MSME Perceptions towards Internet Use: A Comparison of Before and During the COVID-19 Outbreak in Indonesia

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ABSTRACT

Manuscript type: Research paper
Research aims: This paper aims to identify and compare MSME perceptions on Internet use in their business processes before and during the COVID-19 outbreak in Indonesia.
Design/Methodology/Approach: This study employs a web-based survey involving 464 respondents from across MSME owners in Indonesia. A paired sample t-test was used to compare the perception which was delineated under the technology, organisation, environment (TOE) framework.
Research findings: The results show significant changes in the Internet use among 464 MSMEs "before" and "during" the COVID-19 outbreak. Overall, we categorised the perception into three groups,

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https://doi.org/10.22452/ajba.vol14no2.7

namely (1) positive before the COVID-19 outbreak, (2) positive amid the COVID-19 outbreak, and (3) negative for both before, and amid the COVID-19 outbreak.
Theoretical contribution/Originality: This study seeks to extend the theory of technology adoption, and its intended use, by understanding the phenomena from a different point of view, by identifying how the MSME's perceptions of technology changed during the presence of the COVID-19 outbreak, by comparing aspects of the Internet adoption on the conditions before, and during the pandemic.
Practitioner/Policy implication: This study suggests future strategies to encourage better Internet adoption and use among MSMEs based on the three aforementioned categories.
Research limitation/Implications: Further research may address much more on the adoption variables, and consider more geographic distributions of the samples.

Keywords: Technology Adoption, TOE Framework, Internet, MSME, COVID-19
JEL Classification: O32

1. Introduction

The unprecedented coronavirus disease in 2019 (COVID-19) hit the global society at the end of 2019. The World Health Organisation (WHO) announced it as a global pandemic on the 11th of March, 2020 (WHO, 2020). The pandemic has impacted not only the global health, but also the social and economic aspects (Wu et al., 2020; Javed & Muhammad, 2020; Yi, 2020). At the end of 2020, Indonesia was also faced with a widespread of COVID-19, causing an economic slowdown, industrial stagnancy, and transportation system immobilisation, which hampered the educational processes, as well as 'overwhelming' health services, which affected the community psychologically, as well as impacting businesses worldwide (Pakpahan, 2020; Lutfi et al., 2020).

The Government of Indonesia (GOI) has implemented control policies, aspiring to prevent wider transmissions, including contact tracing, isolation, quarantine, social distancing, community detention, work from home (WFH), study from home (SFH), and large-scale social restrictions (Djalante et al., 2020). These control policies have impacted micro, small, and medium enterprises (MSMEs), particularly in terms of maintaining their supply chains and product marketing (Winarsih et al., 2020). Their limited assets, low capital reserves, and low productivity

compared to large companies have made them even more vulnerable. Larsson and Gustavsson (2020) argued that the pandemic has significantly decreased the demand for MSME products and threatened the sustainability of their businesses. Indonesia's economy relies heavily on MSMEs. They represent 99 per cent of all enterprises and employ the majority of the labour force (accounting for 97 per cent of the total Indonesian employees in the economic sector), and contributing to more than 61 per cent of the gross domestic product (GDP) (Ministry of Cooperatives and Small and Medium Enterprises, 2018). Since the COVID-19 outbreak hit MSMEs, the Indonesian economy shrank by 5.32 per cent year-on-year in the second quarter of 2020 (Central Bureau of Statistics, 2020a).

Several studies have argued that the Internet provides potential benefits for MSMEs, by improving their competitiveness at the national and international level (Yuldinawati et al., 2018; Tambunan & Busnetti, 2018; Ghobakhloo et al., 2011). The Internet is also an important tool to promote growth, productivity and efficiency. MSMEs have also used social media such as Twitter, Facebook and YouTube as a means of communication (Lawrence, 2009). Generally, these studies show that the Internet provided at least four important benefits for MSMEs, including (1) ensuring that the businesses remained competitive, (2) driving efficiency in all business processes, (3) increasing customer satisfaction, and (4) supporting business people to make various strategic decisions and facilitating communication.

Despite the rapid growth of Internet use in Indonesia, the number of MSMEs that have utilised the Internet remains very low. According to the Ministry of Cooperative and MSMEs, only 3.79 million of the enterprises (about 8 per cent of MSMEs) in Indonesia utilise the Internet for their business activities (Ministry of Communication and Informatics, 2020). According to Tambunan (2020), the GOI faced various obstacles in encouraging MSMEs to utilise ICTs due to the lack of enthusiasm and knowledge in understanding it for business activities.

Several studies have indeed examined the technology adoption phenomenon among MSMEs. Trinugroho et al. (2021) examined the technological-based innovation adoption of MSMEs, and found that firm characteristics and sales, as well as the owner's characteristics play a vital role in technology adoption. In addition, Effendi et al. (2020) conducted a study on SME's social media adoption intention based on the TOE Framework. The study found that the intention to adopt social media was significantly influenced by technological context,

organisational context, environmental context, and social media awareness. Another study from Patma et al. (2021) scrutinised the determinant factors which affected technology adoption, social media marketing, and business sustainability. The study findings identified that the adoption of Internet technology was influenced by its perceived usefulness, perceived ease of use and cost. The study also found that there was a relationship among Internet technology, social media marketing, and SME sustainability.

Although these studies have discussed technology adoption, the focus remained on the technology adoption, and its determinant factors during the pandemic. We seek to argue that there was a change among MSME perceptions on technology, upon comparing it to during the COVID-19 pandemic. Accordingly, we believe that these changes need to be looked at further in order to understand the changing pattern, and provide appropriate recommendations for MSMEs. Therefore, this study aims to fill the gap by scrutinising the MSME perceptions on the Internet before and during the pandemic, as well as looking at the pattern of changes.

The purpose of this study is to seek more profound knowledge on the Indonesian MSME's perception towards Internet use, given the condition of the COVID-19 outbreak. Specifically, this study aims to identify if any difference exists in the MSME's perceptions towards Internet use before and during the COVID-19 outbreak, and scrutinise this pattern of the difference. Previous studies focused on understanding the determinants of technology adoption and involved only one-time frame, such as e-commerce (Ghobakhloo et al., 2011; Nasco et al., 2008; Purwandari et al., 2019), e-business (Putra & Santoso, 2020), social commerce (Abed, 2020), enterprise resource planning (Musa et al., 2019), and cloud computing adoption (Matias & Hernandez, 2019; Senarathna et al., 2018). In this study, the focus is to get a better understanding of the Indonesian MSME's perception on Internet use "before" and "during" the COVID-19. Therefore, it involves two time frames, i.e., before and during the COVID-19 pandemic. To the very best of our knowledge, very limited or similar research had been undertaken previously in this research area.

The remainder of this paper is organised as follows: Section 2 reviews the literature on Internet adoption and MSMEs. Section 3 describes the methodology employed, while Section 4 discusses the results. Finally, Section 5 concludes the study by providing research implications.

2. Literature Review

2.1 Internet Adoption as a Part of Digitisation of MSMEs

All activities using the Internet form the main part of digital technology. Fitzgerald et al. (2013), defined digital technology as being social media, mobile, analytics, or embedded devices, meant to foster business performance. This definition is in line with the study by Fauzi and Sheng (2020), which defined digital technology as being wireless, use of the Internet and the smartphone, web apps, mobile apps, and social media, which are all influential in stimulating digital business, especially for SMEs. According to these definitions, this study then refers to the Internet adoption as the use of social media, such as Instagram, Twitter, Whatsapp, e-commerce, websites, and other mobile apps such as digital financing.

Internet technology has changed many things in the business environment. It not only has altered the way businesses communicate with their supply chain partners, but also through digital marketing businesses can promote and sell their products. Since most people now have access to Internet through computers, laptops or smartphones, social media has become one of the best online marketing channel (Tambunan, 2020). More and more MSMEs are eager to establish a strong presence on Instagram. Hence, to be able to survive in this new environment, MSMEs are pushed to adopt this technology. The rapid spread of COVID-19 globally, has further forced MSMEs to be in dire need of IT-innovations, as it will help them to connect with customers while being physically separated (Apriyanti & Yuvitasari, 2021). Despite this, many of them have yet to exploit the various digital technologies and social media. Many of the MSMEs in developing countries were faced with expiring stocks, due to their heavy dependence on traditional brick-and-mortar. This further raises scholarly worries to understand the MSME perceptions before and during the COVID-19.

2.2 MSMEs in Indonesian Context

The definition of MSMEs in Indonesia is stated in Law Number 20 Year 2008 which deals with MSMEs. Article 6 of this Law states that the criteria used to define MSMEs as a net asset value, or asset value, excludes land and building of such business premises, or annual sales. In other words, a micro-enterprise is a business unit with either an asset value of Rp50 million, or annual sales of a maximum of Rp300 million. A small enterprise (SE) is a business unit with an asset value of more than

Rp50 million up to Rp500 million, or annual sales of more than Rp300 million, up to Rp2.5 billion. A medium enterprise (ME) is a company with a net worth value of more than Rp500 million up to Rp10 billion, or having annual sales of over Rp2.5 billion, up to Rp50 billion.

Between 1997–2018, the number of national MSMEs increased every year. In 1997, the number of MSMEs was 39.8 million units. The economic crisis in 1998 resulted in a decrease in the number of MSMEs to 36.8 million units. After the economic crisis in 1997–1998, the number of MSMEs in Indonesia continued to increase, and reached 57.8 million units in 2013. During the 15-years period, the number of MSMEs had increased by 46 per cent. The latest data from the Ministry of Cooperatives and Small and Medium Enterprises (KUKM) showed that in 2018 (Table 1), Indonesia had 64.19 million businesses, or around 99.99 per cent of the total business units spread across the country, at 64.19 million. These micro-businesses formed the largest group, amounting to 63.35 million businesses (98.68 per cent), followed by small businesses, which amounted to 783,132 businesses (1.22 per cent), and medium businesses amounting to 60,702 businesses (0.09 per cent).

In terms of labour absorption, MSMEs absorbed a large number of workers. In 1997, MSME employed 65.5 million workers (Central Bureau of Statistics, 2020b). In 2018, the workforce in the MSME sector grew to 116.9 million workers, accounting for 97 per cent of the employment in the economic sector. The remaining 3 per cent were absorbed by large enterprises (Ministry of Cooperatives and Small and Medium Enterprises, 2018).

Furthermore, the MSME sector also contributed to the national GDP. In 1997, at the beginning of Indonesia's economic crisis, MSMEs contributed Rp363 trillion to the GDP. After the economic crisis, its

Table 1: MSMEs and its Employees in 2017 and 2018

Business	2017				2018			
	Frequency	%	Employee	%	Frequency	%	Employee	%
Micro	62,106,900	98.70	105,509,631	87.73	63,350,222	98.68	107,376,540	89.04
Small	757,090	1.20	6,546,742	5.44	783,132	1.22	5,831,256	4.84
Medium	58,627	0.09	4,374,851	3.64	60,702	0.09	3,770,835	3.13
Total	62,922,617	99.99	116,431,224	96.82	64,194,057	99.99	116,978,631	97.00

Note: Source: http://www.depkop.go.id/data-umkm

contribution continued to increase, reaching Rp1,500 trillion in 2013 (Central Bureau of Statistics, 2020c). The average contribution of MSMEs toward the GDP over the last 15 years was 57 per cent of the total GDP. In 2018, the MSME sector contributed 61 per cent of Indonesia's total GDP. Indonesia's GDP in 2018 was Rp14,038 trillion, and the contribution of MSMEs was Rp8,573 trillion (Ministry of Cooperatives and Small and Medium Enterprises, 2018).

Although the number of MSMEs keep increasing every year, their involvement in global value chains (GVCs) is still low compared to other countries, as shown in Figure 1. Efforts to increase the competitiveness of MSMEs are meant to increase their penetration into digital platforms, similar to other countries (Dholakia & Kshetri, 2004; Caniëls et al., 2015). This effort is in line with the current pandemic, where MSMEs encountered difficulties in managing their businesses, including sales, supply, and distribution (Gunadi, 2020). On the other hand, previous studies indicated that the MSMEs competitiveness increased due to interactive processes with buyers and suppliers through sharing of information and communication technology (Tambunan & Busnetti, 2018; Slamet et al., 2017; Yuldinawati et al., 2018). However, the proportion of MSMEs utilising the Internet is still very low.

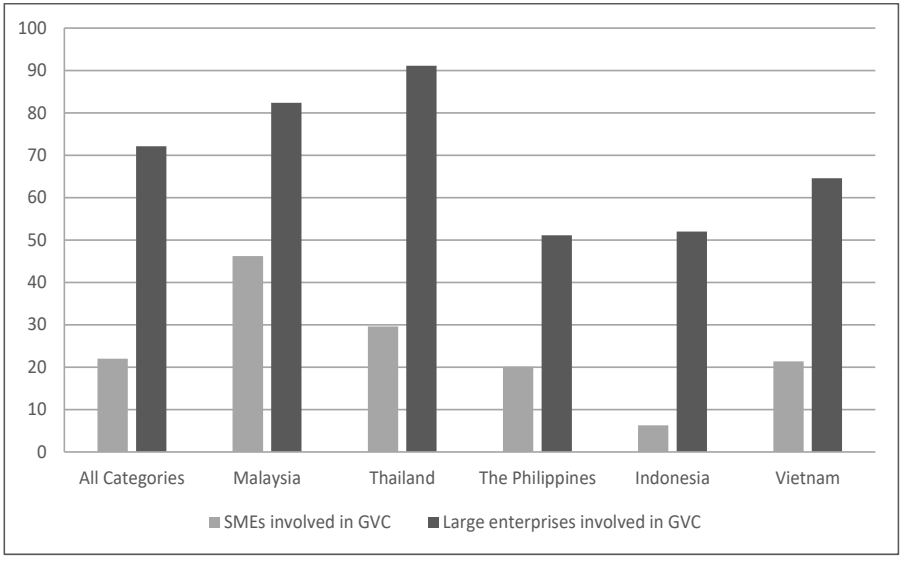

Figure 1: GVCs in Selected ASEAN Countries
Source: Wignaraja (2013).

2.3 Theoretical Framework

Oliveira and Martins (2010) stated that there are several applicable theories to study technological innovation adoption and its use, particularly those related to information technology, ranging from individual adoption to a that of a much broader level, such as in organisations. These theories include the technology acceptance model (TAM) (Davis & Davis, 1989), theory of planned behavior (TPB) (Ajzen, 1991), unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003), diffusion of innovation (DOI) (Rogers, 1983), and technology, organization, environment (TOE) framework (Tornatzky & Fleischer, 1990). Of these various theories, DOI and TOE have been widely used in organisational-level research work (Oliveira & Martins, 2011). However, when compared to DOI, TOE is considered much more robust in providing a broader picture for studying and explaining the adoption of technology and its use, since it considers the environmental context in which it is disregarded for the DOI (Oliveira & Martins, 2011). In addition, TOE has general properties which allows the examination of various variables, thus becoming much more adaptable to various research contexts (Arnold et al., 2018). Therefore, TOE is considered much more suitable for this study.

Furthermore, TOE utilises three contexts to examine the technology adoption and its use. The first context, i.e., the technological context, deals with the intrinsic characteristics of the technology. Secondly, the organisational context focuses on the availability of organisational resources related to the technology. Thirdly, the environmental context relates to the external pressures or influences which might encourage the organisation to adopt the technology (Kuan & Chau, 2001).

Consistent with Kuan & Chau (2001), we performed this study by referring to the "secondary" characteristics of innovation, specifically, characteristics which can be subjectively measured from the adopter's perspective, i.e., perception of the adopter. Meanwhile, the other characteristic, i.e., the "main" characteristic, which is inherent in the innovation and objectively measured, was not investigated. This approach is in line with studies by Kossahl et al. (2012) and Kuan and Chau (2001). The "main" characteristic sometimes fails to consider different adopter's behaviours and subjective perceptions because different adopters might see the "main" characteristic in different ways which might eventually lead to different behaviours. Therefore, the three TOE contexts considered in this study were examined based on the perceptions of the

MSMEs owners. In this case, the owners were considered to have certain awareness and viewpoints on each context, which might have further impact on to their decisions in adopting and using the related technology.

Furthermore, the COVID-19 pandemic has dramatically impacted the business situation among MSMEs. Several studies mentioned the potential role of digital technology to support the stability of MSMEs during this pandemic (Papadopoulos et al., 2020; Priyono et al., 2020). In the meantime, this research found that it is necessary to investigate how the COVID-19 outbreak has affected the MSME's perception of digital technology (i.e., the Internet) in terms of technological, organisational and environmental contexts, for identifying how their perception of these contexts evolved. Therefore, we employed a survey using a retrospective questionnaire to compare the MSME's perception of Internet use "before" and "during" the pandemic, based on the TOE contexts, as shown in Figure 2.

As shown in Figure 2, two variables, namely relative advantage and perceived ease of use represent the technological context, while top management support, and employee knowledge portray the

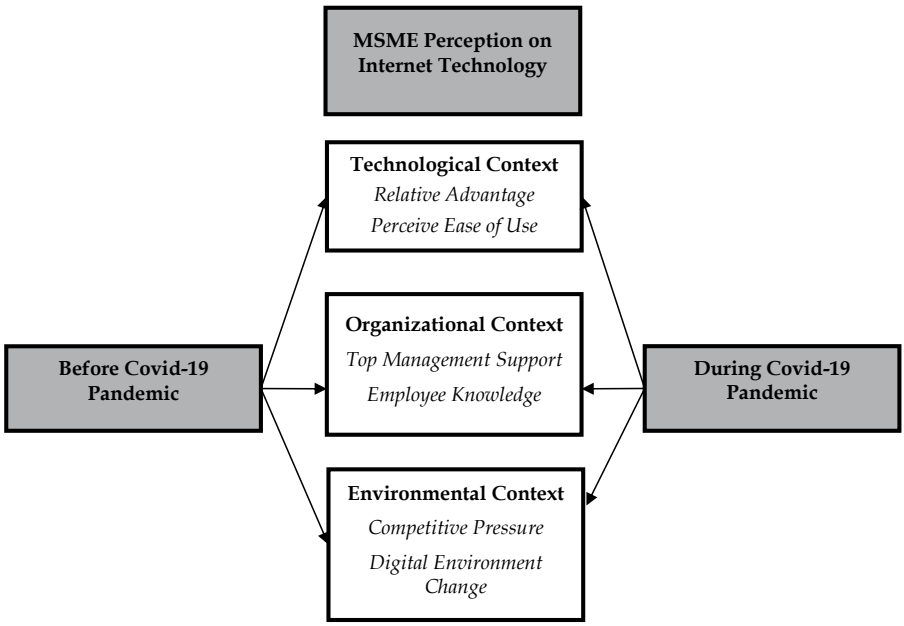

Figure 2: Theoretical Framework

organisational context. To measure the environmental context, two proxies, competitive pressure and digital environment change was employed. The explanation on the variables are provided in the following sub-sections.

2.3.1 Technological Context

We depicted the technological context through two variables, namely relative advantage and perceived ease of use. Relative advantage refers to how technology is considered to provide benefits to the organisation, compared to the previous conditions (Rogers, 1983). This variable is one of the most widely used and has been proven to be a significant determinant factor across various information technology adoption studies (Salahshour et al., 2017), including those which involved MSMEs (Hoti, 2015). Besides, from an Indonesian context, the relative advantage has also been shown to significantly influence the decision to adopt information technology among MSMEs, as found in the studies by Maryeni et al. (2012) and Setiowati et al. (2008).

Digital technology is considered as an opportunity to maintain business sustainability amid extremely disruptive conditions (Papadopoulos et al., 2020). Various forms of Internet utilisation during the pandemic to sustain the continuity of MSMEs comprised digital marketing, financial management, as well as inventory analysis and control (Winarsih et al., 2020). Based on these arguments, it is necessary to identify the perception of Indonesian MSMEs on the Internet use during the pandemic, and if there had been changing perceptions compared to the pre-pandemic conditions in terms of relative advantage.

The second variable, perceived ease of use is defined as to whether the technology is considered easy to use by the users (Davis & Davis, 1989). Technology is perceived as easy if it provides simplicity, flexibility, and compatibility for the user's needs and values (Naiwumbwe, 2012). This variable is also considered an important variable and has been shown to significantly influence the adoption of information technologies in several studies (Salahshour et al., 2017). From an Indonesian context, Wiradinata et al. (2015) stated that the ease of use factor is also a significant issue for MSMEs in adopting Internet-based technologies. Some MSMEs may resist to adopt new generation of Internet-based technology when there is lack of compatibility between the existing systems and emerging technologies (Nguyen et al., 2020). Yet, the current pandemic has ultimately forced MSMEs to seek a suitable form

of Internet adoption according to their business needs (Winarsih et al., 2020), even for those who were previously unaccustomed to digital technologies. Thus, it is vital to explore if those processes yielded the right ease of use and appropriate Internet adoption for their businesses. Based on these arguments, this study posits that:

H_1: There are significant differences between the perception of the technological context 'before' and 'during' the COVID-19 outbreak.

2.3.2 Organisational Context

Two variables were used to represent the organisational context, i.e., top management support and employee knowledge. Top management support is defined as the depth of awareness amongst the top management on the function and importance of the related technology for their businesses, and their commitment to implementing the related technology (Mukred, 2018). As top management is responsible for making potential decisions in an organisation (Premkumar & Roberts, 1999), their support is a paramount factor for MSMEs to adopt technologies (Delone & Mclean, 2003; Hoque et al., 2016). In Indonesia, top management support is proven as a significant influencing factor in numerous information technology adoptions, as noted by Maryeni et al. (2012) and Subawa and Mimaki (2019). In order to cope with the pandemic situation, MSMEs need to consider the adaptation strategies to keep the organisational activities running, such as business transformation through digital technology (Priyono et al., 2020). Moreover, since management or owners have a central role in determining business strategies, it is necessary to see how the technology adaptation strategy was rendered among MSME owners during the Covid-19 pandemic. In this case, it is viewed from how their support for the use of Internet technology during the pandemic period played out and if there had been a change in the intensity of this support when compared to pre-pandemic conditions.

Employee knowledge is defined as the level of knowledge and experience that employees possess related to the technology, and both formal and non-formal trainings which they have attended (Sabherwal et al., 2006). This variable is considered as a determinant factor in the MSMEs for adoption of information technology (Scupola, 2009), and in the context of Indonesian MSMEs (Maryeni et al., 2012; Subawa &

Mimaki, 2019). Furthermore, the increase of learning of digital technology occurred amid the pandemic, as stated by Winarsih et al. (2020), and has become a reasonable basis for exploring the levels of understanding, abilities, and skills of MSMEs employees related to Internet technologies, compared to pre-pandemic conditions. Based on the above literature, this study posits that:

H_2: There are significant differences between the perception of the organisational context 'before' and 'during' the COVID-19 outbreak.

2.3.3 Environmental Context

This study used two variables to describe the environmental context, including competitive pressure and digital environmental change. Competitive pressure refers to the extent to which an organisation experiences the external forces from its competitors to adopt certain technologies (Low et al., 2011). Low et al. (2011) stated that competitive pressure is the critical external factor which influences information technology adoption at the organisational level. In Indonesia, this variable has also been widely considered in several studies on information technology adoption, and has shown a significant influencing factor for the adoption decision as noted in Maryeni et al. (2012), Subawa and Mimaki (2019), and Wiradinata et al. (2015). This study suggests that it is crucial to evaluate how the perception of MSMEs on competitive pressure was used for digital technology to support business continuity, and to survive competition, bearing in mind that almost all business activities were hindered since physical contact was severely restricted during the pandemic. In China, Li et al. (2020) reported that shoppers had moved away from physical brick and mortar store to online purchases in the early stage of crises. This phenomenon created pressure for retail businesses to quickly experiment new methods in order to sustain their competitiveness.

The digital environment change is defined as a level of trends and needs in Internet use and information technology (Yoon et al., 2020). A digital economy based on information technology is the mainstay of all trade and an inevitable reality (Yoon et al., 2020). This variable is still relatively new in terms of technology adoption studies. However, since the importance of MSMEs related to digital trend awareness and encouraging their competitiveness, as well as increasing their flexibility

during the pandemic, this study considered that it is necessary to identify how the perceptions of Indonesian MSMEs towards the need for transformation through the use of digital technology to deal with the Covid-19 pandemic was played out. Based on these arguments, this study posits that:

H_3: There are significant differences between the perception of the environmental context 'before' and 'during' the COVID-19 outbreak.

3. Methodology

3.1 Research Instrument

We carried out the data collection on MSMEs' perceptions towards Internet technology using a web-based survey. The questionnaire contained several items representing variables of the TOE context, which were synthesised from across several previous studies, and tailored to the needs of this study. The respondents were asked to answer questions on two conditions (i.e., "before" and "during" pandemic). This study used a four-point scale to examine the response degree, with "1" being the least desirable and "4" being the highest desirable value. A pre-testing instrument was used by the research team for reviewing, revising and refining the questions (Senarathna et al., 2018). We conducted a pilot study involving five MSME owners to gain feedback regarding the wording and clarity of the questionnaire. We then refined the questionnaire based on their feedback.

Given the limited mobility due to the COVID-19 pandemic and control policies, we resorted to the convenience sampling method. We believe that the MSMEs experienced drastic change during the pandemic, in particular, the micro-businesses. Hence, it was challenging to identify the current sampling frames. Consequently, convenience sampling was considered much more suitable under such conditions. Convenience sampling can be generalised much more appropriately because it allows for various profiles of SMEs (Abed, 2020). The researchers distributed survey questionnaires using an online web link across several social media platforms, and directed communication channels between August and October 2020. The study received 486 responses. Due to incompleteness, 22 responses were excluded. Therefore, the final eligible data for further analysis totalled 464 responses.

3.2 Data Analysis

This study calculated the average of 'before' and 'during' the pandemic perceptions for every TOE context and variable to represent the mean of individual observations of the respondents. Furthermore, the comparison of 'before' and 'during' perception was statistically tested using a paired-sample t-test, to test the significant difference between these conditions, and deduce the tendency of deviation direction. The mean of the 'before' condition was compared to the 'during' condition for each context to identify if the 'before' condition significantly differed from the 'during' condition. To better understand how MSME perceptions on the Internet have evolved given the pandemic condition, this study also attempted to explore it by comparing the mean of 'before' to 'during' pandemic for each context and variable. Then, we compared the data from the MSMEs and their Internet adoption according to three categories of the phenomena; i.e., increase, decrease, and constant.

(a) Increase phenomenon: occurs when the mean of 'during' perception was higher than 'before'. In addition, further exploration regarding the increase phenomenon and patterns were defined as follows:
   (i) Positive increase
   Characterised for those whose perception increased, and 'during' perception is greater than or equal 3.
   (ii) Negative increase
   Characterise for those whose perception is increased and the 'during' perception was less than 3.

(b) Decrease phenomenon: occurred when the mean of 'during' perception was lower than 'before'. In addition, the decreasing patterns were also explored according to the two following criteria:
   (i) Positive decrease
   Characterised for those whose perception decreased, and the 'during' perception was greater than, or equal to 3.
   (ii) Negative decrease
   Characterised for those whose perception decreased, and the 'during' perception was less than 3.

(c) Constant phenomenon: occurred when the mean of the 'during' perception was equal to 'before'. Consistent with the previous categories, the constant phenomenon patterns were also examined according to the two following criteria:

(i) Positive constant
Characterised for those whose perception was constant, and the 'during' perception was greater than, or equal to 3.
(ii) Negative constant
Characterised for those whose perception was constant, and the 'during' perception was less than 3.

4. Result, Discussion and Implications

4.1 Respondents' Characteristics

The majority of respondents (57 per cent) were aged less than, or equal to 40 years of age, and the rest were aged more than 40. With respect to educational attainment, more than half of the respondents (55 per cent) were college graduates, 44 per cent were high school graduates, and only 1 per cent have lower than high school. In regards to the business scale, 87 per cent of respondents were categorised as micro-businesses, 11 per cent were small businesses, and 2 per cent were medium businesses. The majority of these businesses (64 per cent) engaged in the food and beverages sector. With respect to the business location, 60 per cent of the respondents were in DKI Jakarta, 16 per cent were in West Java, 6 per cent were in South Kalimantan, 3 per cent were in West Nusa Tenggara, 3 per cent were in Yogyakarta, and 12 per cent were spread across other provinces. As expected, most of the MSMEs (94 per cent) employed 0-5 workers, while the others had various number of workers, ranging from 6, to more than 20 workers. On the other hand, 84 per cent of MSMEs did not employ IT experts/IT background workers, 16 per cent employed them with a number ranging between 1 to 5 workers, while other MSMEs had more than 5 IT experts/IT background workers. Table 2 depicts the respondents' profiles.

4.2 Validity and Reliability Test

This study employed a validity test to examine the validity level of each item constituted in the research instrument. This procedure was done by correlating each item's score within the TOE contexts and phases (i.e., 'before' and 'during') with the total score of the individual TOE context at each phase. This study applied a correlation analysis using the Pearson's product moment correlation coefficient. Furthermore, the item was considered valid if the correlation result (r-count) was greater than

Table 2: Respondents' Demographic

Demographic	Categories	Frequency	Percentage
Business owner's age	≤ 40 years old	264	56.9
	> 40 years old	200	43.1
Business owner's education level	College/university graduates	254	54.7
	High School Graduates	204	44.0
	Lower than high school graduates	6	1.3
Business size	Micro	406	87.5
	Small	50	10.8
	Medium	8	1.7
Business sector	Food and beverages	297	64.0
	Wholesale and retail	43	9.3
	Fashion	20	4.3
	Individual and household services	20	4.3
	Agriculture, Hunting and Forestry	14	3.0
	Crafts	13	2.8
	Housing	12	2.6
	Fishery	11	2.4
	Education Service	10	2.2
	Social, cultural, entertainment services	4	0.9
	Electricity, gas and water	4	0.9
	Others	16	3.4
Business location	DKI Jakarta	278	59.9
	West Java	74	15.9
	South Kalimantan	28	6.0
	West Nusa Tenggara	14	3.0
	Yogyakarta	14	3.0
	Other Provinces	56	12.1
Number of Employee	0 – 5 Employees	434	93.5
	6 – 10 Employees	19	4.1
	11 – 15 Employees	4	0.9
	16 – 20 Employees	5	1.1
	> 20 Employees	2	0.4
Number of IT Employee	None	389	83.8
	1–5	73	15.7
	>5	2	0.4

the correlation coefficient (r-table). The correlation coefficient (r-table) for the 99 per cent confidence level was 0.128. Based on the test result, the correlation value for all questionnaire items was greater than 0.128. Therefore, all questionnaire items could be declared as valid items at the 99 per cent level of confidence.

In addition, this study conducted a reliability test to evaluate the degree of internal consistency between measurement items and its freedom of error at any point in time (Kline, 2015). As stated in Hair et al. (2013), the Cronbach's alpha was the most-used measurement for assessing reliability. Hence, according to the Cronbach's alpha test results shown in Table 3, all TOE contexts results of the 'before' and 'during' phase were greater than 0.7, meaning that the data performed at a good consistency and reliability (Gliem & Gliem, 2003). Therefore, it can be concluded that this was suitable for further analysis.

Table 3: Cronbach's alpha test results

TOE Context	Cronbach's Alpha (Before Covid-19)	Cronbach's Alpha (During Covid-19)
Technological	0.907	0.862
Organisational	0.786	0.754
Environmental	0.876	0.859

4.3 Paired-Sample Difference Test

The t-test results in Table 4 showed that all the ρ-values were less than 0.05, indicating that they were significant at the 95 per cent confidence level, and thus supported all the formulated hypotheses. It denoted significant differences in the perceptions towards all the TOE contexts and variables for the 'before', compared to the 'during' for the COVID-19 transmission. The results also testified that the MSME's perceptions for the individual context and variables had significantly changed during the pandemic.

In addition, the negative t-values indicated that the change from an individual context and variable portrayed an increase in the value 'during' the pandemic, compared to the 'before' condition. This result means that during the COVID-19 outbreak, the perception of the MSMEs towards the Internet (represented by the three context aspects) tended to be much more favoured.

Table 4: Paired-sample t-test Results for TOE Contexts

Context	Variable	ρ-value	t-value	Mean	SD
Technological		$0.234E^{-39}$	-14.2253	3.5297	0.6467
	Relative Advantage	$0.129E^{-42}$	-14.9727	3.5718	0.6222
	Perceive Ease of Use	$0.520E^{-13}$	-7.0853	3.4246	0.6932
Organisational		$0.969E^{-34}$	-12.8995	3.1656	0.9297
	Employee Knowledge	$0.484E^{-23}$	-10.1639	2.7841	1.0069
	Top Management Support	$0.905E^{-31}$	-12.1732	3.5471	0.6511
Environmental		$0.131E^{-34}$	-13.1084	3.6045	0.5957
	Competitive Pressure	$0.166E^{-34}$	-13.0834	3.6185	0.5883
	Digital Environment Change	$0.978E^{-24}$	-10.3535	3.5765	0.6097

Following the initial estimates, these results are such that the favourable perception towards the Internet has relatively increased since the pandemic occurred. Concerning the wider adoption of the Internet among MSMEs, this positive perception is a good indication for further encouragement of the MSMEs to adopt Internet-based technology, considering that all variables used in this study are considered as pivotal determinants factors of technology adoption (Gangwar et al., 2015). In addition, the perception change towards a positive direction is also corroborated by the data shown in Table 5.

As shown in Table 5, the increased perception signifies influential proportion across all contexts. However, the constant proportion was

Table 5: Number of Respondents According to Perception Comparison upon 'before' and 'during' Pandemic

TOE Context	Number of Respondents			Total Respondents
	Increase Perception (Before < During)	Decrease Perception (Before > During)	Constant Perception (Before = During)	
Technological	249 (54%)	30 (6%)	185 (40%)	464 (100%)
Organisational	222 (48%)	31 (7%)	211 (45%)	464 (100%)
Environmental	188 (40%)	13 (3%)	263 (57%)	464 (100%)

dominated by the environmental context. Therefore, although it has been statistically significant that perceptions change positively (experiencing an increase), we intend to look much deeper at the notable patterns, namely increase, decrease, and constant phenomenon, across the three contexts.

4.4 Pattern of MSMEs' Perceptions During COVID-19 Pandemic

As previously mentioned, this study also examines the changes in perceptions of every context and variable according to the three categories, i.e., increase, decrease, and constant phenomenon. The following subsections discuss the changes of perceptions based on the three contexts, technological, organisational, and environmental in details.

Technological Context

Figure 3 shows that the phenomenon of increasing perception is indeed much more dominant from a technological context. This phenomenon represents the tendency elucidated in the t-test results. Another distinguished pattern is the constant phenomenon, which also represents a considerable proportion of respondents. The decrease phenomenon also occurred across several MSMEs, although the numbers were relatively low.

We further examined the technological context based on two variables, relative advantage (RA), and perceived ease of use (PEOU).

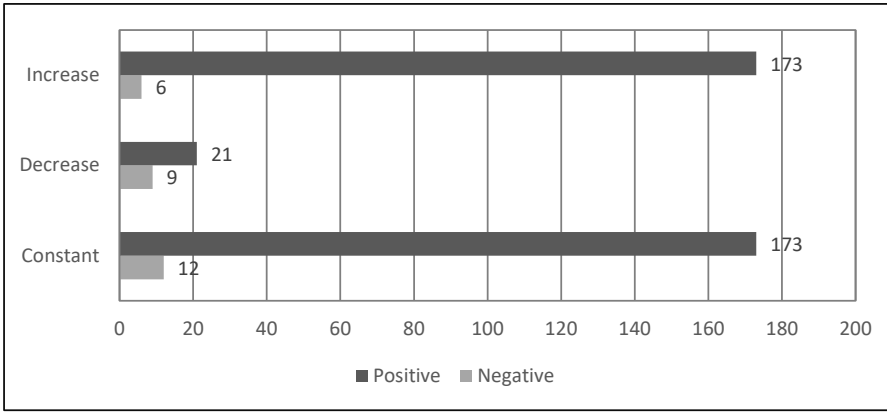

Figure 3: Category According to Perception Comparison of 'before' and 'during' Pandemic for Technological Context

The findings highlighted that the increasing phenomenon was dominated by an increase-to-positive perception, as shown in Figure 4, meaning that MSMEs perceive the Internet as becoming much more beneficial, easier, and more suitable for their businesses since the pandemic outbreak began. We argue that businesses belonging to this category were previously focused on direct sales through physical stores or direct interaction with consumers, but then began to adapt to an online media to support their sales, since the large-scale social distancing regulation was mandated. They typically can derive direct benefits from Internet use during the pandemic. They then began to adapt, allowing for a learning-by-doing, or learning-by-using mechanism. Thus, they found the most suitable patterns of Internet use for their business needs, perhaps even finding previously unthinkable utilisation means.

An increase-to-negative direction occurred among businesses with slower Internet adaptation rates. They perhaps, needed longer time to look for appropriate utilisation patterns, and lessons learned.

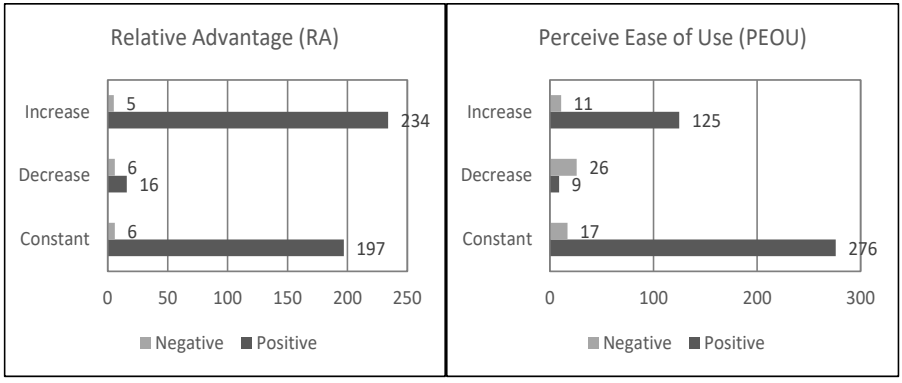

Figure 4: Category According to Perception Comparison of 'before' and 'during' Pandemic for RA and PEOU

The other most significant proportion was the constant-positive phenomenon. This phenomenon belonged to the MSMEs which had realised the benefits, the ease, and the suitability of the Internet even before the COVID-19 outbreak occurred. They might have experienced direct benefits and intensively used the Internet long before the pandemic. In essence, the learning mechanism had occurred over a period of time. Therefore, they may have also become much more familiar, more accustomed, and much more mature in terms of Internet use.

Some MSMEs belonged to the constant-negative category, meaning they perceived the Internet as lacking, or not beneficial, inappropriate, and difficult to implement for their businesses. Ironically, the perception kept continuing amid the pandemic. It is estimated that this negative perception possessed by businesses had to do with the nature of having indirect benefits from the use of the Internet, for example, it did not directly impact the increase of sales. In other words, the learning and adaptation process did not occur. Another aspect that might explain this phenomenon was that the MSMEs were not knowledgeable owners. At the MSMEs level, the owners are the primary decision-makers, which makes their perception of the advantages and benefits of technology an essential determinant of technology adoption (Hameed & Counsell, 2012). Uncertainty about the practicality and benefits of new technology for the owner is a serious obstacle toward implementation (Borhani, 2016).

In addition, there was also a decreasing phenomenon in terms of the benefits of the Internet. This phenomenon might have happened to some businesses which have used the Internet since the beginning, but it does not support their sales. Therefore, they felt that the Internet had become less useful amid this pandemic. These businesses mostly use the Internet connection for complementary needs, such as marketing, improving services (providing Wi-fi), and supporting operational activities (postal systems and security monitoring using CCTV). Therefore, if these businesses are severely affected amid the COVID-19 outbreak, they would even reduce Internet use to minimise operational costs, causing a minimum learning process.

Organisational Context

The organisational context depicted a similar pattern as that of the technological context, where the increasing phenomenon held the largest proportion, followed by the constant phenomenon. The decline phenomenon only occurred within a small proportion of MSMEs, as shown in Figure 5.

A further examination was carried out on the two variables, employee knowledge (EK) and top management support (TMS) (Figure 6). As shown in Figure 6, the increasing phenomenon of the top management support was dominated by the increase-to-positive perception, with only a few demonstrating the increase-to-negative perception. This pattern indicated that the COVID-19 outbreak had remarkably triggered the top management's awareness and willingness to embrace Internet-

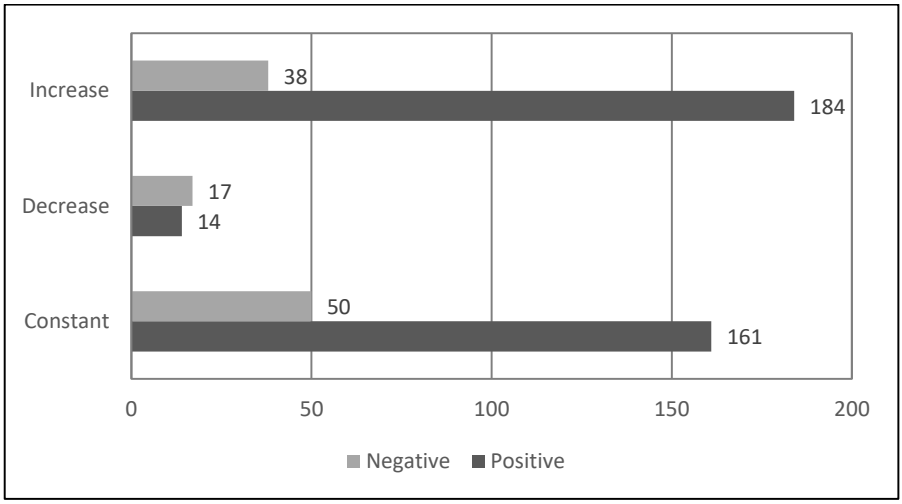

Figure 5: Category According to Perception Comparison of 'before' and 'during' Pandemic for Organisational Context

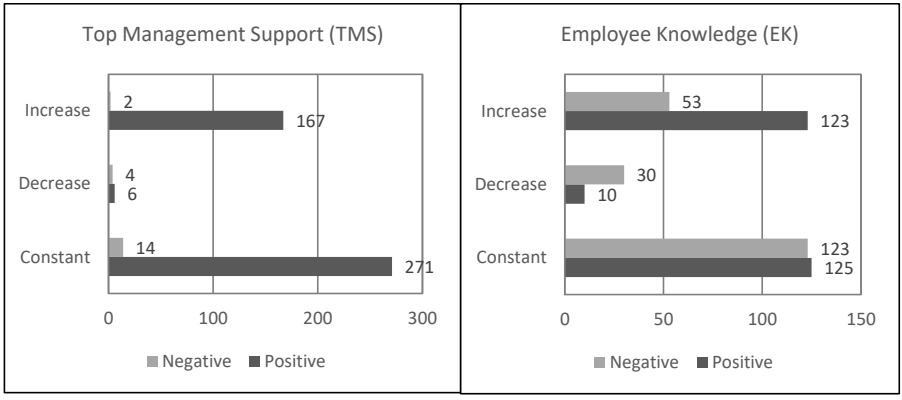

Figure 6: Category According to Perception Comparison of 'before' and 'during' Pandemic for TMS and EK

based technology. This pandemic hit the Indonesian MSMEs in terms of decreased sales, capital difficulties, hampered product distribution, and difficulties in terms of sourcing raw material (Sugiri, 2020). Accordingly, the owners needed to determine the proper mitigation strategy to maintain their business's resilience, such as through the use of digital technology.

A similar situation occurred on the employee knowledge variable, which also holds a sizable proportion of the increase-to-positive perception. We believe that it is consistent with the case of the perceived ease of use variable, i.e., the learning and adaptation processes led to the improvement of the employee understanding and ability to use the Internet. A small proportion of the increase-to-negative perception indicated that some required a longer time to learn, understand, and adapt its use.

The other most significant proportion was the constant-positive. This category fell into the MSMEs which had been implementing the Internet on a daily basis for a long time, and continuously used it as the main business strategy, regardless of the pandemic. Concerning the top management support, we believe that the owners in this category demonstrated fair open-mindedness, curiosity, and relatively good Internet literacy. Top management had a significant influence in terms of building organisational capabilities through the formation of organisational culture, motivation, and innovation capacity-building (Elenkov et al., 2005; Kraiczy et al., 2015; Sperber, 2017). Since the role of top management in MSMEs is very dominant, their level of innovativeness, positive attitudes, and interest towards changes are critical in terms of encouraging technology adoption (Hameed & Counsell, 2012). Sufficient financial capacity is also influential. Organisations with much better economic capacity invested much more in innovation, partly because they are more courageous and able to face the risks of failure (Aiken & Hage, 1971; Nystrom et al., 2002). Moreover, the learning and adaptation process had lasted much longer, so the employee's knowledge and capability were relatively more mature.

On the other hand, some MSMEs belonged to the constant-negative category. We argued that this reflected the reluctance of the MSME owners to embrace the Internet due to the Internet being less significant or portraying indirect benefits. Besides, it may also occur to the MSMEs with lower IT-literacy, or with conservative owners. MSMEs usually face several difficulties in terms of adopting technology, including a lack of understanding of digital technology-based business development opportunities (Chapman et al., 2000; Giotopoulos et al., 2017; Nasco et al., 2008). Furthermore, limited capital may also become a hindrance. Especially amid this pandemic, where high investment in technology was relatively unheard of for MSMEs. The adoption of digital technology not only requires investment costs for technology acquisition, but also incurs several additional costs, such as training,

licensing organisational restructuring, and upgrading of old facilities (Ghobakhloo et al., 2011; Giotopoulos et al., 2017; Tan et al., 2010).

In addition, the constant-negatives of the employee knowledge variable is also substantial. This study argued that the lack of IT-literate employees became one of the contributing factors. Moreover, according to the survey, most MSMEs employed no more than five employees. With the limited number of human resources, they tended to focus much more on the day-to-day operations, and put aside the opportunities for self-development.

Environmental Context

The pattern in the environmental context was quite different compared to the previous contexts. The constant phenomenon was more dominant than the increase, while the decrease phenomenon occurred only in a small proportion, as shown in Figure 7.

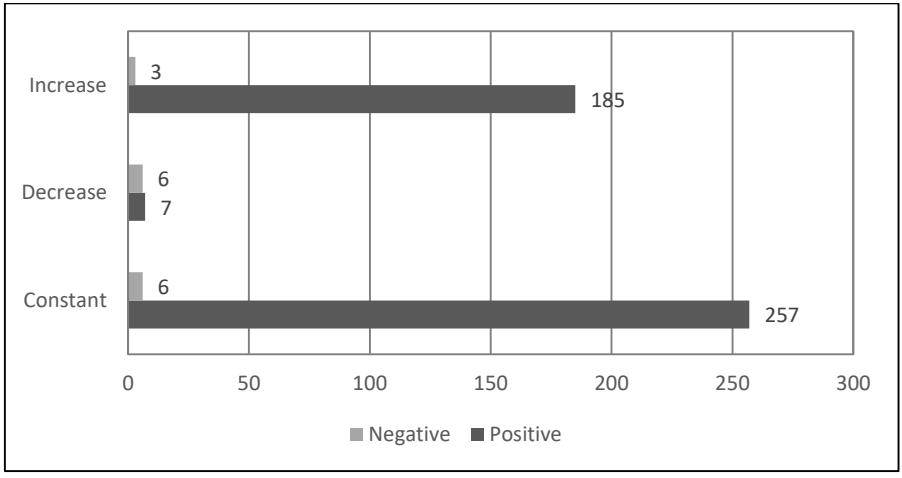

Figure 7: Category According to Perception Comparison of 'before' and 'during' Pandemic for Environmental Context

Figure 8 further shows the scores according to the two variables, competitive pressure (CP) and digital environment (DE). The results indicated that the increasing phenomena of the competitive advantage and digital environment variables were dominated by an increase-to-positive perception. It indicated that the pandemic had influentially triggered the MSMEs awareness of the competitive pressures, trends, and the need to

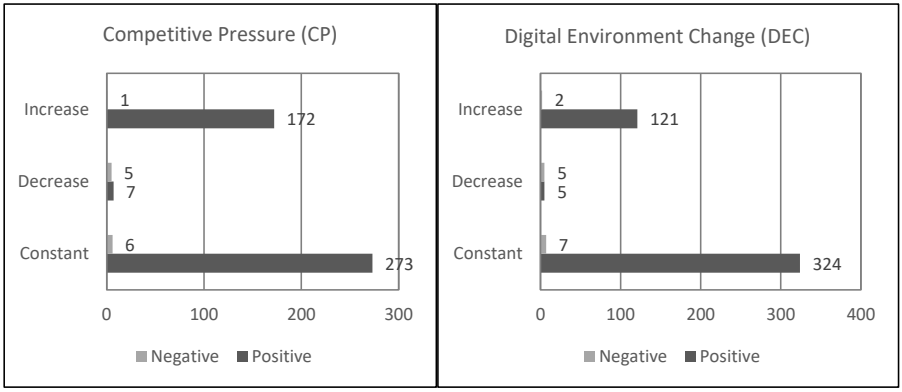

Figure 8: Category According to Perception Comparison of 'before' and 'during' Pandemic for CP and DE

embrace the Internet. Since the pandemic struck, almost all operational activities were hampered, placing the companies in a highly competitive market. The use of digital technology helped them to remain competitive. Due to their size, MSMEs are very sensitive to competition (Setiowati et al., 2008). Adopting innovations under increasing competitive pressure reduces the risk of falling behind based on an industry average performance (Iacovou et al., 1995). Moreover, we also considered the MSMEs Internet utilisation reflected the bandwagon effect. They might be triggered to adopt the Internet because of their competitor's success in using it, especially during the COVID-19 outbreak.

The other most significant effect was in the constant-positive phenomenon, realising that MSMEs had been utilising the Internet long before the COVID-19 pandemic. In addition, some MSMEs fell into the constant-negative category, demonstrating that those who gained relatively low benefits from the Internet utilisation, especially for their essential business needs, such as encouraging sales or minimising costs, did not play out the way they wanted it to. We also believe that the owner's lack of openness and minimum IT literacy became very influential. In addition, the decrease phenomena in the CP and DE variables were also important to note. Similar to the previous condition, the MSME probably used the Internet in the beginning. Unfortunately, it did not focus on supporting sales, which means that the perceived benefits of using the Internet did not directly affect business resilience during the pandemic. Therefore, the urgency to use the Internet was lower.

Conclusively, according to the arguments above, the study attempted to sort the perceptions towards the Internet according to its similarity characteristics. Accordingly, the six categories were further classified into three broad categories and future strategic options based on policy recommendations (see Table 6).

Table 6: Categories of MSMEs' Perception on the Internet and Future Strategic Options

Category	Characteristics	Future Strategic Options
Positive Perception since before COVID-19 Pandemic	• Intensively use the Internet and make it as one of the main strategies. • Have an open mind and good literacy of the Internet. • Have accustomed to and more dedicated resources for Internet utilisation.	• More prepared and mature to employ more digitalised technology. • MSMEs can further explore various forms of digitisation following their business needs, thus enhancing business performance. • Strengthen digitisation through collaboration with large enterprises.
Positive Perception during COVID-19 Pandemic	• More intense utilising the Internet since the occurrence of the Covid-19 pandemic. • Recognising the importance of the Internet to support businesses since the COVID-19 outbreak. • New learning and habituation occurred since the pandemic.	• Allocate more resources in adapting and learning the Internet technology. • Provide knowledgeable employees in exploring and routinising Internet utilisation. • Provide training, internship, and personal assistance to enhance employee competence.
Negative Perception	• Perceive less benefit from the Internet for business needs. • Not having an open mind and possessing minimum literacy towards the Internet, especially in terms of their business needs.	• Provide training, internship, and personal assistance to enhance MSMEs' awareness of Internet usage. • Create a pilot project of encouragement of MSMEs that have never used the Internet. Employ knowledgeable younger workers to assist MSMEs in adopting the Internet.

5. Conclusion

The Internet technology unquestionably plays a paramount role in terms of assessing the MSME's resilience during the COVID-19 pandemic. This notion is supported by our findings, that there is a significant change towards a much more positive perception on the Internet of Indonesian MSMEs. Therefore, it draws the opportunity to penetrate the wider use of the Internet or drive digitisation among MSMEs. Our study also noted other phenomena, where MSMEs exhibited unchanged, or even declined perceptions towards the Internet. Accordingly, this study proposes three major categories of MSME perceptions towards the Internet during the COVID-19 outbreak.

This research contributes to the technology adoption literature enrichment by focusing on how the changes of the adoption determinant factors, given the COVID-19 pandemic affected MSMEs. Similar research works have been conducted across some longitudinal studies. However, this research considered the influential pandemic situation, which has brought about a great turbulence throughout the global market. The results of the perception patterns and categories of MSMEs towards Internet use during the pandemic may contribute toward the policy formulation. The limitation of the study relied on the number of respondents and the geographic distribution of the samples. Further research may also address more variables which support the effective adoption of the Internet, particularly during the COVID-19 pandemic.

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