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Fostering Digital Transformation in MSMEs: The Role of Leadership, Culture, and the Mitigation of Technostress

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ABSTRACT

Investigating the components of digital transformation (DT) in the micro, small and medium enterprise (MSME) sector is the aim of this study. Despite the topic's obvious importance, this empirical investigation is still somewhat limited. This study aims to investigate how technostress inhibitors (TI), digital leadership (DL), and innovative culture (IC) may together stimulate involvement for greater digital innovation (DI) to close that gap. This quantitative study tested a novel conceptual model using survey data from Indonesia's MSME business. The data from the 320 valid responses was analyzed using partial least squares structural equation modelling. The result showed that DL and IC positively affected DI. Techno-work engagement (TE) is a mediator in the relationship of innovation, culture, and leadership. TI played a significant moderating role in relationships related to engagement, leadership, and culture. The study's findings highlight significant issues regarding how organizational support development and leadership style could help DT in the MSME sector. While seeking DI through job engagement, leaders need to demonstrate commitment to long-term resource allocation to avoid any negative effects of digital stress. The study suggests that organizational support can enhance digital transformation (DT) in the MSME market, potentially leading to improved consumer experiences. With the assistance, MSME managers will be able to promote societal and economic growth.

Keywords: Digital innovation, Digital leadership, Innovative culture, Technostress inhibitor.

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1. INTRODUCTION

Micro, small, and medium enterprises (MSMEs) play an important role in developing countries such as Indonesia and contribute to various economic improvements. MSMEs can create jobs for a large number of urban poor people (Kulkarni, Joseph and Patil, 2024). The manufacturing industry, small and medium-sized enterprises, job opportunities, and exports have all benefited significantly from the MSME sector. MSMEs are a pillar of Indonesia's economy that contributes considerably to achieving Gross Domestic Product (GDP). Until 2022, MSMEs contributed 61.1% of Indonesia's GDP, and the remaining 38.9% was contributed by 5,550 large enterprises or 0.01% of the total business actors. Of the 61.1% contribution of MSMEs to Indonesia's GDP, it is dominated by micro-entrepreneurs at 98.68% with a labour absorption capacity of around 89%. The large contribution of MSMEs

to Indonesia's economy means that Indonesia has a potentially strong national economic base because of the large number of MSMEs, especially micro-scale, with considerable absorption capacity (Anatan and Nur, 2023).

Innovative MSMEs before the COVID-19 pandemic were more likely to show resilience and successfully mitigate the impact of the pandemic. In particular, innovative MSMEs are more daring to change their business models by introducing new products and services, increasing online business activities, and switching to new business models that are more oriented to their customers' demands (Nguyen *et al.*, 2024). A fast communication network allows MSME entrepreneurs to collaborate with suppliers and customers, access real-time data, and adapt to the ever-changing market landscape and supply chain (Kraft, Lindeque and Peter, 2022). In addition, digital technology innovations make it possible to change the business model of MSMEs by creating alternative distribution channels and methods to generate and provide added value to customers (Matarazzo *et al.*, 2021). The development of digital technology has the potential to encourage the growth of MSMEs to be more inclusive and sustainable (Costa, Presenza and Abbate, 2023), by spurring the implementation of their business model innovation, generating efficiency, and improving customer service while creating new opportunities for the next business (Da Rocha, Neves da Fonseca and Kogut, 2024). This is especially true for MSMEs because they can find new opportunities by collecting and analyzing big data and engaging all stakeholders to build a digital ecosystem (Kraft, Lindeque and Peter, 2022). Moreover, online platforms should provide more convenient digital payments for their customer. The new digital payment service should offer some attractive features, and financial benefits, and ensure data security and privacy to create motivation to adopt the new technology (Kurniasari, Prihanto and Andre, 2023).

MSME entrepreneurs often feel disadvantaged in dealing with larger corporate organizations. This is mainly due to their limited resources, and limited capacity for knowledge regarding internal and external factors (Lobo *et al.*, 2023). In addition, MSME entrepreneurs have to face other challenges including a limited scale of products and services, smaller market sizes, diminishing market power, and economically limited business opportunities (Andersén, Ljungkvist and Svensson, 2015). Their mostly informal organizational structure with more limited leadership skills and limited business strategy skills is an obstacle to their ability to invest in building their competitiveness (Fernandes *et al.*, 2024). Their mostly informal organizational structure with more limited leadership skills and limited business strategy skills is an obstacle to their ability to invest in building their competitiveness (Luu, 2024). According to Liberty Patiu, Liberty. Co, T, Lawrence. Elazar, Vivian. Jr, (2024) that a person must possess entrepreneurial characteristics and competencies to be successful.

This study underscores the importance of digital leadership style and organizational support in the MSME sector to enhance the role of digital transformation. Faced with accelerating digitalization processes and increasing market pressures, digital leaders must be able to navigate the complexities of digital transformation to unlock new growth opportunities and maintain their relevance in an ever-changing business landscape. With the growing digital ecosystem and the ability to create a culture of innovation and adaptability, business leaders must be able to harness the potential of digital technology transformation, and thus be able to position themselves for success in the digital age (Appio *et al.*, 2024). In facing digital transformation, MSME entrepreneurs must be able to face both opportunities and challenges of changing the business environment. MSMEs must struggle to utilize digital technology to achieve a competitive advantage due to various factors, such as the need for a skilled workforce, stakeholder recognition of the value of digital technology, and managerial readiness to implement technological innovations (Proksch *et al.*, 2024). In addition, the mismatch between their digital capabilities and tools with a broader vision of digital

transformation for MSME entrepreneurs can hinder the process of realizing digital business potential. This gap is becoming even more significant due to the ever-increasing digital technology that demands companies to innovate their businesses (Agostino, Arnaboldi and Lema, 2020). According to Ellyawati and Kusumatriawan (2024), compatibility is an important factor in adopting technology. Companies are most likely to consider adopting a new technology when the technology is compatible with the systems and resources they have. For example, the use of Facebook is compatible with an internet connection and technology that makes it simple and easy to use.

Business organizations must support their talent in overcoming the digital disruption that is occurring, as the constant pressure to update both hardware and software technology can backfire in the form of so-called technostress. Organizations can overcome the unintended effects of technostress by providing support mechanisms in improving technology capabilities as digital solutions through the provision of technology literacy facilities, technical support and facilitating employee engagement, thereby changing employees' perceptions of the importance of resources (Al Issa and Omar, 2024). Work engagement is widely accepted as a major factor that has a strong positive impact on company performance, including the implementation of technological innovations (Mulligan *et al.*, 2021). Therefore, digital leaders can influence techno work engagement (TE) through their role models as role models, the transmission of positive emotions, and the ability to provide attention, offer the help employees need, and distribute the necessary resources (Yu and Moon, 2021).

In addition, an innovative culture (IC) encourages companies to be open to new ideas and foster the ability to take advantage of new technological developments in the context of product or service development. A solid Innovative Culture (IC) establishes an important innovative orientation as a guide for employees in facing the challenges of technological innovation. IC stimulates changes in existing technology, leadership styles, stress, and employee engagement. In the modern world, especially in the MSME sector, innovation and openness to technological developments are crucial components. However, there are still few scholars who have researched the interaction between important elements in Digital Innovation (DI), Digital Leadership (DL), Innovative Culture (IC), technology work involvement (TE), and technological stress inhibitors (TsI). Therefore, to add literature on management in general and digital technology in MSMEs in particular, this study aims to investigate the influence of digital leadership, technostress inhibitors, and innovation culture on the performance of Digital Innovation (Heubeck and Meckl, 2022).

This study was conducted to investigate the influence, of innovation culture, digital leadership, and techno-work involvement (TE) on the digital innovation performance of MSMEs. Techno-stress inhibitors (IT) significantly moderate relationships related to leadership, innovation culture, and technology engagement. The study is intended to answer the following research questions: What actions and processes should organization-level digital leaders take to successfully access and implement digital technologies in their business processes? By investigating this research question, this study aims to offer valuable insights into management literature in general and technological innovation in particular as well as a practical guide for MSME actors in implementing digital transformation to improve their business performance.

2. RESEARCH METHOD

This study uses a descriptive survey method with the analysis unit MSME entrepreneurs in Tangerang Regency, Banten, Indonesia. The MSME population in Tangerang Regency is currently 90,128. Data were collected in a cross-sectional time frame (June-July 2024). To obtain representative data, this study uses non-probability sampling techniques. Data was

collected by sending questionnaires directly to 350 MSME owners or leaders, especially medium entrepreneurs who have the potential to carry out digital technology transformation.

Outlier testing is carried out to see if there is any data irregularity, whether there is missing or incomplete data. 30 data were not suitable for use, therefore 320 data were continued for analysis. 43% of respondents stated that they have been doing MSME business for more than 10 years. 57% of entrepreneurs are women. 43% of business people have net assets of more than IDR 50,000,000. 52% of entrepreneurs achieve annual sales of more than IDR 2.5 billion. Data was collected from various types of businesses, namely: manufacturing (9.8%), furniture entrepreneurs (9.1%), distributors (11.9%), pharmaceuticals (4.2%), fashion (9.5%), building and construction (13.3%), automotive (13.9%), culinary (4.3%), workshops (10%), and electrical & electronics (14%).

In this study, the indicators used in the questionnaire are based on previous research indexed by Scopus and use a five-point Likert scale. The data was analyzed using Structural Equation Modeling - PLS. According to Shiau et al (2019), Structural Equation Modeling Analysis is a powerful method because it can be applied to all types of data scales (nominal, ordinal, interval, and ratio).

3. RESEARCH ETHICS

This research was conducted and reported without deception or intention to harm the participants, environment, or society. It involves being honest, objective, and transparent in all aspects of research, including data collection, analysis, and publication.

4. RESULT

4.1. OUTER MODEL (MEASUREMENT MODEL)

4.1.1. Convergent validity

The validity convergent test was used to prove that the statements on each latent variable in this study could be understood by the respondents in the same way as the researcher intended. Convergent Validity is carried out by looking at reliability items (validity indicators) indicated by the value of the loading factor. The loading factor is a number that shows the correlation between the score of a question item and the score of the indicator construct indicator that measures the construct.

Table 1. Validity test

Item	Outer loading	Result
DI1	0.928	valid
DI2	0.930	valid
DI3	0.935	valid
DI4	0.725	valid
DI5	0.720	valid
DTL1	0.885	valid
DTL2	0.950	valid
DTL3	0.917	valid
DTL4	0.939	valid
DTL5	0.753	valid
IC1	0.960	valid
IC2	0.972	valid
IC3	0.973	valid
IC4	0.704	valid
IF1	0.827	valid

IF2	0.927	valid
IF3	0.926	valid
LF1	0.972	valid
LF2	0.976	valid
LF3	0.987	valid
LF4	0.981	valid
TSP1	0.605	valid
TSP2	0.955	valid
TSP3	0.953	valid
TwE1	0.928	valid
TwE2	0.942	valid
TwE3	0.829	valid

The results show that all items that make up the latent variable have an outer loading value > 0.50. This shows the accuracy of variable measurement in building each quite relevant indicator. These results identify the consistency and reliability of the measurements used in assessing these variables. Thus, the results of this convergent validity analysis provide confidence in the quality of the measurement of the variables used in the study and confirm that these variables are effective.

4.1.2. Discriminant Validity

AVE (Average Variance Extracted)

Validity discriminant measures how far a construct is completely different from another. A high value of discriminant validity provides evidence that a construct is unique and able to capture the phenomenon being measured. The AVE (Average Variance Extracted) value is used to determine the validity value of a construct. The AVE (Average Variance Extracted) criterion for a variable to be valid must be above 0.50.

Table 2. AVE (Average Variance Extracted)

	Average Variance Extracted (AVE)
Digital innovation	0.728
Digital leadership	0.795
Innovative culture	0.828
Techno-work Engagement	0.812
Technostress Inhibitors	0.631

4.1.3. Fornell criterion

The Fornell-Larcker value is used to assess the validity of discrimination. To pass the test, the resulting value on each variable must be greater than the value of the other variable (the number with the column and row positions parallel to the corresponding variable. If the construction correlation in each indicator is greater than that of other constructs, it means that the latent construct can predict the indicator better than the other constructs. The calculation process of the Fornell-Larcker criterion is carried out by comparing the AVE root of each construct against the correlation between one other construct in the research hypothesis model. If the results of the calculation of the Fornell-Larcker Criterion (FLC) show that the root value of AVE of each construct is greater than the correlation value between one construct and another, then the validity of discrimination is stated to be both the validity value of discrimination based on the FLC in this research model can be seen in the following table:

Table 3. Fornell criterion

	Digital innovation	Digital leadership	Innovative culture	Techno-work Engagement	Technostress Inhibitors
Digital innovation	0.853				
Digital leadership	0.658	0.892			
Innovative culture	-0.034	0.076	0.960		
Techno-work Engagement	0.000	0.083	0.833	0.901	
Technostress Inhibitors	0.022	0.111	0.940	0.890	0.795

The results show that each indicator has the largest FLC value in its latent construct compared to the FLC value in other constructs. This explains that the indicators used in this study have good discriminant validity in shaping their respective variables. When viewed from the value of the AVE root (bold) also has a greater value in the construct compared to the value of other variables. This value shows that the variable is classified as valid and there is no indication of collinearity in the variable.

Table 4. Test the validity of discrimination with HTMT

	Digital innovation	Digital leadership	Innovative culture	Techno-work Engagement	Technostress Inhibitors
Digital innovation					
Digital leadership	0.689				
Innovative culture	0.051	0.083			
Techno-work Engagement	0.080	0.090	0.905		
Technostress Inhibitors	0.061	0.122	1.011	0.966	

The results show that there are pairs of variables observed that do not meet the criterion of discriminant validity with an HTMT value of less than 0.90. This shows that there are constructs that do not meet the HTMT test.

4.1.4. Cross loading

Discriminant validity is carried out by looking at the cross-loading value of the construction measurement. The cross-loading value shows the magnitude of the correlation between each construct and its indicator and the indicators of other block constructs. A measurement model has good discriminant validity if the correlation between the construct and its indicator is higher than the correlation with the indicator of the construct of other blocks. After data processing using SmartPLS 3.0, Discriminant validity Cross Loading, it can be seen that the average indicator has a greater correlation coefficient with each construct compared to the value of the correlation coefficient of the indicator in the construction block in the other column, so it is concluded that each indicator in the block is a constructor in the column. In this section, the results of the discriminant validity test will be described. The discriminant validity test uses a cross-loading value. An indicator is declared to meet the discriminant validity if the cross-loading value of the indicator on the variable is the largest compared to other variables. The following are the cross-loading values of each indicator:

Table 5. Cross loading

	Digital innovation	Digital leadership	Innovative culture	Techno-work Engagement	Technostress Inhibitors
DI1	0.928	0.628	-0.009	0.045	0.043
DI2	0.930	0.612	-0.004	0.042	0.048

DI3	0.935	0.624	0.002	0.039	0.052
DI4	0.725	0.466	-0.082	-0.087	-0.038
DI5	0.720	0.446	-0.079	-0.084	-0.041
DTL1	0.481	0.885	0.073	0.063	0.095
DTL2	0.544	0.950	0.069	0.057	0.093
DTL3	0.536	0.916	0.074	0.070	0.107
DTL4	0.533	0.939	0.066	0.086	0.109
DTL5	0.733	0.754	0.055	0.083	0.088
IC1	-0.057	0.053	0.960	0.799	0.886
IC2	-0.023	0.074	0.973	0.802	0.898
IC3	-0.027	0.072	0.974	0.800	0.901
IC4	-0.011	0.080	0.703	0.614	0.721
IF1	-0.030	0.077	0.966	0.799	0.906
IF2	-0.014	0.084	0.697	0.615	0.726
IF3	-0.008	0.078	0.690	0.600	0.722
LF1	0.048	0.089	0.843	0.725	0.883
LF2	0.024	0.086	0.862	0.702	0.883
LF3	0.045	0.089	0.863	0.685	0.883
LF4	0.041	0.087	0.863	0.682	0.886
TSP1	0.000	0.105	0.360	0.385	0.462
TSP2	0.027	0.093	0.579	0.865	0.735
TSP3	0.034	0.108	0.606	0.901	0.753
TwE1	0.029	0.094	0.625	0.928	0.740
TwE2	0.000	0.075	0.645	0.942	0.750
TwE3	-0.026	0.056	0.935	0.829	0.887

Based on the presentation of data in the table above, it can be seen that each indicator in the research variable shows that there is the largest cross-loading value not in the variable it is formed compared to the cross-loading value in the variable itself. Based on the results obtained, it can be stated that the indicators used in this study do not have good discriminant validity on the technostress inhibitor variable.

4.1.5. Reliability Test

A construct is declared reliable if it has a composite reliability value above 0.70 and Cronbach's alpha above 0.70.

Table 6. Reliability

	Cronbach's Alpha	rho_A	Composite Reliability
Digital innovation	0.904	0.923	0.930
Digital leadership	0.935	0.944	0.951
Innovative culture	0.925	0.943	0.950
Techno-work Engagement	0.884	0.885	0.928
Technostress Inhibitors	0.931	0.940	0.943

The results show that the composite reliability value has met the criteria that are determined, which is above 0.70. This confirms that the measurement instruments used in this study are

consistent and reliable because they have an AVE value > 0.50 . Thus, the results of the reliability estimate analysis provide confidence in the reliability of the measurement instrument and the validity of the variable construct used in the study.

4.2. INNER MODEL

4.2.1. Coefficient of Determination

The determination coefficient is an important metric in evaluating how well the regression model matches the observed data. The table presents the determination coefficients (R Square) and R Square Adjusted for endogenous variables. The criteria used to assess the strength of the model are that the R Square value must be between 0.25 and 0.50 to indicate a medium model, and a value above 0.50 indicates a strong model. It can be seen from the results of the following analysis.

Table 7. R Square

	R Square	R Square Adjusted
Digital innovation	0.440	0.434
Innovative culture	0.006	0.002
Techno-work Engagement	0.793	0.790

The results show that the determination coefficient (R Square) for the digital innovation variable is 0.440 or moderate, while the innovative culture is classified as low, and techno-work engagement is classified as large as 0.793.

4.2.2. F Square

Before we discuss the results of further analysis, it is important to understand the concept of effect size used to evaluate how much impact or influence independent variables have on dependent variables in regression models. The table presents the F Square value for the variable resulting from the analysis. The criteria used to assess the effect size are that an F Square value of 0.02 indicates a small or low impact, a value of 0.15 indicates a medium or moderate impact and a value of 0.35 indicates a large or strong impact. With this framework, it can be explained in the following analysis results.

Table 8. F Square

	Digital innovation	Innovative culture	Techno-work Engagement
Digital leadership	0.779	0.006	0.001
Innovative culture	0.008		0.000
Techno-work Engagement	0.001		
Technostress Inhibitors			0.474

Based on the table above, it is concluded that the relatively large effects are those that have an f square value of $0.0 >$ namely digital leadership with digital innovation (0.779), technostress inhibitor with techno work engagement (0.474)

4.2.3. Model FIT (Goodness of fit)

The Goodness of fit (GoF) value test or Gof index developed by Tenenhaus et al. (2004) is used to evaluate measurement models and structural models and in addition, provides simple measurements for the whole of the model prediction. The criteria for GoF values are 0.10

(GoF small), 0.25 (medium GoF), and 0.36 (GoF large). To calculate the GoF, the square root of the average communality index and the average R-squares value are used.

Table 9. R-square, F-square and Gof

	R Square	AVE
Digital innovation	0.440	0.728
Innovative culture	0.006	0.828
Techno-work Engagement	0.793	0.812
Rata-rata	0.413	0.789
Gof	0.571	

The GoF value obtained was 0.571 large criteria. This means that the model has a great ability to explain empirical data, so overall it can be said that the model formed is valid.

4.2.4. Q SQUARE

The next stage is to conduct Q^2 (predictive relevance) testing using the blindfolding method to be able to provide evidence that certain variables used in a model have a predictive relevance with other variables in the model with a measurement threshold value above zero. The threshold value on the Q^2 (predictive relevance) test was 0.02 for small influence, 0.15 for medium influence, and 0.35 for large influence.

Table 10. Q square

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Digital innovation	1500.000	1029.260	0.314
Digital leadership	1500.000	1500.000	
Innovative culture	1200.000	1194.485	0.005
Techno-work Engagement	900.000	346.319	0.615
Technostress Inhibitors	3000.000	3000.000	

Based on the table above, it is known that the Q Square value in the endogenous digital innovation variable is 0.314. These results mean that the amount of data diversity explained by this research model is 31.4%. The amount of data diversity in the endogenous variable of techno work engagement was 0.615, and the diversity in the variable of techno work engagement was 61.5%.

4.2.5. Hypothesis Test

Table 11. Hypothesis Test Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Digital leadership → Digital innovation	0.663	0.664	0.036	18.453	0.000
Innovative culture → Digital innovation	-0.123	-0.128	0.074	1.675	0.095
Digital leadership → Innovative culture	0.076	0.076	0.056	1.358	0.175
Digital leadership → Techno-work Engagement → Digital innovation	-0.001	-0.001	0.003	0.314	0.753
Innovative culture → Techno-work Engagement → Digital innovation	-0.001	-0.003	0.014	0.096	0.924

Technostress inhibitor * digital leadership → Techno-work Engagement	-0.008	-0.008	0.022	0.337	0.736
Technostress inhibitor * innovation culture → Techno-work Engagement	0.005	0.006	0.029	0.171	0.864

The results show that digital leadership influences digital innovation by 0.663. This is because it has a T-statistical value of 18.453 or > 1.96 and a P-value of 0.000 or < 0.05 . Thus, increasing digital leadership will increase digital innovation by 0.663. From the analysis, the results also show that innovative culture does not affect digital innovation. This is because it has a T-Statistical value of 1.675 or < 1.96 and a P Value of 0.095 or > 0.05 . Thus, the hypothesis is rejected or the change in Innovative Culture will not affect the change in Digital Innovation. Related to H3, the results of the analysis show that digital leadership does not affect innovative culture. This is because it has a T-Statistical value of 1.358 or < 1.96 and a P Value of 0.175 or > 0.05 . Thus, the hypothesis is rejected or the change in digital leadership will not affect the change in innovative culture. The results of the analysis also show that technology equality cannot mediate digital leadership to digital innovation. Where the t-statistical value is 0.3144 or < 1.96 and the P Value is 0.753 or > 0.05 . Thus, technology aggregation cannot mediate digital leadership toward digital innovation. From the analysis, the results show that technology increment cannot mediate innovative culture against digital innovation. Where the t-statistical value is 0.096 or < 1.96 and the P-value is 0.9219 or > 0.05 . Thus, technology aggregation cannot mediate innovative culture against digital innovation. The results of the analysis also show that technostress inhibitors cannot moderate digital leadership toward technology efforts. Where the t-statistical value is 0.337 or < 1.96 and the P Value is 0.736 or > 0.05 . Thus, techno work engagement cannot mediate digital leadership to techno work engagement. The final analysis showed that technostress inhibitors could not moderate innovative culture toward techno work efforts. Where the t-statistical value is 0.171 or < 1.96 and the P value is 0.864 or > 0.05 . Thus, technology engagement cannot mediate innovative culture against technology engagement.

5. DISCUSSION

The results of the SEM-PLS analysis show a significant direct positive influence of digital leadership on innovation. This supports the theory of organizational innovation, which emphasizes that leaders must have technical and professional expertise and creative skills to process complex information to influence business innovation. This is in line with previous research that showed a positive and significant relationship between digital leadership and technological innovation (Wang et al., 2022; Yu & Moon, 2021; Heubeck & Meckl, 2022; AlNuaimi et al., 2022). For example, a recent paper by Magesa and Jonathan (2022) emphasized that there are Four Characteristics of Digital Leaders: Promoting Innovation by being an Anticipatory Leader, Digital Intelligent, and Dare to Take Risks (Magesa and Jonathan, 2022).

The culture and digital capabilities of business organizations play an important role in organizational readiness regarding the ability to form new business models (Zhen et al., 2021). There is no doubt that an innovative culture is becoming important in implementing digital innovation. However, it is certainly not enough to increase digital innovation directly through the organization's digital culture and capabilities. Existing studies highlight the existence of various factors that are the impact of an organization's digital culture and capabilities, which positively influence digital innovation. One of the key outcomes of digital culture and organizational capabilities is organizational readiness to influence digital innovation. Thus, the use of digital technology alone cannot guarantee the success of its

implementation (Lartey *et al.*, 2021). Hypothesis 2, which states that IC affects DI, is not supported. This is consistent with previous research that found no link between culture and innovation. Some researchers believe that culture can be set and shaped deliberately. When a technology system clashes with an organization's culture, its implementation will be rejected in one of two ways: the system will be rejected or modified to fit the current culture (Roper, Love and Bonner, 2017). Therefore, digital culture is a means for organizations to implement digital strategies in dealing with the rapidly changing external and internal environment (Zhang *et al.*, 2021). Thus, the existing organizational culture must be encouraged to be able to face the challenges of new values and norms as a first step to consider whether digitalization initiatives can be applied to companies or organizations.

Digital leadership is seen as the backbone of organizational culture in business in the digital era. According to Larjovuori *et al.* (2018), transformation to digital business requires a culture of innovation. This shows that emphasizing creativity, facing more risks, implementing experimentation and testing technology, and implementing smart business processes have become new demands (Larjovuori, Bordi and Heikkilä-Tammi, 2018). In some organizations, changes in organizational structure, especially when it comes to operating within a matrix organization, are considered part of a cultural change because they require a new perspective and business operations. As the business environment becomes more volatile, uncertain, complex, and ambiguous (VUCA), successful leaders must be more flexible, including being able to take on risks and make decisions faster (Cahyadi and Magda, 2021). Therefore, it is an important task for leaders related to organizational digitalization to carry out reforms and direct decision-making practices and form a more agile and flexible organizational structure.

Leaders are increasingly required to be able to face various challenges to adequately implement new technologies that continue to evolve in their organizations, while at the same time being able to implement a process of change in their business operations. Changes in the work environment are pushing leaders to rethink their approach and behaviour. In this context, the most relevant questions are how to manage teams spread across multiple locations, how to handle rapidly evolving technology preferences, and how to transfer knowledge so that the new technology implemented can function optimally (Klus and Müller, 2021). At the top management level, executives must rethink the design and direction of the company's strategy and business model and ensure its adaptation to the modern business environment. Executives play a crucial role in shaping new organizational structures and appropriate business processes and encouraging employees to have a positive attitude in the face of digitalization. Thus, executives must be able to lay the foundation for the implementation of digital transformation while acting as role models and pioneers. This means they must be able to face new challenges that can only be managed with the right leadership skills. Digitalization means forcing organizations to be able to face new risks. In this context, the security of innovative technologies is identified as a very urgent challenge for leaders. In addition, data privacy and security issues must be taken into account, so the ability to protect data inside and outside the organization continues to be a challenge that must be faced (Abowd, 2019).

Related to the advancement of digital technology, business leaders must deal with what is referred to as technostress. Technostress is a multi-phase process, which focuses on a subset of psychological processes caused by the complexity of assessing the elements of digital technology development simultaneously (Cram *et al.*, 2022). Previous research has contributed greatly through various ways of identifying antecedents and the consequences of technostress, classifying the impact of technostress, and focusing on the assessment and countermeasures of technostress (Tarafdar *et al.*, 2020). Technostress have been studied in a variety of professions, for example, IT professionals, sales workers, healthcare workers, and academics. Research in this context reports the characteristics of technology as a major

antecedent of technostress, which has an impact on productivity, organizational commitment, and lower satisfaction (Whelan, Golden and Tarafdar, 2022). Environmental conditions where new technology is one of the important characteristics, such as complexity, reliability, usability, and technology-related events, for example, system breakdowns that have the potential to create new demands on individual technology users (Tarafdar *et al.*, 2020). An improper assessment of the condition results in factors called techno-stressors, or technostressors, that cause stress (Nastjuk *et al.*, 2024). Improper assessment of the condition results in factors referred to as techno-stressors, or technostressors, that cause stress. Nastjuk *et al.*, (2024) in their study, they found that measuring the causal effects of technostress on individual performance shows that the demands of the technological environment are seen as a threat and perceived as the dark side of technostress (Nastjuk *et al.*, 2024). The creators of technostress simultaneously have a greater impact on the psychological and behavioural aspects of the individual. In the context of individual technology users, the decision to use technology is generally not dictated by specific norms implicitly. In other words, the ability of technology users who are forced to replace certain technologies is done by switching to other more modern technologies. This decision is influenced by the so-called "switching costs", which are defined as "the perceived uselessness of the user so that it is necessary to move from the status quo to a new information system" (Borle *et al.*, 2021).

6. CONCLUSION

The ability of MSME leaders to manage themselves and the business environment positively is influenced by a variety of competencies, as well as the ability to motivate others as well as the ability to think and act in an entrepreneurial manner. Meanwhile, organizational skills are influenced by their ability to master such abundant information and achieve balance related to the change process. This ability has a significant positive effect on managing data availability and security. Many researchers respond to the influence of leadership behaviour on innovation culture. The reciprocal trade-off between organizational performance and business innovation becomes a measure of leadership performance. Organizational innovation and the digital innovation (DI) framework describe the influence of leadership, innovation culture, and business processes as determinants of increased innovation. This study concludes that increasing support for organizations will increase the implementation of digital transformation (DT) in MSMEs.

The importance of this topic prompted researchers to investigate other critical predictor mechanisms of digital innovation (DI) for MSMEs, especially in developing countries. The results show that the complexity of technostress inhibitors (TI) also has an impact on the insecurity and discomfort of workers. Failure to learn and manage time puts workers at risk of losing their jobs. The findings show that the complexity of technostress inhibitors (TI) shows a significant relationship with technostressors. One possible explanation for the results of this study comes from the high temporal flexibility that this platform offers. Workers have the option to reschedule tasks to their liking which is unlike what happens in a traditional work environment.

Digital organizational culture has a positive influence on the digital innovation of SME companies. The results of this study also confirm that digital capabilities can predict digital innovation positively. In addition, digital organizational culture and digital capabilities have a positive influence on the readiness of SMEs related to the implementation of digital technology.

Based on the results of this study, it can be concluded that digital organizational culture can be an important factor in improving digital strategy and performance. The lack of a clear business digitalization strategy gives birth to a business strategy and the implementation of

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digitalization contradicts each other. Therefore, business digitalization does not affect the values of digital organizations too much as can be seen from the results of this study. Therefore, a high commitment to the formation of a digital culture is very important for the implementation of digitalization as an adaptive organizational value (Roper, Love and Bonner, 2017).

7. THEORETICAL AND PRACTICAL IMPLICATIONS

This study underscores important issues regarding leadership styles and organizational support in the MSME sector to enhance the role of digital transformation. Leaders must show a commitment to long-term resource allocation to avoid negative impacts that may arise from digital stress while continuing to increase the role of digital innovation through work engagement. This study underscores important issues regarding leadership styles and organizational support in the MSME sector to enhance the role of digital transformation. Leaders must show a commitment to long-term resource allocation to avoid negative impacts that may arise from digital stress while continuing to increase the role of digital innovation through work engagement.

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Digital transformation (DI) is a new imperative for organizational development to survive and reap superior performance. As a source of competitive advantage, DI should be combined with other types of leadership and support structures to help workers become involved in executing the various leaps. Implementing the right strategy can affect the desired innovation. This is the main contribution of this research to the field of management and digital transformation (DT) in MSMEs, especially in developing countries.

The result of this study is to propose a model that conceptualizes the influence of digital leadership (DL), innovation culture (IC) on digital innovation (DI), and technology engagement (TE) mediating the relationship with digital innovation. The role of technostress inhibitors (TI) moderation is also explored as a supporting mechanism for improving the performance of digital innovation (DI). This is in line with previous research that investigated the culture of innovation, leadership, and technology engagement in different industry and job sectors (Kraus et al., 2021; Bakker and Albrecht, 2018). This research is also in line with the results of previous research which emphasized that digital transformation (DT) in the MSME sector in developing countries to redesign and re-engineer their service processes from the ground up to improve their competitiveness (Tsindeliani et al., 2022).

The results of this study can be used as a guide for decision-makers and managers to focus their resources, on improving employee engagement and providing the necessary organizational support to mitigate the adverse effects of digital stress. In addition, the findings of this study also show that digital transformation (DT) demands drastic changes that are likely to disrupt existing cultures. Adopting new technologies and demanding digital skills will put a strain on employees and the entire organization. Thus, digital leadership is not enough to emphasize the importance of applying technology without first learning the right leadership skills and attributes for making effective change. So, digital knowledge, and leadership characteristics, such as creating trust, team development, altruism, and being a role model, are needed to make changes towards digital transformation.

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It also explains how technostress can be anticipated to increase the efforts of digital leaders (DL) and innovation culture (IC) for the sake of increasing digital innovation. Technostress involvement is a variable that can be managed by MSME leaders. The results of this study also show that digital leadership (DL) and innovation culture (IC) individually affect digital innovation (DI). When combined in the model in its entirety, the culture of innovation (IC) was not found to have a significant influence when moderated by technostress inhibitors (TI). For this reason, the advice for managers is to allocate technostress inhibitors

(TI) as a company resource. By doing this, leaders will build trust in employees through effective communication and allocate their resources efficiently and effectively. This digital transformation (DT) strategy can help organizations avoid delays or failures when prolonged digital stress can gradually disappear.

8. STUDY LIMITATIONS AND RESEARCH FUTURE DIRECTIONS

There are limitations in this study. The sample of the paper is drawn from the Indonesia MSMEs sector only. In the next research, industry and country differences need to be taken into account while generalizing the conclusions. It is crucial to recognize that the utilization of PLS-SEM might not have adequately addressed endogeneity stemming from other sources, including measurement error. Therefore, future studies should consider addressing endogeneity more comprehensively.

This study uses a cross-sectional model and relies on leader and manager perception. On the other hand, technological developments and technology adoption processes are dynamic. Therefore longitudinal studies can be conducted in the future to understand these dynamics better. Another suggestion is to investigate other leadership styles as predictors to produce a different innovative culture accompanied by other mediating variables such as a more agile company strategy that can help facilitate the transition of digital technology implementation to improve digital transformation (DT) performance related to limited company resources and improve company performance. Leaders and managers have a very important role to play in this context, not only to drive transformation efforts but also to change the traditional hierarchical organizational structure of MSMEs to become more agile by investing in continuous upskilling initiatives, pioneering new ways of working and introducing a new culture that encourages innovation. Further research is needed to understand these aspects of leadership and the future of work, such as the skills required for future leaders, the characteristics of digital workers, and how MSMEs can improve, cultivate, refresh, maintain and update these capabilities constantly.

The obstacles found in this study include a lack of funding and a lack of expertise, so the perpetrators MSMEs often lack the resources needed to implement digital transformation (DT) strategies. This requires MSME actors to collaborate with various parties, including the University and other stakeholders. Future research may explore the importance of building an ecosystem-oriented approach to enable MSMEs to gain access to financial capital and a wider range of talents. The findings of this study show that new digital technologies are redefining entrepreneurial activities that allow MSMEs to access global markets, value chains, and human resources. However, the local context still exerts a significant influence on SMEs in the early stages of transformation. Further research can identify the mechanisms underlying the creation and management of an ecosystem or collaboration network that supports MSMEs during the digital transformation phase and how to measure their impact.

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