

Digital Business Transformation of SMEs: Tracing Determinant Factors and Actors

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Abstract

This study seeks to identify the principal factors and actors that determine the digital business transformation of small and medium-sized enterprises (SMEs) in the Malang area (Malang City, Batu City, and Malang Regency). The sample size is 43 SME owners who are actively engaged in digitalisation activities within the context of a business incubator and a local government mentoring programme. The sampling method employed was purposive sampling, which was conducted between June and July 2024. The data analysis method comprised the use of AHP and MACTOR. The findings reveal that the three principal factors affecting SME digital business transformation are digital inclusion, digital infrastructure, and the role of SME incubators/consultants. In addition, the three primary objectives of implementing digital transformation are to increase sales/profits, to better market segmentation, and to facilitate non-cash transactions. The actors under the strongest level of convergence are the Local Government of SME and Trade with Financial Institutions (providers of SME business capital), while the moderate level of convergence is observed between the Local Government of SME and Trade with business incubators/consultants. Therefore, this paper suggests that the parties should increase a collaboration level to guarantee digital business transformation for SMEs.

Keywords: Digital transformation; SMEs; AHP; MACTOR.

JEL classification: M21, O14, O33

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1. INTRODUCTION

In the contemporary era, economic development and business progress increasingly rely on innovation in digital technology. This digital technology innovation constitutes a component of the digital transformation process. The digital transformation process is pivotal in the continued viability of small and medium-sized enterprises (SMEs). To ensure their survival, business owners must adapt their practices dynamically and flexibly to meet the demands of the digital age (Clemente-Almendros et al., 2024). Furthermore, crises such as the COVID-19 pandemic can accelerate the digital transformation. This condition is due to the considerable impact of the COVID-19 pandemic on the production and sales levels of MSMEs, necessitating the development of innovative business technologies (Wiliandri, 2020). Qi et al. (2024) posit that digitisation offers opportunities to bolster supply chains' resilience and security. This condition particularly applies to state-owned enterprises and those engaged in global competition.

In a study conducted by Zhang et al. (2023) it was found that external pressures, including those originating from institutional and market contexts and human capital, were associated with positive outcomes in the digital transformation process for 112 Chinese small and medium-sized enterprises (SMEs). Three mechanisms that influence the digital transformation process are professional top managers, increased investment in digital technology and increased subsidies from the government (Luo et al., 2023). Many countries have introduced policies on technological innovation, digital infrastructure and digital transformation in enterprises. Given these considerations, the government has endeavoured to provide digital infrastructure. The digital transformation process is inextricably linked to many internal and external factors inherent to the company in question. Additionally, the ongoing global pandemic has significantly impacted the digital transformation process (Yáñez-Valdés & Guerrero, 2024).

Digital transformation can affect business internalisation (Feliciano-Cestero et al., 2023). Fang & Liu (2024) highlighted several benefits and impacts of digital transformation, including (a) enhanced technology adoption capacity, which in turn increases the effectiveness of responding to market trends, consumer feedback and competitor activity; (b) greater responsiveness and flexibility to global market forces; and (c) increased company innovation in the form of products, services and business models. Kwon & Park (2017) noted that digital transformation engages numerous organisational entities, including marketing, information technology, product development, and human resources. In addition, Vogelsang et al. (2018) identified three key factors that facilitate digital transformation: technology, organisational structure and the external environment. This condition is essential for companies to collaborate with customers, suppliers, and other firms.

Moreover, this study seeks to ascertain the pivotal factors that shape digital business transformation for SMEs in the Malang area and to delineate the key actors involved in this transformation. In light of the above, this study contributes significantly to the existing literature in several ways. Firstly, this study identifies nine determinants of digital transformation that have been widely studied in the existing literature. This condition implies that the study in question determines the determining factors in a better manner.

Secondly, this study identifies five key actors involved in the digital transformation process for SMEs in the Malang area, encompassing both public and private institutions. Thirdly, this study identifies six key objectives of the digital transformation process for SMEs in the Malang area. Moreover, this study employs the AHP and MACTOR methodologies to examine the digital business transformation of SMEs, a technique that has not been widely utilized in previous literature. Finally, this study suggests that policymakers and business actors should enhance inclusion and digital literacy for SMEs in the Malang area. In particular, the local policymakers should implement mentoring and facilitation programmes for SMEs undergoing digital transformation.

The digital transformation model can be elucidated through a multitude of theoretical frameworks. For example, Clemente-Almendros et al. (2024) identified several theories that can be applied to analyse digital transformation models. Firstly, the Resource-Based View (RBV) emphasises the importance of distinctive organisational resources in creating and maintaining competitive advantage. Secondly, the Technology-Organization-Environment (TOE) framework offers a comprehensive perspective on the collective impact of technological, organisational and environmental factors on an organisation's decision to adopt new technology. Thirdly, the Technology Acceptance Model highlights the role of individual users' perceptions in technology adoption, underscoring perceived usefulness and ease of use as pivotal determinants.

Feliciano-Cestero et al. (2023), Fang & Liu (2024) and Jia et al. (2024) have provided detailed insights into digital business transformation by identifying and examining a range of relevant theories. Firstly, the Information Asymmetry Theory postulates that disparities in information mastery exist among different economic participants engaged in market economic activities. Consequently, those with superior information are in an advantageous position, whereas those with lesser information are disadvantaged. Secondly, the ownership, location and internalisation (OLI) paradigm is an appropriate three-dimensional framework for examining the decision-making processes of organisations concerning the pursuit of operational expansion using foreign direct investment (FDI). Thirdly, the Uppsala model (UpM) evaluates several assertions about its applicability to digital firms. Besides, multinational firms encounter distinct challenges when they internationalise compared to traditional firms. The fourth framework is the integration–responsiveness (I–R) framework. The fifth theory is that of strategic momentum.

In their respective works, Fitzgerald et al., (2014), Hanelt et al., (2022), and Nambisan et al., (2019) conceptualise digital transformation from a strategic standpoint as the profound integration of digital technologies with business strategies. This integration, in turn, engenders a systematic transformation of resources, capabilities, business models, processes, products, services and even business ecosystems. This transformation is achieved through learning, innovating, integrating and collaborating. Similarly, Wiliandri (2020) identified the internal and external factors associated with digital transformation. The internal factors encompass information technology, employee skills, digital strategy, financial aspects, organisational and internal IT resources, internal capability compatibility, internal resource compatibility, and business model changes. The external factors comprise digital technology,

digital competition, digital customer behaviour, the input of external IT consultants, supplier relations, customer relations, the compatibility of external capabilities and resources, government regulation, and related industrial factors.

The findings of this study reveal that digital inclusion and digital infrastructure are the primary determining factors for digital business transformation among small and medium-sized enterprises (SMEs) in the Malang area. Other findings show that the three main goals of digital business transformation are sales/profit, market segmentation and cashless transactions. Moreover, the most prominent actors in digital business transformation are local government agencies for SMEs and trade with financial institutions.

Specifically, Fang & Liu (2024) identified that digital transformation significantly impacted corporate technological innovation in China between 2000 and 2020. Digital transformation has been shown to enhance competitiveness, reduce financial barriers, improve the quality of internal control, and increase R&D investment. Furthermore, Clemente-Almendros et al. (2024) observed that digital transformation (digital adoption) can be positively influenced by the manager's academic background, internationalisation and firm size. The advent of digital transformation presents organisational leaders with the challenge of navigating the intricacies of organisational design, processes and goals (Jonathan et al., 2023). Jonathan et al. (2023) have identified five determinant factors influencing IT alignment: organisational structure, organisational culture, leadership skills, stakeholder relations and human resource management. In addition, several key factors influencing digital transformation have been noted, including top management commitment, IT capability, organisational culture change, and human capital capacity (Utami & Jayadi, 2023).

2. METHOD

2.1. Data

This study selects primary data collected by a survey in the Malang area (Malang City, Malang Regency, and Batu City). The total sample size was 43 business owners, selected through the purposive sampling method from June to July 2024. They participated in an SME training program conducted by the local government agency and local incubator business in the Malang Area.

The primary data are focused on identifying and collecting several indicators. The indicators involve (a) the determinant factors and the objectives of digital business transformation for SMEs following several theories consisting of the resource-based view (RBV), the Technology Acceptance Model (TAM), and the Technology-Organization-Environment (TOE) framework and (b) the actors which play a significant role in SMEs training program in Malang area.

The determinant factors of digital business transformation in the Malang area cover digital literacy, digital inclusion, transaction cost, digital infrastructure, government programs and incentives, incubators/consultants for SMEs, market segmentation, digital culture, and digital security. Besides, the objectives of digital business transformation consist of sales/profit orientation, market segmentation, local economy, digital literacy and inclusion,

cashless transactions, and local employment. Meanwhile, the actors in digital business transformation for SMEs are local government agencies for SMEs and trade, business associations of SMEs, business incubators/consultants, financial institutions, and universities.

2.2. Method

2.2.1 Analytic Hierarchy Process (AHP)

AHP is a qualitative method that identifies and assesses the priority factors of a particular variable. Saaty (2008) has elaborated on the concept and practical guidance of AHP for the decision-making process. This study employs AHP to identify and determine the priority factors of digital business transformation for SMEs in the Malang area. The assessment of each factor in digital business transformation uses nine scales (1-9) follows:

- Scale 1: the pairwise comparison between two factors has a similar meaning
- Scale 3: the one factor has the weakest beneficial impact compared to another factor
- Scale 5: the one factor has a weak beneficial impact compared to another factor
- Scale 7: the one factor has a moderate beneficial impact compared to another factor
- Scale 9: the one factor has a strong beneficial impact compared to another factor
- Scale 2, 4, 6 and 8: the one factor has a beneficial impact between the scale of 3, 5, 7 and 9.

Furthermore, the determinant factors of digital business transformation for SMEs can be constructed using an AHP framework as follows (Figure 1):

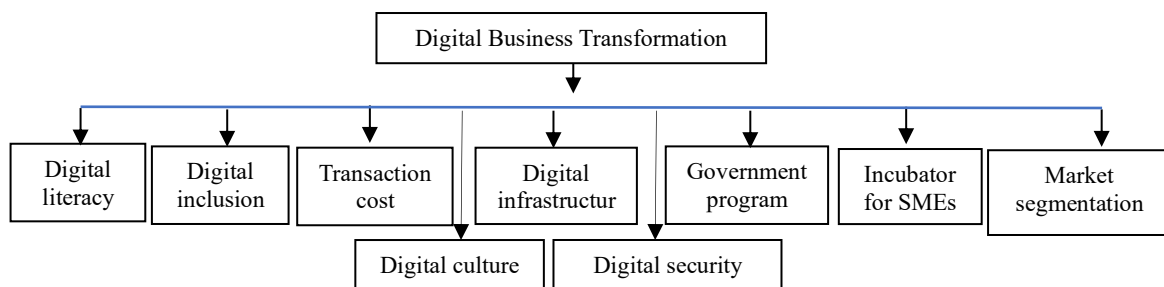


Figure 1. The AHP Framework

2.2.2 Matrix of alliances and conflicts tactics, objectives and recommendations (MACTOR)

MACTOR is a qualitative method to assess the role and interaction between actors in digital business transformation for SMEs in the Malang area. It provides a convergence and divergence among actors using several steps, including selecting actors, setting objectives, and describing the relationships among actors (Rees & MacDonell, 2017). Therefore, this study sets several objectives for business digital transformation, covering sales/profit orientation, market segmentation, local economy, digital literacy and inclusion, cashless transactions, and local employment.

The 43 respondents were grouped into five actor categories. They are local government agencies for SMEs and trade, business associations of SMEs, business incubators/consultants, financial institutions, and universities. All actors chose a specific preference regarding their contribution to leading digital business transformation for SMEs in Malang using the MACTOR method. The preference uses Likert scales between 1-4 (1 = strongly disagree/worst, 2 = disagree/weak, 3 = agree/good, and 4 = strongly agree/best). Technically, this study employs MACTOR 2.0 software.

3. RESULTS AND DISCUSSIONS

3.1. Results

The AHP procedures have been employed to ascertain the priority factors determining digital business transformation for SMEs in the Malang area. The initial procedure is the construction of a pairwise comparison. This pairwise comparison represents a subjective assessment of the relative importance of two factors pertinent to the digital transformation process. Respondents' perceptions of the pair of digital literacy and digital inclusion factors are represented on a scale of 4 for digital inclusion and 0.25 for digital literacy. This level of perception indicates that small and medium-sized enterprise (SME) owners have attempted to integrate digital technology more extensively into their business processes. The next stage is to enhance their knowledge and understanding of digital technology. A thorough account of the specifics of each pair of factors can be found in Table 1.

Table 1. Pairwise comparison for Digital Transformation

Digital Transformation for SMEs	Digital literacy	Digital inclusion	Transaction cost	Digital infrastructure	Government program and incentive	Incubator/Consultant for SMEs	Market segmentation	Digital culture	Digital security
Digital literacy	1.00	0.25	0.33	0.33	0.25	0.33	0.33	0.50	0.33
Digital inclusion	4.00	1.00	4.00	3.00	4.00	4.00	2.00	5.00	3.00
Transaction cost	3.00	0.25	1.00	0.33	0.33	0.25	0.25	0.33	0.25
Digital infrastructure	3.00	0.33	3.00	1.00	4.00	3.00	5.00	3.00	3.00
Government program and incentive	4.00	0.25	3.00	0.25	1.00	0.20	0.33	0.33	0.50
Incubator/Consultant for SMEs	3.00	0.25	4.00	0.33	5.00	1.00	4.00	3.00	3.00
Market segmentation	3.00	0.50	4.00	0.20	3.00	0.25	1.00	3.00	4.00
Digital culture	2.00	0.20	3.00	0.33	3.00	0.33	0.33	1.00	2.00
Digital security	3.00	0.33	4.00	0.33	2.00	0.33	0.25	0.50	1.00

Source: The Author(s) calculation

Table 2. Priority Factors Determine Digital Transformation for SMEs

Digital Transformation for SMEs	Eigenvector	Normalized Eigenvector	Rank (Priority)
Digital literacy	42768815	0.029	9
Digital inclusion	370740229	0.250	1
Transaction cost	51983263	0.035	8
Digital infrastructure	304487195	0.205	2
Government program and incentive	76846600	0.052	7
Incubator/Consultant for SMEs	250668366	0.169	3

Table 2. (Continued)

Digital Transformation for SMEs	Eigenvector	Normalized Eigenvector	Rank (Priority)
Market segmentation	178221511	0.120	4
Digital culture	109970259	0.074	5
Digital security	99748069	0.067	6
Consistency Index (CI)		0.125	
Consistency Ratio (CR)		0.086	

Source: The Author(s) calculation

Note: CR is calculated as CI divided by RI, where RI is the average CI from random matrices. RI values may be different across research studies. The Alonso and Lamata's value is about 1.4499 for 9 elements. Besides, $CR < 0.10$ indicates a concern of consistency in pairwise comparison.

Table 2 presents the results of the AHP analysis of the priority factors affecting digital business transformation in SMEs in the Malang area. The table explains that the primary objective of digital transformation is digital inclusion, with a value of 0.250. This value illustrates that the proprietors of SMEs attach greater importance to utilising digital technology, particularly in marketing, than other considerations. This condition indicates that businesses must act promptly to ensure continuity in the digital age.

The second priority factor is digital infrastructure, which has a value of 0.205. The development of digital infrastructure facilitates more extensive and improved access to digital technology. The higher quality of digital infrastructure engenders a better quality of digital business transformation. Suppose small and medium-sized enterprises face a dearth of adequate and widely accessible infrastructure. In that case, digital business transformation cannot be achieved with precision and optimal efficacy.

Incubators/consultants for SMEs occupy the third priority regarding value, with a value of 0.169, in the ranking of forms of digital business transformation. Business incubators are defined as institutions that implement incubation and have been regulated in the Presidential Regulation of the Republic of Indonesia Number 27 of 2013 concerning the Development of Entrepreneurial Incubators and the Republic of Indonesia Government Regulation Number 7 of 2021 concerning Facilitation, Protection and Empowerment of Cooperatives and Micro, Small and Medium Enterprises. Article 1, number 1 of Presidential Regulation 27/2013 defines an entrepreneurial incubator as "an intermediation institution that carries out the incubation process for Incubation Participants (Tenants)".

The subsequent finding is that the two lowest-ranking determinants of digital transformation for SMEs include transaction costs and digital literacy. The AHP values for these two factors are 0.035 and 0.029, respectively. This condition suggests that owners of SMEs do not consider the costs as the main factor associated with digital business transactions when undergoing digital transformation. In addition, they pay less attention to digital literacy as a concept of digital technology, which they must learn and comprehend as part of the digital transformation process. The apparent neglect of digital technology literacy among SME owners may be attributed to the perceived necessity of practical experience with

digital technology, which is of greater importance than the theoretical understanding of digital technology itself.

Moreover, this study analyses several objectives and actors (stakeholders) involved in the digital business transformation process for SMEs in the Malang area. The MACTOR method was employed to elucidate the function of objectives and the interconnections between these actors. The digital business transformation goals for SMEs can be broadly categorised as follows: (a) sales/profit, (b) market segmentation, (c) local economy, (d) digital literacy and inclusion, (e) cashless transaction, and (f) local employment.

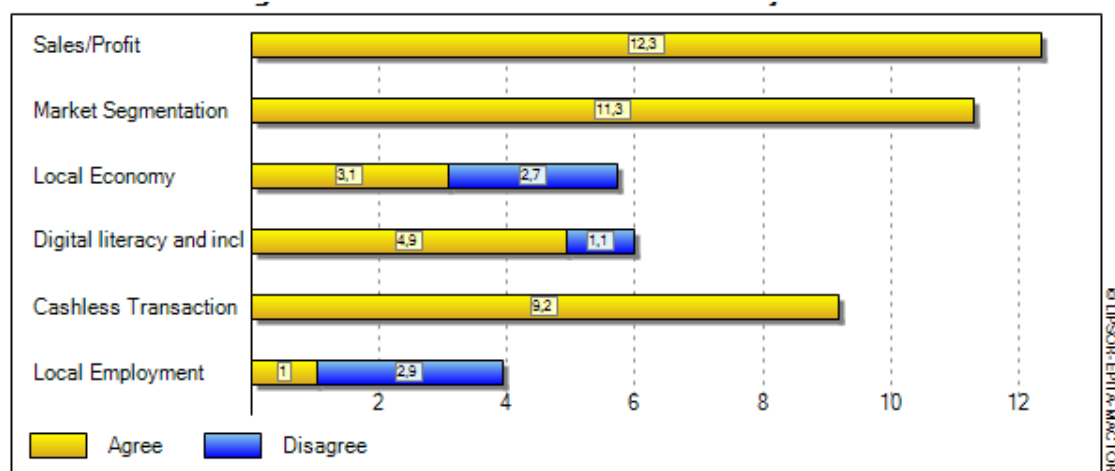


Figure 2. Histogram of Actor's Mobilisation towards its Objectives

Figure 2 illustrates the distribution of perceptions of SME owners regarding each objective. The objective of digital transformation is perceived to have the most significant impact on sales/profit. This condition shows that the primary objective of digital business transformation for SME owners is to increase sales and profits. The following level of perception is observed in the context of market segmentation. These two findings are mutually reinforcing, as attaining elevated sales/profit levels can be facilitated by implementing targeted and sustainable market segmentation strategies. Moreover, the digital transformation of SMEs in Indonesia has the potential to serve as a model for cashless transactions and a cashless society.

The level of perception of SME owners towards each digital business transformation goal can be quantified through the net distance indicators. The following findings are presented concerning the level of net distances between objectives (Figure 3): (a) The longest net distances occur between sales/profit (S/P) and market segmentation (MS); (b) long net distances occur between sales/profit (S/P) and cashless transaction (CT), and MS and CT; and (c) short net distances occur between S/P and local economy (LE), S/P and digital literacy-inclusion (DLI), DLI and LE, MS and DLI, DLI and CT, LE and CT, and LE and local employment (LP).

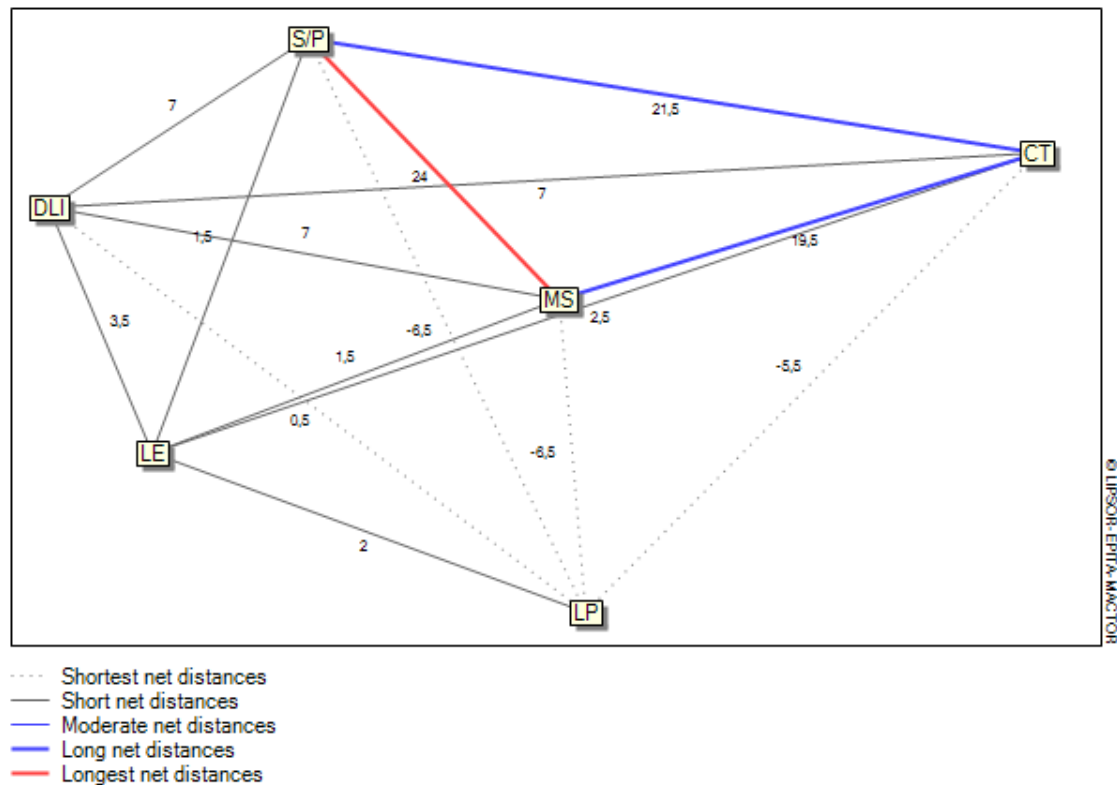


Figure 3. The Net Distances between Objectives

The results of the MACTOR analysis also reveal the extent of convergence between the various actors. The level of convergence explains the degree of proximity and the velocity of interaction between actors involved in the digital business transformation process for SMEs. Figure 4 delineates several findings on the level of convergence between actors, as follows: (a) the strongest convergence was observed between local government agencies for SMEs and Trade (LGSMET) and financial institutions (FI); (b) moderate convergence was noted between LGSMET and business incubator (BI), and LGSMET and university (U); and (c) weak convergence was identified between BI and FI, and business association of SMEs (BA) and LGSMET.

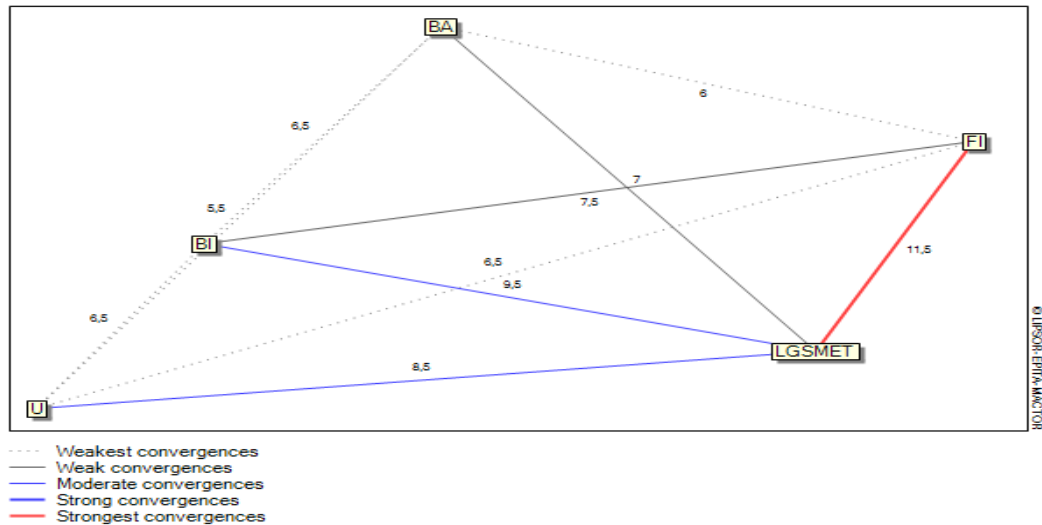


Figure 4. The Convergence Levels between Actors

The MACTOR analysis enables the measurement of the degree of divergence between actors, as illustrated in Figure 5. The figure describes the following findings: (a) the strongest divergences are observed between universities (U) and financial institutions (FI), as well as between FI and business incubators (BI); (b) moderate divergence is evident between U and local government agency for SMEs and trade (LGSME); and (c) the weakest divergences are observed between LGSME and BI, as well as between LGSME and business associations of SMEs (BA).

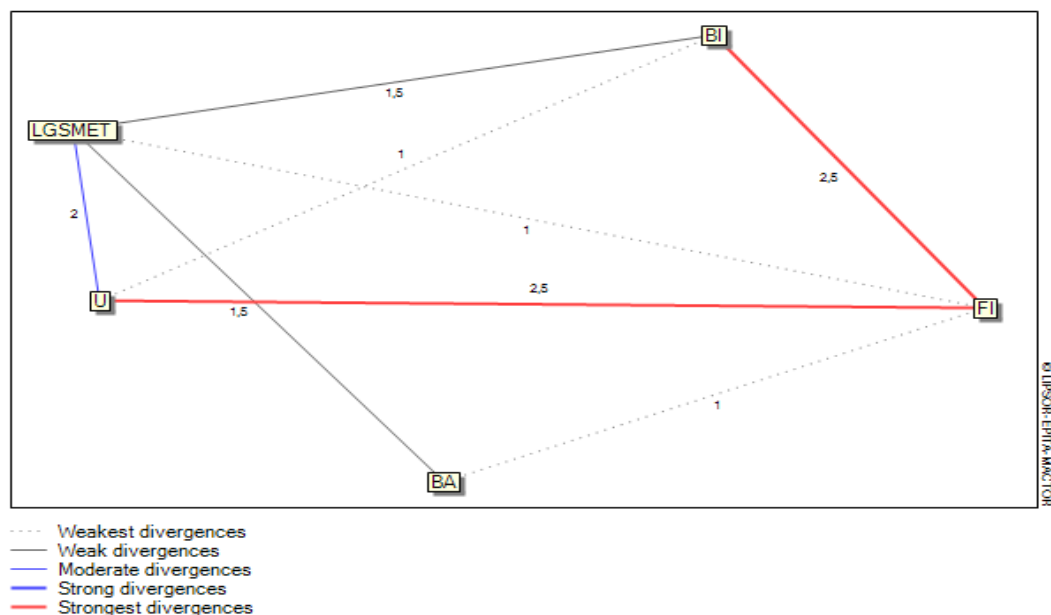


Figure 5. The Divergence Levels between Actors

Figure 6 presents the degree of net distances between actors in the digital business transformation of SMEs. The findings of the MACTOR are as follows: (a) the longest net distance is observed between LGSMET and FI; (b) a moderate net distance is evident between LGSMET and BI; and (c) a weak net distances are noted between LGSMET and U, and BI and BA.

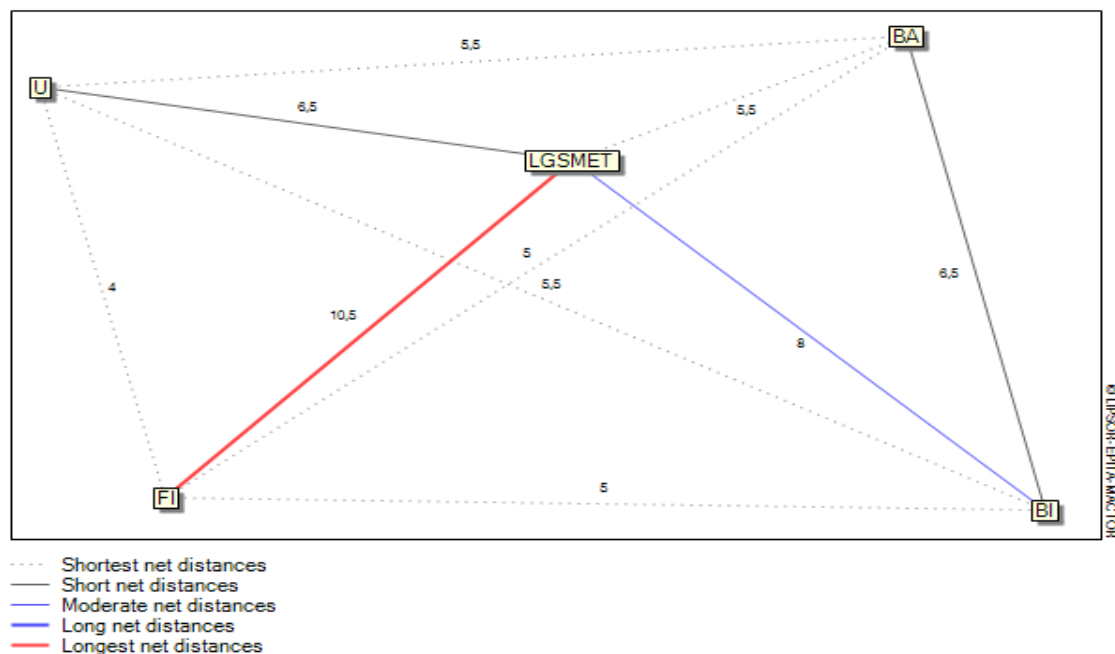


Figure 6. The Net Distances between Actors

3.2. Discussion

This study demonstrates that the extent of digital transformation is contingent upon the level of digital inclusion, the quality of digital infrastructure, and the availability of SME incubators and consultants. This condition means that the findings stimulate all parties in digital business transformation for SMEs to increase the collaboration level and contribution. Moreover, the advent of digital business transformation presents both an opportunity and a challenge for developing small and medium-sized enterprises (SMEs) in the Malang area. Digital transformation objectives are to encompass sales/ profit, market segmentation, local economic development, digital literacy and inclusion, cashless transactions, and local employment. Two entities that exhibit the most significant degree of convergence are local government agencies for SMEs and trade with financial institutions.

The process and benefits of digital business transformation for SMEs have been the subject of considerable discussion in the literature. For example, Phiet (2024) posits that digital transformation is integral to SME development. In addition, technological capability, organisational factors, environmental elements, government regulations, and competitive

pressure have been identified as key drivers of digital transformation among 380 SMEs in the Central Highlands region of Vietnam. Feng et al. (2024) discovered that digital transformation presents opportunities for businesses to advance towards the higher echelons of the global value chain, facilitated by factors such as innovation synergy, cost reduction and industrial integration. This condition was observed in China between 2007 and 2016. The extant literature indicates that digital transformation is conducive to enhanced innovation, productivity and resource utilisation. Nevertheless, these studies have not succeeded in elucidating the role of stakeholders (actors) in the digital transformation process. In light of the above, the findings of this study provide a valuable contribution to the development of the literature on the digital transformation of SMEs. In particular, this current study fills the empirical gaps from previous literature on the relationship and contribution among parties to stimulate digital transformation for SMEs in Malang area.

The digital transformation process comprises four principal components and three dimensions (Tungpantong et al., 2022). These four principal components cover (a) strategy, (b) process, and (c) product/service. Meanwhile, these three dimensions, namely: (a) externally, with a focus on the creation of a digital experience for customers; (b) internally, affecting business operations, decision-making and organisational structure; and (c) holistically, encompassing all parts and functions of the affected organisation. Wahid & Zulkifli (2021) argued that digital transformation can assist small and medium-sized enterprise (SME) proprietors optimise technology deployment. The determining factors for digital transformation can be broadly categorised as competitive pressure, technological advancement, cost minimisation and environmental influence.

The current study provides new evidence of digital business transformation both determinant factors and actors for SMEs in Malang area. The findings are supported by previous literature regarding the beneficial impact of determinant factors and actors in transforming digital business. For example, digital transformation can facilitate enhanced production efficiency and green sustainable development (Yang et al., 2024a). Digital transformation can have implications for the potential to attract foreign investment. Ko et al. (2022) have investigated the relationship between the level of success (innovation) of digital transformation and the role of information technology and organisational management commitment in Hungary. They revealed that the level of digital innovation within an organisation is contingent upon the degree of commitment demonstrated by its management. In other words, information technology's success is contingent upon company management's commitment.

In particular, Zou et al. (2024) discovered that younger CEOs demonstrated a greater proclivity to engage in digital transformation for Chinese listed firms between 2007 and 2022. Additionally, younger CEOs tend to exhibit greater proactive engagement in pursuing corporate digital transformation initiatives. Moreover, Kusuma et al. (2024) illustrated that sales directors play a pivotal role in digital transformation to ensure sales achievement. The leadership models, organisational citizenship behaviour (OCB), and sales management control have been demonstrated to influence digital transformation positively. The

aforementioned studies support this study's findings regarding each actor's role in the digital business transformation process for SMEs in the Malang area.

A review of recent literature reveals the identification of factors determining digital transformation and the involvement of stakeholders. For instance, Liu et al. (2024) asserted that digital transformation exerts influence on the establishment of prices or returns on financial asset portfolios. Furthermore, the process of digital transformation enhances business resilience to external shocks. Specifically, Malewska et al. (2024) explained that digital transformation in SMEs requires appropriate and dynamic business model innovation to reduce the risk of digital transformation failure. As posited by Astanto et al. (2022), company size exerts a detrimental effect on business inefficiency, export orientation within specific industrial sectors, and import intensity, which has a tendency to adversely impact corporate performance. The impact of digital transformation on SME performance can also be applied to business operations, marketing, and finance (Putri et al., 2022).

In their Yang et al. (2024b) hypothesised that digital transformation can be linked to decision-making and allocation processes, as theorised by agency and decentralisation models. Chen et al. (2024) posited that digital transformation has the potential to engender a range of benefits enhancing organisational performance and innovation. Merín-Rodrigáñez et al., (2024) observed that innovation business models function as effective mediators in the relationship between digital transformation and company performance. Besides, the innovation model has the potential to generate opportunities for the enhancement of investment by SMEs. Liao et al. (2024) emphasised that the development of digital transformation adopted green digital transformation innovation. Kao et al. (2024) noted that digital transformation investments are susceptible to failure due to the inaccuracy of the determination of components or dimensions. The condition is imperative that a number of factors are given due consideration, including the consumer experience, training, resource allocation and organisational operations.

As Panchal et al. (2024) argued, digital transformation in SMEs delivered the quality of company performance. The digital transformation is directed towards integrated technology digitalization. Within the broader context of industrial resource factors, the discrepancy between education levels and job opportunities within the industry is identified as a key impediment to the industry's optimal development (Khoiruddin et al., 2024). This condition is also the cause of the SME digital transformation process not being achieved significantly.

The several previous literatures that were elaborated in previous paragraph emphasized the issues and findings on the determinant factors and models of digital transformation for SMEs. However, the literatures were ignoring the relationship and contribution among parties in digital transformation process for SMEs. Therefore, this current study reveals the relationship and contribution the main parties using MACTOR. In particular, the findings stimulates the parties (actors) to enhance the collaboration level in guarantying digital business transformation for SMEs in Malang area.

4. CONCLUSIONS

This study identifies the priority factors and determining actors for the digital business transformation of small and medium-sized enterprises (SMEs) in the Malang area. The total sample size was 43 business owners, selected through the purposive sampling method from June to July 2024. The AHP and MACTOR methods were selected to describe the study objectives. Moreover, several theories were employed to buttress the study's objectives and data analysis, including the resource-based view (RBV), the Technology Acceptance Model (TAM), and the Technology-Organization-Environment (TOE) framework.

The findings reveal that the three priority factors shaping digital transformation are digital inclusion, digital infrastructure, and SME incubators/consultants. In contrast, three low-level digital transformation factors have been identified, namely: government programmes and incentives (relatively small in scale), transaction costs and digital literacy. The principal objectives of digital transformation are to enhance sales/profits, facilitate market segmentation, and facilitate non-cash transactions. Moreover, the two actors that exhibit the most substantial degree of convergence are local government agencies for SMEs and trade with financial institutions. Additionally, the actors that exhibit the strongest level of divergence are universities and financial institutions.

The implications of the study can be elucidated in several ways. Firstly, the implications of the existing literature highlight that the priority factors and roles of actors in the SME digital transformation process offer a valuable opportunity to gain a deeper empirical understanding of previous research and a range of theories, including RBV, TAM and TOE. Secondly, the policy implications emphasise the necessity for facilitating digital-based SME mentoring programmes and expanding market access. Thirdly, the practical implications for business are that SME owners should enhance their digital culture to facilitate the successful implementation of digital business transformation.

This study is subject to certain limitations, namely the lack of consideration of digital culture and digital leadership variables in the context of digital transformation. Besides, the digital culture and leadership for SMEs can be elaborated using RBV and Dynamic Capability Theory. Those variables can be utilized to reveal the digital transformation process for SMEs. Furthermore, this study does not contrast the experiences of SMEs that have not yet undergone digital transformation with those that have achieved success in this regard. It is recommended that future research address the limitations of this study, including the aforementioned weaknesses

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