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Mapping the Factors: Understanding Digital Technology Development in Depok City, Indonesian MSMEs

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Abstract

This research aims to examine the interaction between various variables and digital technology instruments and map the position of each variable in Indonesian MSMEs. The study also measures the level of Digital Technology Development descriptively and tests the variables of Access & Infrastructure, Utilization, and Expertise on Digital Technology Development. The research involves 132 MSME samples and employs a structured questionnaire for primary data collection. The results of the measurement indicate that the usage level of digital technology by MSMEs for Access & Infrastructure is lower than the level of Utilization of digital technology and lower than the level of Expertise. Access & Infrastructure does not have an individual impact on Digital Technology Development in MSMEs. On the other hand, the Utilization variable and the Expertise variable have a significant impact. However, collectively, all three variables significantly affect Digital Technology Development in MSMEs and exhibit a high level of correlation.

Keywords: Digital Technology; Handphone; Indonesian; SMEs

1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are the backbone of many economies worldwide, playing a critical role in driving economic growth, job creation, and income enhancement. Globally, MSMEs represent over 90% of businesses, contributing 60-70% of total employment and around 55% of GDP in developing countries (Arnold, 2019). In countries like Japan, the United Kingdom, and Australia, MSMEs contribute significantly to exports, foster social inclusion, and promote sustainable development by creating opportunities in local communities. In Indonesia, MSMEs have an even greater economic impact. As of 2023, Indonesia has approximately 64.2 million MSME operators, making up 99.99% of all businesses. These MSMEs employ around 117 million workers—97% of the national workforce—and contribute 60.5% to the national GDP (Ministry of Cooperatives and SMEs, 2023).

The rapid development of digital technology has opened new opportunities for MSMEs to expand their market reach and enhance operational efficiency. Online platforms such as e-commerce and social media enable MSMEs to access broader customer bases, not only locally but also internationally (Lecerf and Omrani, 2020). Digital tools also allow for improved inventory

management, production processes, and customer service through integrated management systems (Teerasoponpong and Sopadang, 2022; Lu et al. 2021). Digital technology can further strengthen brand presence through targeted online advertising as well (Fraccastoro et al. 2021).

Indonesia's digital infrastructure, as measured by the Information and Communication Technology Development Index (ICTDI), indicates that there are still barriers to the widespread adoption of digital tools. In 2021, Indonesia's ICTDI score was 5.76 out of 10, with sub-indices for access & infrastructure (5.76), utilization (5.66), and expertise (5.97) (Untari et al. 2021). These figures highlight gaps in infrastructure and skills that hinder MSMEs from fully utilizing digital technologies.

While MSMEs are vital to Indonesia's economy, specific challenges at the local level, particularly in urban areas, remain underexplored. Depok, a rapidly urbanizing city near Jakarta, offers a unique context for studying how MSMEs navigate the pressures of modernization and digital transformation. Many MSMEs, especially in Depok, have yet to fully realize the potential of digital technology (Peter and Dalla, 2021).

Despite extensive research on the role of digital technology in MSMEs globally and nationally, limited attention has been given to the specific factors influencing digital technology adoption in Depok. Previous studies have documented various factors impacting digital adoption in MSMEs (Dahbi and Benmoussa, 2019; Ulas, 2019; Eze et al. 2019; Sriram and Vinodh, 2021), but there is a gap in understanding how these variables interact in specific urban settings like Depok. The unique characteristics of Depok—such as its growing infrastructure, diverse MSME landscape, and proximity to Indonesia's capital—create a distinct environment for studying digital adoption and its challenges.

This study aims to examine the key variables that contribute to digital technology development in MSMEs in Depok. By mapping these variables and analyzing their interactions, the research seeks to provide insights into the digital transformation process of MSMEs in rapidly developing urban areas. The findings may offer valuable lessons for policymakers and business leaders seeking to enhance digital adoption not only in Depok but also in other similar urban centers across Indonesia.

2. LITERATURE REVIEW

2.1. Digital Technology: Access and Infrastructure

Access and infrastructure of digital technology are two crucial components that enable people worldwide to connect to an increasingly integrated online world (Correa et al. 2020). Internet access refers to the ability of individuals or organizations to connect to the internet through various technologies such as broadband (Haini and Pang, 2022), WiFi (Velden and Sadowski, 2023), or cellular networks (Kiran, 2023). Meanwhile, infrastructure plays a significant role in a country's economic growth and encompasses hardware, software, as well as cable and wireless networks that form the foundation of the entire internet ecosystem. This infrastructure also includes data centers, servers, undersea cables, satellites, and many other elements that support global connectivity (Sriram and Vinodh, 2021).

The capacity and capabilities of access and infrastructure in digital technology play a crucial role in determining how much MSMEs can harness this potential (Liu et al. 2021). Technological advancements have expanded access capacity, resulting in higher speeds, lower latency, and more reliable connectivity. With this increased capacity, MSMEs can quickly download and upload large amounts of data, enjoy high-quality video streaming, and run complex online applications (Saravanan and Sudhakar, 2020).

However, the capacity and capabilities of this infrastructure are still uneven worldwide. Some regions, especially in rural or developing areas, may face limitations in access and low digital technology speeds. Research by Lwoga and Chigona (2019), for instance, provides an example of poor internet infrastructure in rural Tanzania, where frequent power outages, slow internet access, low language proficiency, and relatively high internet access costs are common issues.

The same challenges exist in Indonesia (Mudra, 2018), where internet connectivity in Kerinci Regency, Jambi Province, is also a problem. Other scientiest (Amin, 2018) also states that in many underserved rural areas in Papua, South Sulawesi, Papua, and other provinces, issues with access and internet infrastructure such as slow connectivity, unappealing applications, limited electricity supply, and a lack of instructors are prevalent. Then many MSMEs in Indonesia (26.07%) do not purchase digital technology devices, and among those who do, 41.27% of MSMEs make small purchases (less than Rp. 5 million). They also discovered that websites are less appealing to MSMEs in Indonesia due to lower order rates compared to other platforms, relatively high creation costs, and many MSMEs feel they do not need a website (Utoyo and Gusnisa, 2018). This condition creates a digital divide that can lead to slow educational development, limited economic opportunities, and reduced participation in social and political life (Ndoya and Asongu, 2022).

2.2. The Utilization of Digital Technology

The utilization of digital technology today, including smartphones, websites, e-commerce, social media, data traffic, and online advertising, has become an integral part of human life (Wang et al. 2020). Many aspects of both business and non-business activities have shifted to the digital realm, offering numerous benefits for each of them. Optimal utilization of digital technology for businesses can provide MSMEs with enhanced capabilities to reach a wider audience and significantly increase their visibility (Peter and Dalla, 2021).

For instance, with e-commerce, MSMEs can access the global market and expand their market share without the need for physical stores in various countries (Kolbe et al. 2022). Social media also allows MSMEs to interact more personally with customers, understand customer needs better, and provide preferences to customers more effectively (Sharma et al. 2020). In Indonesia, social media plays a significant role in marketing and is widely utilized by many MSMEs (Patma et al. 2021).

However, despite the many advantages of utilizing digital technology for MSMEs, there are still several drawbacks to consider. First, with the abundance of information and online advertisements, competition has become extremely fierce (Butkouskaya et al. 2020). Increased competition can make it challenging for MSMEs to differentiate themselves and reach their target audience. However, competitors are not a significant threat to MSMEs. The most significant threat to MSMEs is customers, and MSMEs perceive competitors as resources and tend to socialize with them (Upson and Green, 2020).

Second, data security and system disruptions are becoming increasingly important issues. With the growing amount of data stored and exchanged online, threats to information security and privacy are on the rise. According to Utoyo and Gusnisa (2018), in Indonesia, there are still many issues when MSMEs use digital technology, such as malfunctioning (73.48%) and data loss or data damage (38.17%). The open nature of internet access can lead to risks related to hacking, identity theft, and the spread of false information (Yeboah and Opoku, 2023), resulting in additional challenges for MSMEs.

Third, the costs associated with digital technology, such as website development and maintenance or online advertising expenses, can be relatively high, especially if not utilized according to business needs (Kmecova et al. 2021).

In the future, MSMEs in Indonesia will face significant changes in the use of digital technology. Future digital technology will heavily incorporate artificial intelligence (AI) (Baabdullah et al. 2021), augmented reality (AR), virtual reality (VR), the Internet of Things (IoT) (Pappas et al. 2021), big data, and various electronic payment methods (Xu et al. 2018; Kamble et al. 2018; Shafique et al. 2020). Therefore, MSMEs in Indonesia must be aware of and adequately prepared to harness these new technologies in an increasingly complex digital era."

2.3. Human Resource Expertise

In an increasingly advanced digital era, the use and utilization of digital technology have become the primary keys to driving the growth and progress of MSMEs. To succeed in this evolving environment, Human Resources (HR) with the appropriate knowledge and skills in digital technology are crucial. HR factors have the most significant influence on the development of digital technology in MSMEs (Trabert et al. 2022). The knowledge and skills of HR in digital technology encompass a deep understanding of various technological aspects, such as website management, digital marketing, data analysis, cybersecurity, and more. HR with expertise in these areas will be capable of identifying opportunities to enhance business efficiency, reach a broader customer base, and innovate with technology-based solutions (Garbelli, 2020).

Furthermore, HR's understanding of the latest technology trends, as outlined above, is also highly valuable. The better HR is at mastering these technologies, the greater the potential for MSMEs to compete in an increasingly digital global market.

In addition to the knowledge and skills that HR should possess, there are several challenges that MSMEs face regarding the scope of HR. One of them is that most MSMEs still use outdated HR management systems that do not meet the needs of this digital era (Kmecova, et al. 2021). Another issue is the lack of access to trained HR in rural and remote areas in the use of digital technology. MSMEs in these areas struggle to acquire or develop HR with adequate technological knowledge (Lwoga and Chigona, 2019).Moreover, the cost of training and developing HR in digital technology can be a constraint for MSMEs with limited resources. Such training and development require an investment of time and money that not all MSMEs can afford (Kajal et al. 2021), especially when their profits may not cover these expenses (Kmecova, et al. 2021).

In Indonesia, digital technology still provides low cost production efficiency, where 55.39% of MSMEs have efficiency levels of less than 25%. However, it turns out that 8.43% of MSMEs have achieved high efficiency levels, indicating that digital technology has successfully provided high production cost efficiency in Indonesia as well (Utoyo and Gusnisa, 2018). Utoyo and Gusnisa (2018) added another piece of information, which is the percentage of MSMEs' workforce involved in the use of digital technology is still very low (4.53%). Furthermore, MSMEs' HR who regularly use computers in Indonesia is also low (24.19%). A research results (Gushevinalti et al. 2021) provide an overview of HR competency in MSMEs in Indonesia. They stated that, overall, HR competence in rural and urban areas in Bengkulu is at a low to moderate level, with none at a high level. These conditions indicate that many HR in MSMEs in Indonesia need training and knowledge in the use of digital technology to improve production efficiency and effectiveness.

3. RESEARCH METHODOLOGY

The sample used in this research consists of MSMEs in Depok, Indonesia that meet the following criteria: already using digital technology, in operation for a minimum of 3 years, and currently running their business successfully. The sample was purposively selected, totaling 132

respondents / MSMEs. Primary data were collected through a questionnaire from August to October 2023, with respondents providing answers on a scale of 1 to 10. The independent variables include Access & Infrastructure, Utilization, and Expertise.

This research adopts variables from the International Telecommunication Union (ITU, 2023), which is also used by the Central Statistics Agency of Indonesia (Untari et al. 2021). The research instruments are adopted from various studies, including internet connectivity (Kim, 2020), website usage (Crosato et al. 2021), social media usage (Wardati and Mahendrawathi, 2019), e-commerce (Tolstoy et al. 2022), application usage in business (Teerasoponpong and Sopadang, 2022), digital payment (Al-Okaily et al. 2020), performance monitoring (Gamache et al. 2019), advertising (Hagan, 2021), knowledge of digital technology (Olsson and Bernhard, 2021), digital technology usage skills (Louw and Nieuwenhuizen, 2020), creativity (Ismail et al. 2021), and digital technology usage proficiency (Del et al. 2019). This research also adopts cost-related instruments (Rojas et al. 2021), which have been rarely studied.

Descriptive statistics were conducted to describe the condition of each variable and instrument and provide an overview of the interactions. Inferential tests will be used to test the validity, reliability, correlations, and influences among variables. Inferential tests include validity tests, reliability tests, normality tests, T-tests, F-tests, and correlations. The research model is as follows:

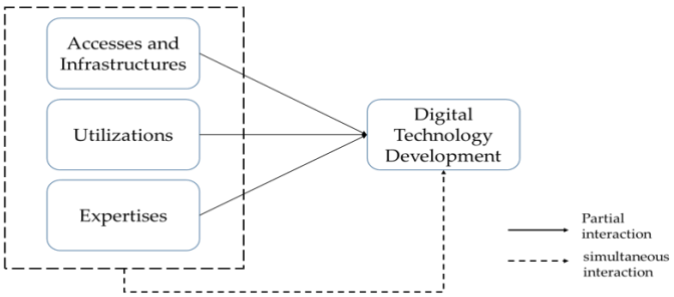

Fig. 1. Research Model

4. RESULT / FINDING

Table 1 provides an overview of the respondents' profiles in this study. The age distribution of respondents in this research is fairly balanced, with respondents below 36 years old and those above 36 years old. The gender distribution is relatively balanced between males (49.30%) and females (50.70%). The highest educational attainment of MSME owners is high school (75.40%). Another characteristic of the MSMEs in this study is that the majority of them are engaged in the food sector, and they have been in business for more than 5 years (49.30%). Furthermore, most of them only have local permits from the local neighborhood association (RT/RW) (80.00%) rather than other permits from the Department of Trade, Cooperative Office, or higher-level authorities. These MSMEs generally do not have branch offices (80.60%), do not employ any staff (48.50%), and have a monthly sales turnover ranging from Rp.0 to Rp.5 million (58.20%). Additionally, some of these MSMEs involve family members in running the business (58.60%).

In Table 2, we can see the profile of digital technology utilization by MSMEs. All of these MSMEs use smartphones as their primary technological device for conducting business operations. Smartphones are also used for communicating with customers/vendors (80.60%), chatting via WhatsApp (82.80%), and making WhatsApp calls (55.20%). On the other hand, only a small portion of MSMEs use computers.

Furthermore, these MSMEs have been using digital technology for more than 5 years (53.00%) and update their online information daily (31.80%) or as needed (58.30%). They also receive orders through social media (68.70%) and, to a lesser extent, from online marketplaces (12.70%).

When it comes to managing digital technology, most MSME owners handle it themselves (79.90%) rather than relying on an admin (14.20%). Additionally, these MSMEs utilize digital technology for customer service (34.30%), sales improvement (31.30%), and promotion (24.60%), apart from expanding their market (3.00%), creating transaction records (3.70%), and conducting business analysis (0.70%). However, only 33.60% of MSMEs believe that digital technology can increase sales by more than 25%, while others have lower confidence in achieving such sales increases.

Table 1. Profile of Respondents

Description	Percentage
Age (years)	
15 – 20	24,60
21 – 25	3,70
26 – 30	8,20
31 – 35	13,40
> 36	50,00
Gender	
Male	49,30
Female	50,70
Education	
Postgraduate	2,20
Undergraduate	15,70
Diploma	6,70
High School	75,40
Duration of the business (years)	
1	0,00
2 - 3	12,70
4 - 5	38,10
> 5	49,30
Licensing held	
Community association	80,00
Local Trade office	8,80
Local Cooperative office	2,40
Ministru of Trade	1,60
Ministry of Cooperative & MSMEs	4,00
Products	
Food	53,00
Furniture	3,00
Vehicle spare parts	4,50
Grocery items	5,20
Stationery & book	2,20
Others	32,10
Branches	
None	80,60
1-2 branches	13,40
More than 2 branches	6,00

Employee	
None	48,50
1-2 people	26,10
More than 2 people	25,40
Average monthly sales turnover	
Rp.0 – Rp.5 million/month	58,20
Rp.5 – Rp.10 million/month	13,40
Rp.10 – Rp.20 million/month	14,20
> Rp.20 million/month	14,20
Family members involved in running the business	58,60
MSMEs is the main source of income	80,60

In Figure 2, it is evident that the utilization of digital technology access and infrastructure is relatively suboptimal. Quantitatively speaking, the average score for the utilization of Access and Infrastructure on a scale of 1-10 remains low (49.62%). Many MSMEs do not make full use of websites, e-commerce, business management applications, performance monitoring applications, and lack sufficient budgets for promotions. Quantitatively, this is reflected in the utilization rates of these infrastructures, which are below 35%. In contrast, the usage of internet connectivity, social media, and electronic payment applications has relatively high scores, each at 96.20%, 85.70%, and 69.50%, respectively. The costs associated with purchasing and servicing digital technology devices, as well as internet expenses, are considered reasonably affordable (58.20% and 53.70%).

Table 2. Profile of MSMEs's Digital Technologi

Description	Percentage
Technology Devices Used:	
Handphone	100,00
Laptop/computer	14,20
Ipad	4,30
Internetshop	0,70
Android TV	0,70
Communication Channels to Customers / Vendors	
Fixed Phone	1,50
Handphone	80,60
Whatsapp chat	82,80
Whatsapp call	55,20
Email	5,20
Messenger / comments	11,20
SMS	6,70
Duration of Using Digital Technology for Business (Years)	
3	14,20
5	27,60
> 5	53,00
Updating Information on Website / Social Media	
Everyday	31,80
Every 2-3 days	9,80
Once a week	0,00
As needed	58,30
Order Receiving Channels	
Social Media	68,70

Market place	12,70
Internet / Social Media Ads	3,70
Conventional Ads	9,00
Others	5,90
Objectives of Using Digital Technology	
Promotion	24,60
Sales	31,30
Customer handling	34,30
Market development	3,00
Creating a transaction receipt	3,70
Business analysis	0,70
Technology Manager	
Available	14,20
Not Available	79,90
Sometime in the future	6,00
Increase in Sales when Digital Technology is Used Optimally	
5%	20,10
10%	20,90
25%	25,40
> 25%	33,60

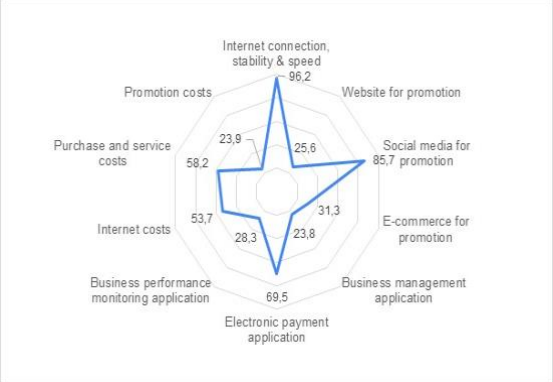

Fig. 2. Mapping of Accesses and Infrastructure

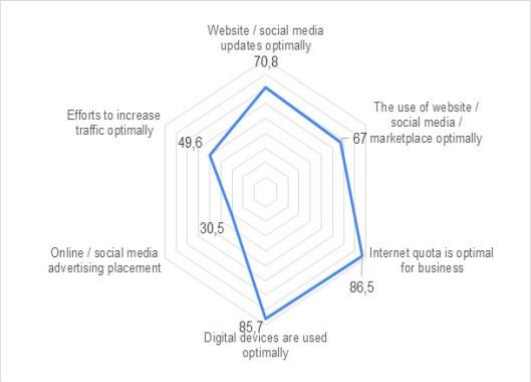

Fig. 3. Mapping of Digital Technology Utilizations

Unlike the Access & Infrastructure variable, the Utilization variable has a quantitative average utilization rate of 65.02% (Figure 3). In this variable, nearly all MSMEs have made good use of digital technology, except for advertising placements (30.50%) and efforts to increase traffic (49.60%). They have effectively utilized their internet quotas (86.50%), devices (85.70%), and information updates (70.80%).

Regarding the Usage of Skills variable (Figure 4), quantitatively, it has the highest average value compared to other variables (71.13%). Notably, MSMEs excel in their ability to manage and fulfill orders (94.10%). This is followed by their proficiency in communicating with customers through digital devices (90.20%). They are also aware of the importance of safeguarding customer data in their business operations (85.90%) and are capable of filtering digital information (85.10%). When it comes to knowledge of hardware and the ability to learn new things in the field of digital technology, MSMEs perform well, with rates of 77.60% and 71.60%, respectively. Areas where MSMEs have relatively lower expertise include software knowledge (55.90%), hardware and

software usage skills (46.20%), creativity in creating digital works (52.20%), and data analysis skills (56.30%).

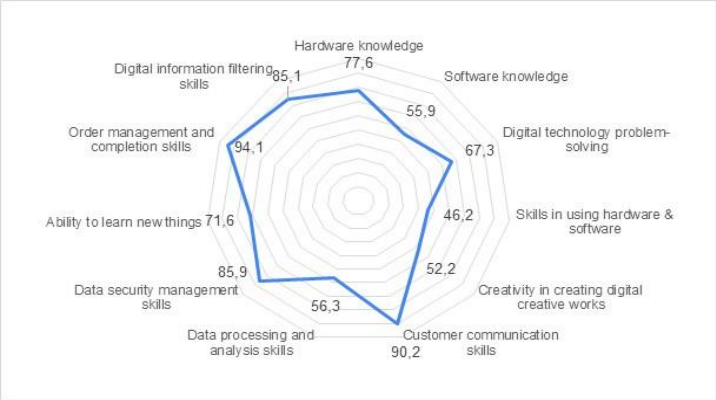

Fig. 4. Mapping of Digital Technology Expertises

The R-table value in Table 3 with DF = 130 (N-2 = 132 – 2) and alpha of 0.05 is 0.1438. Table 3 shows that the Corrected Item-Total Correlation values for instruments X1.1; X1.9; X1.10, and X2.3 are below 0.1438, while other instruments are above this value. This indicates that these instruments are not valid, and they will not be used in the subsequent data processing. Table 3 also displays the Cronbach's Alpha if Item Deleted values. All instruments in these values show values above 0.05, indicating that all instruments are reliable.

Table 3. Validitas Test

Variabel	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
$X_{1.1}$	57,7500	174,800	,054	,360	,679
$X_{1.2}$	62,5606	144,767	,343	,219	,646
$X_{1.3}$	58,4015	158,257	,387	,577	,643
$X_{1.4}$	62,0758	144,437	,327	,244	,650
$X_{1.5}$	62,8258	154,557	,246	,472	,663
$X_{1.6}$	59,4621	125,884	,597	,508	,587
$X_{1.7}$	58,0227	158,328	,378	,628	,644
$X_{1.8}$	62,4242	135,071	,503	,505	,611
$X_{1.9}$	58,1212	172,306	,073	,366	,680
$X_{1.10}$	59,9697	170,686	,109	,439	,676
$X_{1.11}$	59,6667	163,232	,326	,448	,652
$X_{1.12}$	62,7197	153,379	,285	,402	,655
$X_{2.1}$	32,6774	45,976	,548	,663	,547
$X_{2.2}$	32,7500	46,758	,550	,689	,549
$X_{2.3}$	31,3306	59,703	,113	,310	,664
$X_{2.4}$	31,7177	49,847	,494	,511	,573
$X_{2.5}$	35,3468	49,578	,187	,769	,686
$X_{2.6}$	36,0242	49,146	,329	,780	,617
$X_{2.7}$	33,5242	50,934	,380	,426	,601
$X_{3.1}$	67,2901	145,638	,761	,675	,887
$X_{3.2}$	68,4275	144,939	,717	,666	,889
$X_{3.3}$	67,9771	145,530	,808	,682	,884

$X_{3.4}$	68,8779	151,277	,569	,669	,899
$X_{3.5}$	68,6031	151,195	,659	,687	,893
$X_{3.6}$	66,6412	161,293	,508	,463	,900
$X_{3.7}$	68,5420	155,542	,546	,447	,899
$X_{3.8}$	66,8779	153,539	,595	,611	,896
$X_{3.9}$	67,6794	146,912	,748	,728	,888
$X_{3.10}$	66,2214	166,297	,374	,434	,906
$X_{3.11}$	67,1374	152,181	,761	,723	,888

Table 4. Normality Test

		Unstandardized Residual
N		128
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	1,43238728
Most Extreme Differences	Absolute	,076
	Positive	,076
	Negative	-,065
Test Statistic		,076
Asymp. Sig. (2-tailed)		,059[c]

a. Test distribution is Normal. b. Calculated from data. c. Lilliefors Significance Correction.

In Table 4, it can be seen that the Asymp. Sig value of 0.059 is greater than 0.05, indicating that the data is normally distributed.

Table 5. Coefisien Regresion, T Test and Multikolinearity

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	,234	,776		,301	,764		
X_1	-,073	,113	-,055	-,643	,521	,628	1,591
X_2	,700	,117	,507	5,999	,000	,637	1,571
X_3	,496	,109	,324	4,537	,000	,892	1,122

The theory of multicollinearity states that if the tolerance value is below 0.1 and the VIF value is above 10, then the data exhibits multicollinearity. The test results in Table 5 show that the tolerance values for all variables are above 0.1, and the VIF values are below 10, indicating that the data does not exhibit multicollinearity.

From Table 5, we can also see the results of the t-test, where the Sig values of the Utilization variable and the Expertise variable are below 0.05, indicating that both of these variables have a significant individual impact on Technology Development. Meanwhile, the Access & Infrastructure variable has a Sig value greater than 0.05, suggesting that it does not have an impact on Technology Development.

Table 6. F Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	191,261	3	63,754	30,367	,000[b]
Residual	270,829	129	2,099		
Total	462,090	132			

Table 6 reveals that the Sig values are less than 0.05, indicating that the variables of Access & Infrastructure, Utilization, and Expertise collectively have a simultaneous impact on the Technology Development of MSMEs.

Table 7. Coefisien Determinant

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,643[a]	,414	,400	1,44895

Based on Table 7, the variables of Access & Infrastructure, Utilization, and Expertise have a correlation of 41.40% with the Technology Development.

5. DISCUSSION

The age data of the respondents (Table 1) shows that the respondents belong to a relatively young generation that is accustomed to using digital technology. This age group is not significantly different from the ages mentioned in similar research (Szymkowiak et al. 2021), where these ages are considered to be familiar with digital technology.

The gender data shows a balanced ratio between male and female entrepreneurs. This indicates that women can also engage in business activities similar to men. In Tanzania, women use digital technology for educational purposes, reading news, seeking health information, job opportunities, and for social issues or entertainment, rather than for entrepreneurship (Lwoga and Chigona, 2019). According to the research by Olsson and Bernhard (2021), female entrepreneurs learn digital technology skills informally and gradually adapt to digital technology. These women also have the ability to select competent employees with digital technology skills. Unfortunately, this study does not provide a comparison with the digital technology skills of men.

The most common highest level of education in this study is high school (SMA). This aligns with the education level of respondents in some researchs (Nainggolan, 2016; Famiola and Wulansari, 2020), where the majority of MSME owners have a high school education. According to Wicaksono et al. (2021), individuals with this level of education tend to use digital media as a source of information. If these MSME owners pursue higher education, they are likely to become more skilled in using digital technology (Hargittai et al. 2019).

Furthermore, many of these MSMEs involve family members in their businesses. Family involvement in MSME management can influence business performance. If the family includes multiple generations, it can affect control and coordination processes (Alayo et al. 2019). Therefore, MSMEs may need to hire non-family members as professional employees/managers for business sustainability.

All of these MSMEs use smartphones, with only a few using computers (Table 2). According to Correa et al (2020), users of digital devices who only use smartphones have lower digital technology skills compared to computer users. In addition to skills, smartphone users also tend to explore online platforms less. They also mentioned that digital device users, particularly smartphones, include women, individuals with lower education and income levels, and uneducated teenagers. This confirms that some of the respondents share these characteristics, such as having lower education levels and lower income.

Table 2 also indicates a low acceptance of orders through marketplaces. According to Liu et al (2021), marketplaces may become less effective due to intense competition among MSMEs and increased costs resulting from rising orders. Furthermore, they explained that the increase in

orders is often accompanied by increased shipping costs, prompting some MSMEs to adopt hybrid marketing (online and offline) or even switch to offline marketing exclusively.

Another point highlighted in Table 2 is that some MSMEs have administrators managing digital technology. These administrators play a crucial role in MSMEs. They observe and operate the digital technology used, oversee the effectiveness of digital infrastructure usage for MSME's business objectives, and translate MSME's needs into digital technology. The most critical aspect of an administrator's role is to maintain and ensure the security and protection of customer rights. Perhaps the cost factor explains why many MSMEs do not hire administrators to manage digital technology (Wang and Rusu, 2018).

Table 2 also shows that many MSMEs have limited confidence in increasing their income through digital technology, with most believing it will not exceed 25%. This aligns with the findings of Utoyo and Gusnisa (2018), who reported that a significant percentage of MSMEs experienced an income increase of less than 25% after adopting digital technology.

5.1. Access and Digital Technology Infrastructure

Figure 2 shows that the utilization of digital technology access in Depok is still low. Utoyo and Gusnisa (2018) provided information that the subscription costs for MSME's internet in Indonesia are often below Rp.1 million per month (68.49%). This low subscription cost indicates limited data utilization by MSMEs, likely due to financial constraints preventing them from subscribing to larger internet packages. This low data utilization suggests that MSMEs use data minimally for various business purposes, such as data collection, processing, analysis, and decision-making.

Figure 2 also indicates that online payment applications are well-known and accepted among MSMEs. According to Al-Okaily et al (2020), this suggests that MSMEs have high expectations for the performance of these applications, possibly influenced by a social environment where many people use them. These applications are also considered to provide good "price value," meaning the benefits perceived outweigh the cost. Additionally, online payment applications are viewed as more secure than conventional payment transactions.

Regarding the low usage of websites in Figure 2, it's possible that MSMEs face challenges in both website creation and day-to-day operations, including having websites that may not be accessible via smartphones (Ulas, 2019). However, Crosato et al. (2021) stated that, based on their research, a website can predict whether it can help a business succeed or not. Therefore, MSMEs can decide whether to modify their websites or not for their business. They used online indicators that refer to features and information extracted from MSME's websites. These indicators can predict the risk of business failure. This research suggests that these online indicators can be used as a complement or alternative to accounting calculations to predict business failure.

Louw and Nieuwenhuizen (2020) provide another cost-effective solution for MSMEs looking to have a website. They suggest that MSMEs can handle URL creation, hosting, and website design themselves without involving third parties, or as an alternative, they can let a third party provide the URL while they create the hosting and website design.

In terms of e-commerce usage, MSMEs also did not respond positively. According to (Susanty et al. 2020), e-commerce is not an attractive platform for MSMEs to transition to digital technology.

Figure 2 also provides an overview of the distribution of variables related to Access and Infrastructure. Based on this figure, it's indicated that instruments involving expenses have low usage. Websites require costs for both creation and domain rental. E-commerce for promotions also demands financial investment. Using applications for business management and performance monitoring also involves the purchase of these applications. Similarly, budgeting

for promotions, purchasing equipment, servicing equipment, and subscribing to an internet connection all require financial resources. It appears that MSMEs might still hesitate to spend money as an "investment" to improve their businesses.

This confirms the respondent profile data regarding the number of branches, employees, and, especially, revenue in Table 1. Most of the MSMEs in this study do not have branches and employees. The revenue for most of these MSMEs is below Rp. 5 million per month. This situation suggests that the MSMEs in this study are small-scale businesses.

As mentioned by (Harash et al. 2014), financial constraints can hinder MSME's performance, limit their ability to grow or acquire new businesses, and ultimately restrict job creation. These financial limitations force MSMEs to focus more on negotiating the prices of capital goods, reducing functional risks, controlling operational costs, and making more efficient product storage cost calculations, as well as creating more efficient and effective future expenditure estimates (Kajal et al. 2021).

5.2. Utilization of Digital Technology

The utilization of digital communication devices and social media should be combined with conventional communication tools to achieve better results in the sales process. These three communication tools should be focused on three main phases: identifying new business opportunities, persuasion, and communication management. However, several factors can lead to suboptimal results, such as culture, geographical proximity, communication technology capabilities, and customer priorities (Fraccastoro et al. 2021).

In addition to using digital media, it's essential to utilize word-of-mouth when engaging with customers. This is necessary because MSMEs customers have different communication channels. For elderly customers, word of mouth plays a more significant role than digital communication channels. Meanwhile, for customers who have limited social interaction or come from an educational background or foreign origin, digital communication channels are more suitable (Wicaksono et al. 2021).

Concerning increasing traffic to make digital technology more beneficial for MSMEs, some MSMEs have already employed SEO (search engine optimization) and SEM (Search Engine Marketing) to boost traffic/followers (Castagna, et al. 2020). However, these efforts have not yet reached their full potential in improving MSMEs performance. The same holds for digital advertising (Peter and Dalla, 2021).

Regarding the utilization of digital platforms, there are actually 14 risks that MSMEs must consider (Andriani et al. 2020). These risks include insufficient financial resources for implementing and maintaining the platform, lack of technical expertise in platform management, low customer trust and credibility in the platform, unattractive platform design, and negative customer experiences. The numerous risks involved have made MSMEs hesitant to fully embrace digital platforms.

Behind the suboptimal utilization of digital technology (Peter and Dalla, 2021), there's a low level of optimism among MSMEs. Only about a third of MSMEs believe that using digital technology can lead to a sales increase of more than 25%, while the majority believe that the increase will be below 25% (Table 2).

This low optimism needs to be countered with high motivation and enthusiasm. Motivation and enthusiasm are key components that must be instilled in MSMEs to achieve higher sales volumes. In an increasingly competitive business environment with ever-changing economic conditions, strong enthusiasm is the primary driver to innovate, self-develop, and pursue growth (Al-Okaily

et al. 2020). When MSMEs owners and their workforce have high spirits, they seek new opportunities, overcome obstacles more easily, and face challenges with determination. Enthusiasm also inspires them to invest in technology development, improve product or service quality, and engage in continuous learning. With strong enthusiasm, MSMEs exhibit better resilience and have greater opportunities to achieve higher sales volumes, secure a larger market share, and create sustainability in their business (Shahzad et al. 2019).

5.3. Digital Technology Expertises

Figure 4 illustrates the mapping of MSME's expertises levels regarding various issues related to digital technology usage. For activities they've been doing for a long time, such as managing and fulfilling orders and communicating with customers, they seem to be highly experienced. In terms of data security, it appears that MSMEs can take various digital technology security measures (Bryan, 2020). These measures include implementing strong password policies, creating data backups, and collaborating with digital technology security experts.

However, in general, MSMEs still lack expertise in managing new technologies like digital technology. They are not proficient in identifying hardware and software components. They are also not accustomed to using applications to facilitate problem-solving, creative work, and data processing for analysis.

This confirms the respondent profile in Table 1 regarding the educational levels of the respondents. Respondents mostly have high school (SMA) education, which is still in the E phase of the Indonesian education structure. At this stage, high school students are relatively unable to conduct research and analysis effectively (Kemendikbud, 2023).

Several other factors that can make MSMEs struggle in managing digital technology and adapting to hardware and software include limited knowledge and skills resources (Garbelli, 2020), insufficient profitability for education/training investments (Kmecova et al. 2021), the complexity of digital technology (Sriram and Vinodh, 2021), fear of change (Budhiraja, 2019) and lack of access to support resources (Ndoya and Asongu, 2022). Castagna et al. (2020) also added some factors, such as a lack of awareness of the benefits of digital technology usage for MSMEs performance, insufficient capabilities of MSMEs to keep pace with rapid digital technology advancements. Some MSMEs still tend to use traditional technology for marketing rather than advanced digital marketing tools like email, internet banner ads, affiliate marketing, and advergames.

To prepare for the future, MSMEs needs to empower their human resources. Human resources have a positive impact on MSME's innovations (Latifah et al. 2022). It's also noted that social media can be used for social interaction among HR and for sharing knowledge to foster creative innovation. Therefore, HR training should be conducted now so that the investment made in this training can provide competitive advantages, improved growth, ease of MSMEs adaptation and competition, increased performance and innovation, greater security, and higher MSMEs target achievement.

Table 7 shows that this research is an important initial step in understanding the factors influencing technology development in MSMEs. However, it's essential to remember that there are many other variables beyond these three that also contribute to this technology development. Previous research (Gamache et al. 2019), highlights other variables at play, such as management commitment, skill mastery, digital architecture, automation, data quality, digital technology adoption, government roles, and MSMEs success factors.

In addition to these variables, MSMEs also need access to various information for consideration in building digital technology within their organization. According to (Eze et al. 2019), MSMEs

requires information about the advantages and disadvantages of the technology itself, organizational structure, the external environment, and the need for information itself. These are fundamental elements to embark on a technology development journey.

However, preparation before adopting digital technology is also a crucial stage in this process. MSMEs must prioritize ease of technology use, reliable internet infrastructure use, and customer-oriented innovations. Once the preparation phase is complete, the implementation phase must be executed promptly (Sriram and Vinodh, 2021). The digital technology implementation strategy can be accelerated with strong motivation, a positive attitude toward technology, and pressure from low customer demand or sales (Nair et al. 2019). This process can be further expedited when MSMEs feel the need to adapt to the rapidly changing digital environment.

Above all the points discussed in this article, digital technology development is not the ultimate goal but rather a tool that can assist MSMEs in achieving sustainable growth and progress.

6. CONCLUSION AND RECOMMENDATION

The mapping of digital technology access and infrastructure used by MSMEs indicates that MSMEs in Depok city, Indonesia can access the internet stably and quickly. These MSMEs also utilize social media for promotion and use electronic payment applications fairly effectively. However, the use of website infrastructure, e-commerce, business management applications, performance monitoring applications, and related costs remain relatively low.

Mapping the utilization of digital technology shows that MSMEs efficiently utilize internet quotas, digital technology devices, and information updates on websites/social media. However, their utilization for online advertising and efforts to increase traffic/followers remains relatively low.

Regarding the mapping of skills in using digital technology, it is evident that skills related to conventional technology use, such as customer communication and order management, show a high level of proficiency. However, skills related to the digital technology world, such as software knowledge, digital creative work, digital data processing and analysis, demonstrate relatively lower proficiency levels.

The results of measuring the level of digital technology usage show that the level of digital technology usage by MSMEs for access and infrastructure lower than the level of digital technology utilization and lower than the level of proficiency.

Inferential testing results indicate that the access and infrastructure variables do not individually influence digital technology development in MSMEs at Depok city. In contrast, utilization and expertise variables have a significant impact. However, simultaneously, all three variables significantly influence digital technology development in MSMEs at Depok city, with a strong correlation rate.

In an increasingly interconnected global era, this research has significant potential in propelling MSMEs toward success in the digital era. This research contributes significantly to understanding the variables affecting the utilization of digital technology by MSMEs in Depok city, Indonesia. Identifying these key variables will fill knowledge gaps in the current literature, provide insights into their interactions, and assist in formulating effective strategies. It is expected that this research will offer practical guidance to MSMEs owners, the government, and other stakeholders in supporting MSME's growth, enhancing competitiveness, and shaping a sustainable economy.

The implications of the research findings can serve as considerations for small MSMEs in running their businesses. To compete in the digital era, these MSMEs must make greater use of low-cost platforms with high promotional effects. They must also enhance their skills and knowledge in

recognizing and using digital hardware, software/applications, and continuously learn new aspects of digital technology. An important step is to conduct research and analyze data so that MSMEs can assess their position, external conditions, and plan future steps to compete in the digital era.

Regarding the research results, this study has its limitations. It only employed three variables, and they showed a relatively weak relationship with digital technology development in MSMEs, as per the literature review, many other variables can affect digital technology development, such as digital technology risk (Andriani et al. 2020), information (Eze et al. 2019), and organizational factors (Nair et al. 2019).

The second limitation is that this research only covered very small-scale (micro) SMEs, both financially and non-financially. MSMEs at a larger scale could not be depicted in this study. Therefore, future research should conduct a more comprehensive study involving various variables associated with digital technology development across various economic scales of SMEs.

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