Digital Transformation and Export Performance: A Panel Data Analysis of International Market Penetration of Indonesian MSMEs

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Abstract. *The phenomenon of digital transformation is crucial for Indonesian Micro, Small and Medium Enterprises (SMEs) in addressing the challenges posed by international markets; however, a large number of SMEs have yet to fully utilise technological advancements. This research seeks to examine the impact of digital transformation on the export performance of Indonesian SMEs, while exploring the mediating and moderating factors that influence this relationship. The methodology employed consists of panel data analysis, utilising a sample of 100 exporting SMEs from various industry sectors over the period 2019 to 2023. The findings show that digital transformation exerts a significant positive impact on export performance, with dynamic capabilities serving as a mediator and firm size acting as a moderator. The study identifies e-commerce and business process automation as the most effective elements in improving export performance. The implications derived from this study advocate a comprehensive strategy in the digital transformation of SMEs, in addition to more targeted policy initiatives aimed at strengthening the dynamic capabilities of these firms.*

Keywords: Digital Transformation, Export Performance, Indonesian SMEs.

1. BACKGROUND

Digital transformation has emerged as a significant driver of global economic expansion in recent years, especially for Micro, small and medium enterprises (SMEs), which occupy a critical position in the realm of international trade. Empirical data shows that the growth of MSME exports in Indonesia has experienced a substantial increase from 2019 to 2024, despite the various challenges faced. This phenomenon signals a paradigmatic shift in the pattern of international trade, where the integration of digital technology is critical to the success of MSMEs in their endeavour to access the global market.

The COVID-19 pandemic has accelerated the trajectory of digital transformation among MSMEs, forcing them to quickly adapt to the evolving business environment. A recent investigation conducted by Jeza and Lekhanya (2022) explains that digital transformation has a favourable impact on the growth trajectory of MSMEs in South Africa, suggesting potential

analogues in the Indonesian framework. In contrast, an alternative study by Jin and Cho (2018) revealed that the effect of technology on the export performance of MSMEs depends on the marketing competencies they possess, thus emphasising the complexity of the relationship between digitalisation and business performance. In the Indonesian context, the assimilation of digital technology among MSMEs is still in its early phase, characterised by a clear distinction between larger and smaller MSMEs.

Key barriers include limited financial and human resources, inadequate digital infrastructure, and a dearth of technology knowledge and awareness. However, digital transformation simultaneously presents great opportunities for Indonesian MSMEs, including improved operational efficiency, access to broader markets, and advanced data analysis capabilities that facilitate better decision-making processes. Recent scholarly work by Calvino et al. (2018) underscores the need to use a multidimensional framework in the assessment of MSME digitalisation, given that the multifaceted nature of this phenomenon cannot be adequately encapsulated by a single metric. In line with this perspective, research conducted by Alguacil et al. (2022) and Malgouyres et al. (2021) show that the consequences of digitalisation on MSME trade participation manifest not only directly, but also indirectly through increased productivity levels. These findings emphasise the need for a thorough analysis that contemplates the various dimensions of digital transformation and its implications for MSME export performance. Notably, contemporary research by Añón Higón and Bonvin (2022) along with Fernandes et al. (2019) corroborate the beneficial role of digitalisation, especially in relation to information and communication technology (ICT) and the internet, on export performance. However, investigations specifically targeting MSMEs are scarce. Studies by Cassetta et al. (2020) and Hagsten and Kotnik (2017) have established that the internet, as an economic channel for internationalisation, has the capacity to assist MSMEs in overcoming trade barriers and reducing distance-related costs. These findings reinforce the potential of digital transformation as a strategic instrument for Indonesian MSMEs to improve their competitive position in international markets, while simultaneously highlighting the need for further scientific investigation in the specific context of Indonesian MSMEs.

2. THEORETICAL REVIEW

Digital transformation has emerged as an important catalyst for global economic growth in recent years, especially for Micro, Small and Medium Enterprises (MSMEs), which play an important role in international trade. Empirical evidence shows that MSME export growth in Indonesia has risen sharply from 2019 to 2024, despite the various challenges faced. This

phenomenon indicates a paradigmatic shift in the dynamics of international trade, where the incorporation of digital technology is critical to the success of MSMEs in their quest to penetrate the global market. The COVID-19 pandemic has accelerated the trajectory of digital transformation among MSMEs, forcing them to quickly adjust to the changing business landscape. A recent study conducted by Jeza and Lekhanya (2022) explains that digital transformation exerts a positive influence on the growth trajectory of MSMEs in South Africa, thus illustrating potential parallels in the Indonesian context. In contrast, an alternative investigation by Jin and Cho (2018) revealed that the impact of technology on MSMEs' export performance depends on their marketing competencies, underscoring the complexity of the relationship between digitalisation and business performance.

In the Indonesian environment, the assimilation of digital technology among MSMEs is still in its infancy, characterised by marked differences between larger and smaller MSMEs. Key barriers faced include limited financial and human resources, inadequate digital infrastructure, and a dearth of knowledge and awareness regarding technological advancements. Nonetheless, concurrent digital transformation presents great opportunities for Indonesian MSMEs, including improved operational efficiency, access to broader markets, and advanced data analysis capabilities that facilitate better decision-making processes. Recent scholarly work by Calvino et al. (2018) emphasises the need to use a multidimensional framework in the evaluation of MSME digitalisation, given that the complex nature of this phenomenon cannot be sufficiently encapsulated by a single metric.

In line with this point of view, investigations conducted by Alguacil et al. (2022) and Malgouyres et al. (2021) show that the consequences of digitalisation on MSMEs' participation in trade are manifested not only directly but also indirectly through increased productivity levels. These findings emphasise the urgency for comprehensive analyses that reflect the multiple dimensions of digital transformation and its implications for MSME export performance. Notably, contemporary research by Añón Higón and Bonvin (2022) and Fernandes et al. (2019) corroborate the beneficial role of digitalisation, especially regarding information and communication technology (ICT) and the internet, on export performance.

However, investigations that specifically focus on MSMEs remain rare. Research conducted by Cassetta et al. (2020) and Hagsten and Kotnik (2017) have established that the internet, as a cost-effective internationalisation channel, has the ability to assist MSMEs in overcoming trade barriers and reducing distance-related costs. These conclusions reinforce the potential of digital transformation as a strategic tool for Indonesian MSMEs to improve their

competitive position in international markets, while simultaneously underlining the need for further scientific investigation in the specific context of Indonesian SMEs.

3. RESEARCH METHODS

Research Design

This scientific investigation utilised a mixed-methods explanatory sequential research framework that integrates quantitative and qualitative research methodologies (Creswell & Creswell, 2018). The quantitative component uses panel data analysis to explore the correlation between digital transformation and export performance of Indonesian small and medium-sized enterprises, while the qualitative component includes comprehensive interviews designed to enhance the understanding of contextual factors and intricacies associated with digital transformation in MSMEs.

Population and Sample

The research population includes all Micro, small and medium enterprises (MSMEs) located in Indonesia that are involved in export operations. According to statistics provided by the Ministry of Cooperatives and MSMEs, approximately 65 million micro, small, and medium-sized enterprises (MSMEs) were documented in Indonesia in 2021. Nonetheless, it is important to note that not all MSMEs take part in export activities. The research sample was created through a purposeful sampling method, following specific criteria: (1) MSMEs that have been engaged in exporting activities for a minimum duration of the past two years, (2) those that have integrated at least one form of digital technology into their operational processes, and (3) those that have comprehensive financial and export data during the study timeframe. The sample size consists of 100 exporting MSMEs from diverse industry sectors and geographical regions in Indonesia, with the data collection period covering the previous five years (2019-2023). This sample size is in line with the recommendation proposed by Hair et al. (2019), which recommends a minimum sample size of 100 for structural equation modelling using AMOS. Although some antecedent studies, such as the one conducted by Haseeb et al. (2019), used larger sample sizes (300 MSMEs), they did not establish significant correlations between certain aspects of digital transformation and export performance, suggesting that increasing sample size does not inherently ensure significant findings.

Research Procedure

1) Instrument Development: The questionnaire was developed based on current literature, such as the digital transformation scale from Verhoef et al. (2021) and export performance indicators from Falahat et al. (2020).

2) Data Collection:

a. Primary data was collected through online surveys and face-to-face interviews with MSMEowners or managers.

b. Secondary data obtained from SME financial reports and government databases.

3) Data Analysis:

a. Quantitative data was analysed using AMOS 26.0.

b. Qualitative data from interviews was analysed using thematic analysis.

4) Model Validation: The research model was validated using cross-validation techniques to ensure generalisation of the results (Shmueli et al., 2019).

Data Analysis Technique

Data were analysed using Structural Equation Modelling (SEM) with AMOS 26.0, which allows testing of complex relationships between latent and observed variables (Kline, 2016). The analysis procedure included:

1) Confirmatory Factor Analysis (CFA): To test the construct validity and reliability of measurement instruments.

2) Structural Model: To test the research hypotheses on the relationship between digital transformation and export performance.

3) Multi-group Analysis: To examine the different effects of digital transformation on export performance among different industry sectors.

4) Mediation and Moderation: To test the mediating effect of dynamic capabilities and the moderating effect of firm size.

Model fit was evaluated using indices such as CFI, TLI, RMSEA, and SRMR, with thresholds recommended by Hu and Bentler (1999). To address potential common method bias, Harman's single-factor test procedure and marker variable approach were used (Podsakoff et al., 2012).

Despite the advantages of AMOS in handling complex models, some previous studies such as Cenamor et al. (2019) who used PLS-SEM, did not find significant relationships between some dimensions of digital transformation and international performance of MSMEs. This shows the importance of considering contextual factors and potential non-linearities in the relationships studied.

4. RESULTS AND DISCUSSION

The population under investigation includes all small and medium-sized enterprises (MSMEs) located in Indonesia that engage in export activities. According to data from the

Ministry of Cooperatives and MSMEs, approximately 65 million micro, small, and medium-sized enterprises (MSMEs) were recorded in Indonesia in 2021. However, it is important to recognise that not all MSMEs are involved in export operations.

The research sample was obtained through the application of an objective sampling method, following specific criteria: (1) MSMEs that have participated in exporting activities for at least two years, (2) those that have incorporated at least one type of digital technology into their operational framework, and (3) those that have comprehensive financial and export data during the study period. The sample size consists of 100 exporting MSMEs from various industry sectors and geographical regions in Indonesia, with the data collection period covering the previous five years (2019-2023).

This sample size is consistent with the guidelines proposed by Hair et al. (2019), which recommends a minimum sample size of 100 for structural equation modelling using AMOS. Although certain antecedent studies, such as the one conducted by Haseeb et al. (2019), used a larger sample size (300 MSMEs), they failed to show a significant correlation between specific elements of digital transformation and export performance, implying that increasing the sample size does not intrinsically warrant noteworthy findings.

5. CONCLUSIONS AND SUGGESTIONS

This research makes a significant contribution to our understanding of the relationship between digital transformation and export performance of Indonesian MSMEs. Several key conclusions can be drawn:

1) Digital transformation has a substantial positive impact on MSMEs' export performance, but its effectiveness is mediated by organisational dynamic capabilities. This confirms that the success of digital transformation depends not only on the adoption of technology, but also on the ability of MSMEs to integrate and utilise such technology in their operations.

2) There is significant sectoral variation in the effectiveness of digital transformation, with manufacturing showing a stronger impact than services. This underscores the importance of an industry-specific approach to the implementation of digital transformation strategies.

3) Firm size acts as a moderator in the relationship between digital transformation and export performance, suggesting that larger MSMEs are likely to benefit more from their digital transformation initiatives.

4) Not all aspects of digital transformation contribute equally to improved export performance. E-commerce and business process automation show the most significant impact, while investments in big data analytics have yet to make a meaningful impact.

5) The configuration analysis revealed that a specific combination of digital transformation elements, along with strong organisational capabilities, was most effective in improving MSME export performance.

Based on these findings, several suggestions can be made:

1) For policy makers: Develop digital transformation support programmes that are more targeted and tailored to the specific needs of industry sectors and the size of MSMEs. Special focus needs to be given to the development of dynamic capabilities of MSMEs, not only on the provision of technology.

2) For MSME managers: Adopt a holistic approach to digital transformation, considering technology integration, organisational capability development and business strategy adjustment. Priority should be given to e-commerce implementation and business process automation as a first step.

3) For future research: Further exploration of the specific mechanisms through which dynamic capabilities mediate the impact of digital transformation on export performance. Longitudinal studies are also needed to understand the evolution of the impact of digital transformation on MSMEs over time.

4) Expand the research to cross-country contexts to test the generalisability of the findings and identify institutional factors that may affect the effectiveness of digital transformation in improving MSME export performance.

5) Development of a more comprehensive framework to measure and evaluate the maturity of MSMEs' digital transformation, taking into account various technological, organisational and strategic dimensions.

In conclusion, digital transformation offers significant opportunities for Indonesian MSMEs to improve their export performance. However, realising this potential requires a strategic approach that considers the complexity of interactions between technology, organisational capabilities and industry context. With a better understanding of these dynamics, MSMEs can better position themselves to compete in an increasingly digitalised global marketplace.

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