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Analysis of technological, organizational, environmental, and digital adoption factors on the net benefit of the mses sector in east java-indonesia

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ABSTRACT

Digital transformation is a necessity for organizations in the current new normal era. Most organizations have successfully adapted and continued to carry out business activities during the crisis due to the Covid-19 pandemic by carrying out digital transformation. Digital transformation is challenging to implement in small-scale organizations, especially the MSME sector, which has many limitations. So, the success of digital transformation in the MSME sector is still in doubt. To examine this phenomenon, this research proposed a conceptual model developed based on TOE and D&M (DeLone and McLean). Using quantitative methods in the new normal era, the proposed conceptual model aims to determine how technological, organizational, environmental, and digital adoption influences net benefits in the MSME sector. The survey has been distributed online to the MSME sector in East Java. It obtained 400 respondent data based on a random sampling technique and analyzed using PLS-SEM. Based on the conceptual model, the researcher has proposed four hypotheses that have been tested using PLS. The results of this research found that technological, organizational, environmental, and digital adoption positively affected net benefits in the MSME sector. The four proposed hypotheses are proven.

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1. INTRODUCTION

The current business climate grows and develops in an increasingly complex and tight digital technology era, companies can no longer generate a sustainable competitive advantage simply by adopting new Information Technology (IT) into the company's business activities. The condition of business competition turns out to require companies to formulate an appropriate long-term and short-term strategy to maintain the viability of the company. Many companies, both in developed and developing countries, have spent large amounts of money on implementing IT to obtain optimal value and benefits, but it

is not easy to realize this. The phenomenon that has occurred is further complicated by external environmental factors such as the COVID-19 Pandemic which has caused various uncertainties in the business environment (Puspitawati et al., 2022).

IT Innovation is a tool capable of supporting business digitalization that was previously implemented conventionally. Several companies have transformed using IT innovation to ensure the continuity of business processes during the previous COVID-19 Pandemic to the current New Normal Era (O'Leary, 2020)(Liang et al., 2020)(Wang & Tang, 2020). Properly using these IT innovations can reduce the negative impact of the corona virus on humans and companies. The success of companies in their IT transformation has led to increased profits during the past crisis. With virtual conferencing, online shopping, working, and schooling from home, the supply chains of the food industry (i.e., restaurants and cafeterias), retail establishments, healthcare, etc. operate remotely and carry out all activities from ordering, picking to delivery online. The use of robots and IoT has also been developed in various sectors until now. So, IT transformation towards digital adopted by companies can have a wider positive impact on the country's economic growth (Dutta et al., 2020)(Kumar, K., Kumar, N., & Shah, 2020)(Bai et al., 2021).

In fact, small scale companies cannot carry out digital transformation quickly. They have lower capital reserves, less inventory and lower productivity than large scale companies. So that small-scale companies are more vulnerable to crises (Liu & Cheng, 2018). There are many challenges that companies must pay attention to in carrying out the IT transformation process. Including current technology readiness factors, organization, and the environment (Lokuge et al., 2019)(Masudin et al., 2020). In small scale companies, IT transformation is more challenging to do because there are more inhibiting factors. Small scale companies tend to use IT as a tool, not as a core business. So, they must improvise IT assets to carry out IT transformation (Burstr, 2021). In an uncertain environmental situation such as the last Covid-19 Pandemic, this has created a high risk if IT investments are not properly assessed. In addition to this phenomenon, organizational strategy readiness also needs to be changed if carrying out IT transformation.

The decision to adopt information technology in companies to innovate is influenced by three factors i.e., technological development, organizational conditions, and environmental, commonly known as the TOE Framework. TOE has a general framework structure for assessing technology adoption (Bose & Luo, 2013)(Zebua & Widuri, 2023). Because of these characteristics, the TOE framework is used to examine the MSEs sector in this research. Small-scale organizations are Micro and Small Enterprises (MSEs) which are productive businesses owned by individuals or business entities that have met the criteria as micro-enterprises based on Indonesian government laws and regulations no. 20 of 2008.

The context of technology includes all information technology relevant to the MSEs Scale. Information technology can be in the form of technology that has been used or available but not used. MSEs should set regulatory limits, scope, and speed of change of technology used. For information technology in accordance with business strategy (Baron, 2019)(Nugroho et al., 2017). The organizational conditions context is a descriptive description related to business scope, top management support, organizational culture, complexity of managerial structures, quality of human resources, competence of the MSEs sector (Zhu et al., 2006)(AlBar & Hoque, 2019). The environmental factors experienced by the MSEs sector are currently influenced by pandemic pressure, government laws and regulations, competition, and other unpredictable external factors due to an uncertain business environment (Kusumawati & Subriadi, 2019)(Awan & Arnold, 2021). Previous research examined MSEs as a sector that contributes positively to sustainable and social development in developing countries (Oppong & Owiredu, 2014)(Blankson & Nukpezah, 2019). Since the Covid-19 pandemic caused the crisis, this

positive contribution has decreased significantly. By examining the factors of technology readiness, organization, and the environment in MSEs more deeply, researchers can classify which factors need improvement.

2. RESEARCH METHOD

This research was carried out for six months (March to September 2022) using a quantitative method. The initial stage of the researcher conducting preliminary research aims to analyze the main problems that underlie the importance of developing research topics. In the second stage, the researcher conducted a literature study to find the theory relevant to the research topic. The third stage produces a conceptual research model. The fourth stage is making and distributing research questionnaires to respondents. Suppose the questionnaire results pass the validity and reliability tests. In that case, they can proceed to stage five, but if they have not passed the test, the researcher organizes and distributes the questionnaire again. The fifth stage is Conceptual model testing based on SEM-PLS. The sixth stage is data analysis and research results (see Figure 1).

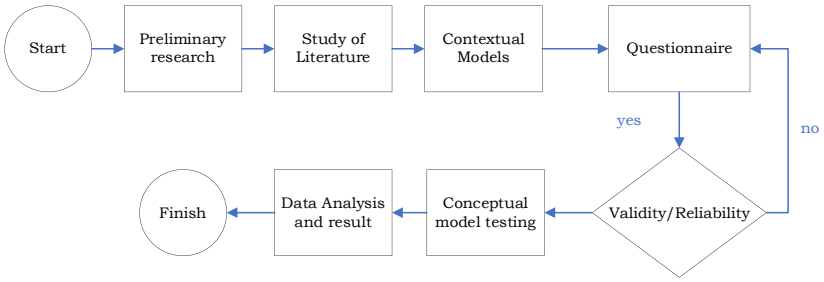

Figure 1. Research Design Flow

The research hypothesis concept was developed based on the TOE Framework combined with the D&M (DeLone and McLean) "IS Success Model" 2003. Tornatzky et al. have created the TOE Framework, which claims that adopting innovation depends on organizational, environmental, and technological characteristics (Katebi et al., 2022). This technological research context is digital technology currently widely used by small-scale organizations. This technology is used due to the negative impact of the Covid-19 pandemic. IS Success Model conceptual model created by DeLone and McLean in 2003 to measure the success of an information system based on user benefit. The D&M IS Success Model has been simplified to answer in the research objectives. This study only used net benefit variables to measure digital adoption success in the MSEs sector (Mustafa et al., 2020). The design context of this research has represented that technological, organizational, environmental factors influence digital adoption. In the end, it can be measured how the net benefit of the MSEs sector carries out digital adoption (see Figure 2).

The research population was of 9.78 million MSEs sector in East Java (Noer Hidayati, 2022). The number of research samples that have been used is 400 MSEs sectors. It was obtained using the Slovin formula. This research was a simple random sampling technique to represent the population. Data collection was carried out through the development of a questionnaire and measured using a five-point Likert scale. Furthermore, reliability and validity tests were carried out on the questionnaire instrument to determine the feasibility of the questionnaire. This study used data analysis Partial Least Square (PLS) with the Structural Equation Modeling (SEM) approach. PLS-SEM was chosen because it was adjusted to the problem formulation, hypothesis, and conceptual framework. PLS-SEM is not only limited to research indicators but is also used for formative relationships that examine relationships between

variables in causal research (cause and effect). In addition, PLS-SEM can solve very complex models with many variables without experiencing any estimation model problems. The PLS-SEM method has a structural model (Outer Model and Inner Model) with Path Analysis to prove the truth of the hypothesis (M. Ali et al., 2021).

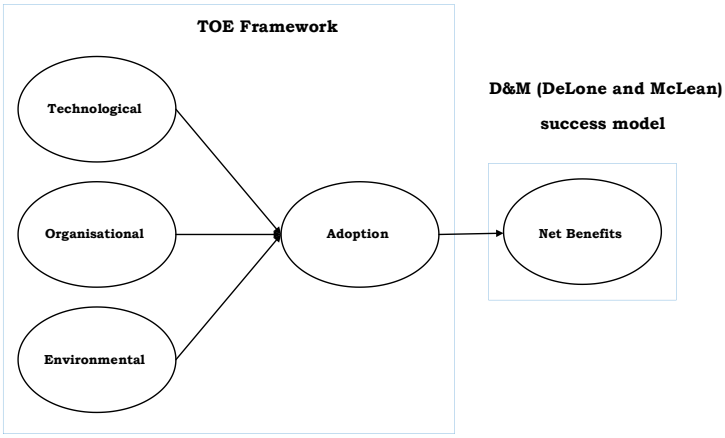

Figure 2. Research Hypothesis Concept

3. RESULTS AND DISCUSSIONS

3. 1 Validity Test

Questionnaires were distributed to 400 MSEs sector respondents who used the digital application. The classification of MSEs business sectors is based on geography and type of business. Questionnaire data that has been collected was tested for validity and reliability using SPSS. The validity test of the questionnaire aims to determine whether the data is on target/according to the research objectives. An indicator is categorized as valid if it has r count > r table or has a Sig value. (2-tailed) < α (M. Ali et al., 2021). Based on the number of samples (N) of 400 with a significance level (α) of 5% or 0.05, an r-table of 0.298 was obtained (see Table 1).

Table 1. Questionnaire Validity Test

Variable	Indicator	Pearson Correlation (r-count)	r-table	Sig.	Description
Technological (TCH)	Relative advantages	0,866	0.298	0,000	Valid.
	Compatibility	0,802	0.298	0,000	Valid.
	Complexity	0,679	0.298	0,000	Valid.
	IT readiness	0,752	0.298	0,000	Valid.
	IT integration	0,838	0.298	0,000	Valid.
Organisational (ORG)	Perceived usefulness	0,874	0.298	0,000	Valid.
	Top management support	0,731	0.298	0,000	Valid.
	Organizational culture	0,806	0.298	0,000	Valid.
	Organizational size	0,852	0.298	0,000	Valid.
	Financial support	0,872	0.298	0,000	Valid.
	Training	0,789	0.298	0,000	Valid.
Environmental (ENV)	Regulatory environment	0,779	0.298	0,000	Valid.
	Competitive environment	0,781	0.298	0,000	Valid.

Variable	Indicator	Pearson Correlation (r-count)	r-table	Sig.	Description
Digital Adoption (DAP)	Pandemic pressure	0,905	0.298	0,000	Valid.
	Political Stability	0,852	0.298	0,000	Valid.
	Agile	0,903	0.298	0,000	Valid.
	Dynamic	0,904	0.298	0,000	Valid.
	Interactive	0,938	0.298	0,000	Valid.
Net Benefits (NBF)	Tangible benefit	0,881	0.298	0,000	Valid.
	Intangible benefit	0,926	0.298	0,000	Valid.

3. 2 Reliability Test.

The reliability test was carried out by looking at the Cronbach alpha value of the resulting data. A questionnaire is declared reliable if the Cronbach alpha value is above 0.7 (M. Ali et al., 2021). Reliability testing has used 400 samples (N= 400) with a questionnaire statement totalling 20 items has concluded reliable (see Table 2).

Table 2**.** Questionnaire Reliability.Test

Variable.	Cronbach's Alpha.(α)	Description
Technological	0,887	Reliable
Organisational	0,861	Reliable
Environmental	0,845	Reliable
Digital Adoption	0,853	Reliable
Net Benefits	0,882	Reliable

3. 3 Demographics of Respondent's

Demographic data of respondents have been obtained from distributing questionnaires to the MSEs sector who have used digital aplication in several cities and regencies of East Java which play a major role in increasing the added value of the regional economy, i.e.: Surabaya City, Sidoarjo Regency, Pasuruan Regency, Gresik Regency, and Malang Regency (Roosa, 2022).

Based on the total data of respondents, it is known that the most respondents came from the Sidoarjo Regency MSEs sector, a total of 85. The second is a respondent from the Gresik Regency MSEs sector, a total of 82. The third is a respondent from the Surabaya City sector MSEs, a total of 80. The fourth is a respondent from the MSEs sector Malang Regency, a total of 78. And the fifth is a respondent from the Pasuruan Regency MSEs sector, a total of 75 (see Table 3).

Table 3**.** Demographics of Respondent's

City or Regency	Number of Respondent
Surabaya	80
Sidoarjo	85
Pasuruan	75
Gresik	82
Malang	78
Total	400

Several digital technologies that have been adopted by the MSEs sector i.e.: system integration (such as ERP and CRM), cloud computing, internet of things (IoT), autonomous robots, big data, cyber-physical systems, additive manufacturing (AM),

augmented reality (AR), ect (Dutta et al., 2020). Thus, the demographic data of this research referred to the nine digital technologies in the MSEs sector (see Table 4).

Table 4. Digital Technology Adoption in MSEs Sector

Digital Technology	Number of Respondent
Enterprise Resource Planning (ERP).	179
Customer Relationship Management (CRM).	172
Cloud Computing.	18
Internet of Things (IoT)	25
Autonomous Robots.	6
Big data.	0
Cyber.- Physical Systems	0
Additive Manufacturing.(AM)	0
Augmented Reality.(AR)	0
Total	400

Referring to table 4, ERP is a digital technology that was adopted a lot by the MSEs. CRM, IoT, cloud computing and autonomous robots are next sequenced. While the respondents of this research did not use big data, Cyber-Physical Systems, AM, and AR technology.

3. 4 Statistical Inferential Analysis

At this stage, the results of the analysis of the data that have been collected using the PLS-SEM method using SmartPLS software. Model analysis in PLS-SEM is carried out through two stages of assessment, i.e., the evaluation of the Measurement Model (Outer Model) and the evaluation of the Structural Model (Inner Model).

3.4.1 Measurement Model.(Outer Model)

The Convergent validity, discriminant validity, and composite reliability tests have been carried out. Five variables and four hypotheses have been proposed for analysis (see Figure 2). Convergent validity means that a set of indicators represents one latent variable and the underlying latent variable. This representation can be demonstrated through unidimensionality which can be expressed using the average value of the extracted variance (Average Variance Extracted/AVE). The AVE value is at least > 0.7. This value illustrates adequate convergent validity which means that one latent variable can explain more than half of the variance of its indicators on average. Composite reliability is considered better in estimating the internal consistency of a construct. Rule of thumb used for Composite Reliability values greater than 0.7 and Cronbach's alpha values greater than 0.7. The results of the Convergent Validity and Reliability tests have used 400 data to conclude if all variables pass the test (see Table 4).

Table 4. Test Results.of Convergent Validity and Reliability.

Variables	AVE	Composite Reliability. Cronbach's	Cronbach's Alpha
Technological	0,891	0,927	0,925
Organisational	1,000	1,000	1,000
Environmental	1,000	1,000	1,000
Digital Adoption	0,841	0,808	0,926
Net Benefits	0,974	0,898	0,908

Discrimanant validity occurs when there are two instruments that measure two constructs that are predicted but are not correlated and produce scores that are not correlated. To find out the results of discriminant validity is to test discriminant validity

by looking at the cross-loading value for each variable must be > 0.7. In this research, all variables have passed the Discriminant Validity test (see Table 5).

Table 5. Discriminant Validity Test Results

Variables	TCH	ORG	ENV	DAP	NBF
TCH	0.921				
ORG	0.574	1,000			
ENV	0.596	0.867	1,000		
DAP	0.581	0.183	0.037	0.836	
NBF	0.597	0.305	0.227	0.221	0.897

3.4.2 Structural Model (Inner Model).

The Structural Model described the causal relationship between latent or exogenous variables built based on the substance of the TOE theory and IS Success Model 2003 (see Figure 3). Based on this explanation, this research has proposed four hypotheses. The first hypothesis has examined the relationship between technology and digital adoption. The second hypothesis has examined how the relationship between organizations to digital technology. The third hypothesis has examined the relationship between the environment and digital adoption. The fourth hypothesis has examined the relationship between digital adoption and net benefits.

Table 6. Path Coefficient Results

Hypothesis	P Values	Results
H1: Technological → Digital Adoption	0,000.	Accepted.
H2: Organisational → Digital Adoption	0,000.	Accepted.
H3: Environmental → Digital Adoption	0,000.	Accepted.
H4: Digital Adoption → Net Benefits	0,000.	Accepted.

This research proposed five variables (i.e., technological, organizational, environmental, digital adoption, and net benefits). The research variables reflected the characteristics of the MSEs population in the sector to be tested. Technology, organization, and environment are independent variables influencing digital adoption as the dependent variable. Meanwhile, digital adoption is an independent variable that affects net benefits as the dependent variable.

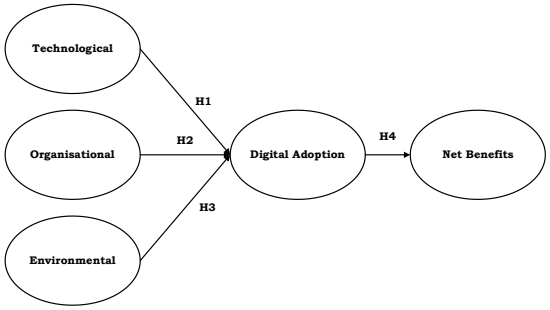

Figure 3. Conceptual Model

This SEM research conceptual model aims to determine how the MSEs sector has achieved net benefits from digital adoption. Evaluation of the inner research model is based on path coefficients. Measurement Model this research "path diagram" (see Figure 4), is a visual display of an SEM model, which includes a few signs of the relationship between variables. Evaluation of the structural model of this research was based on the significance of the relationship between constructs/variables. This can be illustrated

from the path coefficient which describes the strength of the relationship between constructs. From the path coefficient it is known that the results of path analysis, and the results of the strength of the relationship between research variables. The conclusion of the hypothesis test is accepted if the p-value > 0.05 and vice versa.

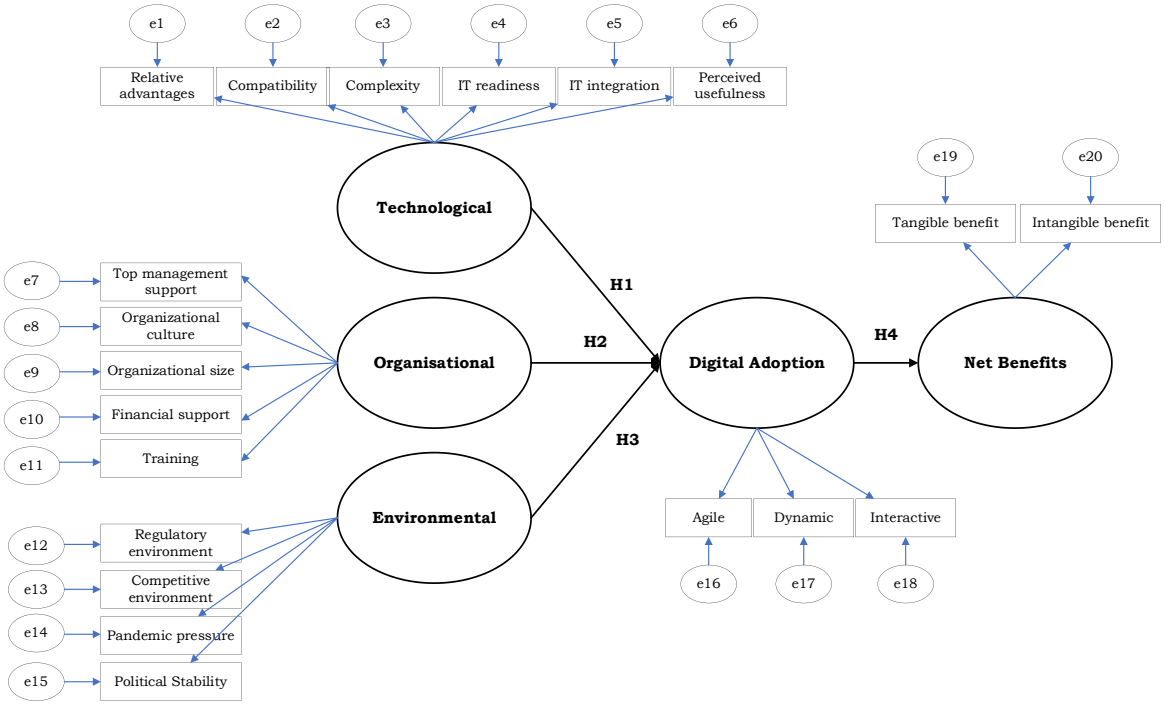

Figure 4. Measurement Model "Path Diagram" Research

3.4.3 Discussion

The first hypothesis stated that technological context has a positive effect on digital adoption in the East Java MSEs sector. Based on the results (see Table 6) we know that the technological in this research has a significant impact on digital adoption with a p-value of 0.00 (<0.05). It is concluded if the first hypothesis (H1) can be proven and accepted. Technological context (TCH) illustrated that adoption depends on technology from outside and within the organization, such as relative advantages, compatibility, complexity, IT readiness, IT integration, and perceived usefulness. The results of this hypothesis (H1) were in accordance with several previous research (AlBar & Hoque, 2019)(Baron, 2019)(Cruz-jesus et al., 2019)(O. Ali, 2020).

The second hypothesis stated that organizational context positively affects digital adoption in the East Java MSEs sector. Based on the results (see Table 6) we know that the organizational in this research has a significant impact on digital adoption with a p-value of 0.00 (<0.05). It is concluded that the second hypothesis (H2) can be proven and accepted. Organizational context (ORG) illustrated that top management support, corporate culture, organizational size, financial support, and training influence technology adoption. The results of this hypothesis (H2) were in accordance with several previous research (Božič & Dimovski, 2019)(Cruz-jesus et al., 2019)(Bai et al., 2021)(Abdullah et al., 2022).

The third hypothesis stated that environmental context positively affects digital adoption in the East Java MSEs sector. Based on the results (see Table 6) we know that the environment in this research has a significant impact on digital adoption with a p-value of 0.00 (<0.05). It is concluded that the third hypothesis (H3) can be proven and accepted. Environmental context (ENV) illustrated that the sregulatory environment,

competitive environment, pandemic pressure, and political stability influence technology adoption. The results of this hypothesis (H3) were in accordance with several previous research (Cruz-jesus et al., 2019)(Dutta et al., 2020) (Effendi et al., 2020)(Abdullah et al., 2022).

The fourth hypothesis stated that digital adoption positively affects net benefit in the East Java MSEs sector. Based on the results (see Table 6) we know that digital adoption in this research has a significant impact on net benefit with a p-value of 0.00 (<0.05). The Digital Adoption context (DAP) illustrated that agile, dynamic, and interactive are the characteristics of digital adoption that change traditional business processes to be automated, versatile, fast, and instant. It was caused by organizations adopting new technologies to get more benefits. Net Benefits (NBF) illustrated that IT benefits are assessed based on tangible and intangible benefits (Kusumawati & Subriadi, 2019). Tangible benefits are benefits that directly improve company performance, such as reducing costs so that they can be seen in the company's account as an increase in profits and possibly in return on investment. Intangible benefits make work more accessible in the organization but are not directly identifiable in performance improvement. These benefits cannot be easily seen in an increase in company accounts. It is concluded that the fourth hypothesis (H4) can be proven and accepted. The results of this hypothesis (H4) were in accordance with several previous research (Nugroho et al., 2017) (Angelina et al., 2019).

4. CONCLUSION

Based on the results of the PLS-SEM testing and the discussion carried out, proves that the conceptual model proposed by this study was fully accepted. The technological context has a positive effect on digital adoption, meaning that increasing awareness based on the technological context will increase the MSEs sector to carry out digital adoption. Organizational context has a positive effect on digital adoption, meaning that the more aware the organization is of technology, the more the MSEs sector will be able to adopt digitally. The environmental context has a positive effect on digital adoption, meaning that the MSEs sector is increasingly aware of environmental changes, so the MSME sector is increasingly aware of digital adoption. Digital adoption has a positive effect on net benefits, meaning that increasing awareness of digital adoption will increase the MSEs sector to get net benefits.

There are several limitations to this research. First, researchers conducted a general study of the MSMEs sector, undertaken only in East Java. It is hoped that further research can more specifically examine MSMEs engaged in health, food, etc. Subsequent analysis can also expand the MSMEs area as a research sample to better represent Indonesia's existing conditions. Second, the conceptual models that researchers have used are TOE and a simplified conceptual model of D&M (DeLone and McLean). It is hoped that further research can use the D&M (DeLone and McLean) abstract model variables, i.e., information quality, system quality, service quality, actual use, or intent to use, user satisfaction, and net benefits. In addition, further research can also use other conceptual models related to the study of information technology adoption, for example, the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Task-Technology Fit Theory (TTF), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Reason Action (TRA), etc. Or future research is expected to be able to propose a new conceptual, based on the results of an abstract study of the existing information technology adoption model. Third, future research can use qualitative methods to examine similar phenomena. This is because quantitative research conducted by researchers does not occur naturally. In this research, each respondent could only answer questions briefly without explaining the reasons, so researchers could not see things from different perspectives regarding the depth of meaning. In addition, this

research needs to be studied further using qualitative methods so that the research results better describe the reality and complexity of the digital transformation of small-scale organizations as well as obtain a comparison of the results of this research that has been completed using quantitative methods with further research developed using qualitative methods.

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