government transactions to MSEs through the E-Katalog, their insights remain pertinent in explaining how digital infrastructure can broaden MSE engagement in public procurement systems (Bhattacharya, 2019; Garcia-Murillo & Velez-Ospina, 2017; Kartiasih, Nachrowi Djalal, et al., 2023; Mbuyisa & Leonard, 2017).

Qualitative evidence also suggests that low internet utilization rates in Indonesia are not solely attributable to infrastructure limitations; they are also influenced by broader socioeconomic factors. According to the 2023 Indonesian Internet Survey by the Indonesian Internet Service Providers Association (APJII), the majority of users access the internet via mobile broadband (77.31%), while only around 20.76% rely on fixed broadband connections at home. The relatively low adoption of fixed broadband is largely driven by its high cost and the perception that essential internet needs are already met through mobile data services (APJII, 2023).

Key barriers to optimizing internet usage include the high cost of internet data, particularly for low-income households, and limited digital skills related to the operation of smartphones or computers. A 2021 report by the World Bank corroborates these findings, noting that the combined cost of fixed broadband subscriptions and digital devices can constitute 20–35% of monthly expenditures for poor households. Thus, the persistently low level of internet utilization in many regions reflects a broader structural challenge that necessitates inclusive and equitable digital policy interventions. These interventions should not only focus on expanding infrastructure coverage but also address issues of affordability and digital literacy (World Bank, 2021).

CONCLUSION

This study demonstrates that internet utilization plays a significant role in enhancing the success of local governments in directing procurement spending toward MSEs through the E-Katalog system. The findings reveal that a higher internet utilization rate corresponds with a greater proportion

of local government transactions involving MSEs. This outcome is particularly relevant considering that individuals who own MSEs tend to exhibit higher internet utilization rates compared to the general population. This suggests that increased digital engagement within communities—independent of direct policy interventions—can generate positive spillover effects in the form of greater MSE participation in government procurement. Accordingly, expanding internet access can facilitate greater participation among MSE owners and support local governments in achieving their MSE-related procurement targets.

This finding is consistent with the theoretical frameworks of Information Economics and Transaction Cost Theory. Digitizing government procurement through platforms such as the E-Katalog helps to reduce information search costs and enhance transactional efficiency. Through digital access, MSEs are better positioned to search for, comprehend, and respond to procurement opportunities made available on the E-Katalog platform. Simultaneously, local governments appear to respond to

growing digital readiness by allocating larger portions of their procurement budgets to MSEs as part of broader efforts to promote a more inclusive and equitable procurement ecosystem.

However, despite the observed positive relationship, internet utilization in Indonesia remains uneven and constrained by cost barriers. As highlighted by the APJII survey and the World Bank (2021), the financial burden of internet subscriptions and the limited affordability of digital devices—such as smartphones and computers—pose significant challenges, particularly for low-income households and MSE owners in underdeveloped regions.

Based on the findings drawn from this study, several policy implications emerge. First, given the positive effect of internet usage on MSE participation in public procurement, policymakers should prioritize initiatives aimed at increasing internet access and adoption at the district level. Second, to promote equitable internet access among MSEs—who already demonstrate higher digital engagement—targeted incentives are recommended. One such

measure could involve internet tariff discounts linked to the Business Identification Number (Nomor Induk Berusaha/NIB). This policy would allow internet service providers—such as Telkomsel and other operators—to offer special pricing schemes to formally registered MSEs within the Online Single Submission (OSS) system. In addition to alleviating cost barriers, which have consistently impeded internet usage, such a policy would also encourage the formalization of MSEs and enhance their productivity in digital spaces. Thus, this fair yet targeted pricing mechanism has the potential to serve as a crucial bridge in reinforcing the role of MSEs within the government's digital procurement ecosystems.

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