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ANALYSIS OF THE IMPLEMENTATION OF MSME DIGITAL TRANSFORMATION IN THE 3T REGION: A CASE STUDY ON THE PROGRAM OF THE COOPERATIVES, MSMES, INDUSTRY, AND TRADE OFFICE OF PUNCAK JAYA REGENCY, CENTRAL PAPUA

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ABSTRACT

This study investigates the implementation of digital transformation programs for Micro, Small, and Medium Enterprises (MSMEs) in Indonesia's 3T regions (Frontier, Outermost, and Disadvantaged), focusing specifically on Puncak Jaya Regency in Central Papua. Employing a qualitative case study approach, data were collected through in-depth interviews, field observations, and document analysis. The study aims to explore how local governments implement digitalization strategies for MSMEs in remote areas with limited infrastructure and technological access.Findings indicate that approximately 30–40% of MSMEs began adopting simple digital tools such as social media platforms for product promotion and mobile cashier applications for recording transactions. These changes were largely influenced by training and mentoring programs initiated by the local Department of Cooperatives and SMEs. Despite these advancements, several challenges remain, including poor internet connectivity, low digital literacy, lack of continuous technical assistance, and limited availability of digital devices. To address these obstacles, the local government applied adaptive strategies such as delivering training in local languages, providing hands-on support, and conducting outreach directly to the business owners in their communities. While early economic impacts are modest—such as slight increases in weekly revenue and broader customer reach—there is potential for long-term growth. The study concludes that a sustainable, community-based, and culturally appropriate model of digital transformation is essential to ensure inclusive development for MSMEs in Indonesia's remote and underserved areas like Puncak Jaya.

Keywords: Digital Transformation; MSMEs; 3T Regions; Local Government; Community-Based Model

INTRODUCTION

The 3T (Disadvantaged, Frontier, and Outermost) regions face significant development challenges, such as limited infrastructure, low access to basic services, and high geographical isolation. One of the 3T regions in Indonesia is Puncak Jaya Regency in Central Papua Province. The area has limited access to information and communication technology, which has a direct impact on local economic growth and community business resilience (Kemendesa, 2020).

Micro, Small, and Medium Enterprises (MSMEs) have an important role in the Indonesian economy, especially in disadvantaged areas. MSMEs account for more than 60% of the national Gross Domestic Product (GDP) and absorb up to 97% of the workforce (Kemenkop UKM, 2022). However, MSMEs in the 3T region still face serious obstacles, including limited market access, capital, and digital technology adoption (Zulkarnaen & Arifin, 2022).

In rural Indonesia, MSMEs face significant digital inequality. (Amalia et al., 2025) found that only 30–45% of rural businesses have proper internet access, while the rest are limited by infrastructure constraints and digital illiteracy, further widening the digital divide.

Digital transformation is a strategic effort to integrate technology in all aspects of business, including marketing, transactions, and financial management. This transformation is not only related to the use of software or digital platforms, but also

fundamental changes in the business model and culture of the organization (Westerman et al., 2014). The local government, through the Cooperatives and SMEs Office, has launched the MSME digitalization program as part of the Go Digital MSME Roadmap 2021–2024 (Kemenkop UKM, 2021). This program includes digital marketing training, the use of cashier applications, and the use of e-commerce platforms.

(Hendrawan et al., 2024), emphasized that digital transformation requires not only technological tools but also significant changes in mindset, leadership, and business models—elements that are often underdeveloped in remote MSMEs.

However, the effectiveness of the program in the context of 3T areas such as Puncak Jaya has not been widely researched academically. Challenges such as low digital literacy, limited internet networks, and socio-cultural barriers create complexity in the implementation of digital transformation. Therefore, this study aims to analyze the implementation of the MSME digital transformation program in Puncak Jaya Regency, identify obstacles and opportunities, and formulate a contextual and inclusive strategy.

LITERATURE REVIEW

Several previous studies have discussed digital transformation in the Micro, Small, and Medium Enterprises (MSMEs) sector in underdeveloped areas. (Zulkarnaen & Arifin, 2022), examined local government strategies in encouraging the digitalization of MSMEs in disadvantaged areas and found that successful implementation is highly dependent on training support, technology subsidies, and cross-sector collaboration, including with universities and non-governmental organizations. This research emphasizes the importance of the role of local governments as the main driver of digitalization, especially in areas with limited infrastructure.

(Yuliani, 2021), also highlighted the challenges of digitizing MSMEs during the COVID-19 pandemic. He noted that although digitalization is an urgent need during the pandemic, many MSME actors outside urban areas still find it difficult to access and utilize technology due to limited digital literacy, devices, and internet networks. This research is relevant in the context of the 3T region, where the digital divide is particularly pronounced and requires locally-based interventions.

Moreover (Yuliani, 2021) stated that community-based approaches, the use of local languages, and the use of adaptive technology are very effective in increasing digital adoption by MSME actors in disadvantaged areas. This research shows that the success of digitalization does not only depend on the provision of technology, but also on the suitability of strategies with local socio-cultural conditions. (Purnomo et al., 2024b), through a systematic review, concluded that while digitalization offers enhanced market reach and process efficiency, MSMEs still face common challenges such as affordability, digital skills gaps, and security threats. (Sutrialintang et al., 2024)demonstrated that digital marketing literacy in Southwest Papua significantly enhances MSME resilience and entrepreneurial orientation, suggesting similar potential in Puncak Jaya with the right support.

(Wicaksono et al., 2024) highlighted the growing cybersecurity threats in MSMEs, especially those in remote regions that lack IT knowledge and protection systems, underscoring the need for basic cyber awareness in digital training modules. Data from (Google Temasek & Bain & Company, 2023), digitized MSMEs have the potential to increase revenue by 26% compared to those that are not digital. Meanwhile, according to the Ministry of Cooperatives and SMEs (2022), the digitalization of MSMEs

supports increasing productivity, market expansion, and business resilience against external disruptions such as pandemics.

As a theoretical foundation,(Westerman et al., 2014), states that digital transformation encompasses more than just the use of technology; It is a strategic change that touches aspects of organizational culture, business model, and customer service processes. This framework provides a conceptual basis for understanding the digitalization of MSMEs not only as a technical process, but also as a transformative endeavor that requires systemic support.

Digitalization of MSMEs and Technology

Table 1. Types of Digital Technology Adopted by MSMEs in the 3T Region

Digitization Area	Technology Used
Marketing	Social media (Instagram, TikTok, Facebook)
Transaction	Cashier (POS) and e-wallet applications
Sales	E-commerce (Tokopedia, Shopee, Lazada)
Finance	Bookkeeping app (Digital accounting)

Source: Research Results, 2025

MSME digitalization includes the adoption of various technologies that support business operations, ranging from marketing to finance. MSMEs that go digital generally use social media for promotion, e-commerce for product distribution, as well as cashmere applications and digital bookkeeping for business management. Digital transformation delivers increased market reach, operational efficiency, and profitability but remains hindered by limited resources, technical skills, and data security issues (Purnomo et al., 2024a)

Digital Transformation Challenges of the 3T region

Digital transformation in the 3T region has its own challenges. Based on Presidential Regulation No. 63 of 2020, the 3T region is characterized by difficult geographical access, limited ICT infrastructure, low digital literacy, and the dominance of distinctive local culture. These challenges can be described as follows:

a. Geographically difficult to access (mountains, borders),
b. Limited internet and electricity networks,
c. Low digital literacy of the community,
d. Lack of training and mentoring,
e. The strong influence of local wisdom and regional languages.

Therefore, the digital transformation strategy in the 3T area cannot be equated with the urban area.

Digital Intervention Strategy of the 3T region

Research by (Dartanto et al., 2021), stated that the digitalization strategy in the 3T area must be adjusted to the socio-cultural characteristics of the community. The bottom-up approach, which involves indigenous leaders and local youth, is more effective in building sustainable technology adoption.

Table 2. MSME Digitalization Intervention Strategies and Solutions in the 3T Region

Strategy	Explanation
Digital Literacy	Basic technology training: use of smartphones, internet, e-commerce.
ICT Basic Infrastructure	Construction of BTS, public WiFi, solar power supply.
Local Partnerships	Collaboration with BUMDes, NGOs, and universities for digital empowerment.

Strategy	Explanation
Adaptive Technology	Use offline/low-data usage applications (e.g., lightweight POS applications).
Local Language and Wisdom	Design training and apps that support local languages and cultures.

Source: Research Results, 2025

Programs such as the Digital Village from the Ministry of Communication and Informatics show that strengthening technological capacity in disadvantaged villages requires synergy across sectors, ranging from the government, academia, the private sector, to local communities.

Based on literature reviews, most research on the digital transformation of MSMEs focuses on urban areas or developing areas. Research that specifically examines the implementation of digital transformation in the 3T area, especially through in-depth case studies such as in Puncak Jaya Regency, is still very limited. In addition, there have not been many studies that have identified local factors such as culture, age of business actors, and language in influencing the success of digitalization programs.

Thus, this research occupies an important position in filling the research gap by providing an empirical and contextual overview of how the digital transformation of MSMEs is carried out in the 3T area, as well as how the program can be adjusted to be more inclusive and sustainable.

Problem Formulation

Based on the background that has been described, the formulation of the problem in this study is as follows:

1. How is the implementation of the digital transformation program run by the Cooperatives, MSMEs, Industry, and Trade Office of Puncak Jaya Regency for local MSME actors?
2. What are the supporting and inhibiting factors in the implementation of MSME digital transformation in 3T areas such as Puncak Jaya Regency?
3. To what extent does the digital transformation program have an impact on increasing the capacity and performance of MSMEs?

Research Objectives

The objectives of this study are:

1. Analyzing the implementation of the MSME digital transformation program carried out by the local government in Puncak Jaya Regency.
2. Identify supporting and inhibiting factors in the implementation of MSME digital transformation in the 3T area.
3. Assessing the impact of digital transformation on the business development and competitiveness of local MSMEs in Puncak Jaya Regency.

RESEARCH METHODOLOGY

Approaches and Types of Research

This study uses a qualitative approach with a case study method. The qualitative approach is used to deeply understand social phenomena that occur in the natural context, as well as to see the perspectives and meanings provided by MSME actors and the implementers of digitalization programs. The case study method was chosen because the focus of the research is one specific location, namely Puncak Jaya Regency, with the aim of intensively describing and analyzing the implementation of MSME digital transformation by local government agencies (Yin, 2018).

Location and Subject of Research

The research location is in Puncak Jaya Regency, Central Papua Province, which is included in the 3T (Disadvantaged, Frontier, and Outermost) category based on Presidential Regulation Number 63 of 2020. The research subjects consisted of:

- MSME actors who are fostered by the Cooperatives, MSMEs, Industry, and Trade Office.
- Program implementing officials/staff in the agency who are directly involved in planning, training, and evaluating the digitalization program.

Data collection techniques

Data collection is carried out through:

1. In-depth interviews to explore information about the experiences, understandings, and obstacles felt by MSME actors as well as perceptions from the agency (Creswell, 2013).
   Building organizational competence—such as learning routines and knowledge sharing—is essential to mature digital transformation in SMEs" (Gonzalez-Varona et al., 2024)
2. Field observations, both participatory and non-participatory, are carried out to see firsthand the activities of MSMEs in applying digital technology in daily business activities.

Data Analysis Techniques

The data was analyzed with an interactive approach developed by (Miles et al., 2014), which consists of three main stages:

1. Data reduction: the process of sorting and simplifying raw data into relevant and focused information.
2. Data presentation: organizing data into narrative forms, tables, and thematic matrices.
3. Drawing conclusions and verification: compiling interpretations and drawing findings based on the patterns, relationships, and meanings of data that arise inductively.

RESULTS

This research produced a number of key findings related to the implementation of digital transformation programs for MSME actors in Puncak Jaya Regency. The findings were obtained through in-depth interviews with 10 fostered MSME actors and 3 staff of the Cooperatives, MSMEs, Industry and Trade Office, as well as direct observation of MSME activities in Mulia District and its surroundings.

3.1 Adoption Rate of Digital Technology by MSMEs

Before the program, most MSME actors were not familiar with the concept of digitalization. However, after the training, as many as 4 out of 10 MSME actors (40%) began to take advantage of simple digital features such as:

a. Product promotion via WhatsApp and Facebook
b. Transaction logging using Google Sheets
c. The use of a simple Android-based cashier application (example: Smart Cashier)

"I can now promote through the local community Facebook group. Buyers are more aware of my products, even though they are still limited to the district."
— Informant 2 (noken handicraft entrepreneur)

Infrastructure and Digital Literacy Barriers

A number of main obstacles were found in the implementation of the digitalization program:

a. Internet access is uneven, especially in districts far from the district center.
b. MSME actors aged >40 years tend to have difficulty participating in digital training.
c. There is no technology service center (digital house) as a place for follow-up assistance.

In observations, the younger generation of MSME actors are more adaptive in using Facebook and WhatsApp Business, while elderly business actors prefer to continue using manual methods.

Contextual Service Response and Strategy

The Cooperative Office has shown the adaptation of the strategy according to the local context:

a. The training is delivered using regional languages and hands-on methods.
b. Facilitation is in the form of an entry-level Android phone to be used as a business tool.
c. Initial collaboration with local Papuan market places as a promotional medium.

"We use a village-to-village approach, because not all business actors come to the office. We came directly."
— Service staff, Informant 11

Limited but positive Economic Impact

Although not yet significant, some MSMEs are starting to feel the economic impact of digitalization:

a. 3 MSME actors received orders from outside the district through digital promotions.
b. Within 2 months after the training took place, it increased by 10-15% after using social media.
c. However, the sustainability of the use of technology still depends on internet signals.

The Need for a Local Digitization Model

The need for a community-based digital transformation model was found:

a. Training needs to involve peer-to-peer learning between MSME actors.
b. Educational content is more effective if it is in the form of visual videos in local languages.
c. It is suggested that there be synergy with BUMDes and vocational high schools (SMK) to strengthen human resources

Table 3. Conclusion of Research Results

Yes	Aspects	Key Findings
1	Digital Access	Increased by 30-40% of MSMEs through social media and cashier applications
2	Obstacles	Limited internet network and low digital literacy
3	Service Response	Contextual and practice-based approach
4	Economic Impact	There has been an increase in transactions, but it has not been significant and consistent

Yes	Aspects	Key Findings
5	Strategic Needs	A local digitalization model based on culture and community is needed

Source: Research 2025

CONCLUSION

This study shows that the implementation of digital transformation of MSMEs in Puncak Jaya Regency as a 3T area has experienced positive developments even though they still face various limitations. The results of the study show that the training and mentoring program organized by the Department of Cooperatives, MSMEs, Industry and Trade has succeeded in encouraging around 30-40% of MSME actors to start adopting simple digital technology, such as social media for promotion and cashier applications for transaction recording.

However, the digitalization process is still faced with major challenges, such as limited internet networks, low digital literacy, limited devices, and the lack of adequate technology support centers. The strategy of the official approach based on direct practice, the use of local language, and visits to MSME locations has proven to be quite effective in building the initial interest of business actors in digitalization.

The economic impact of digital transformation is beginning to be seen, marked by an increase in transactions and the emergence of orders from outside the district, although the scale is still small and inconsistent. This research also identifies the importance of developing local digital transformation models that are based on culture, community, and strategic partnerships, such as with BUMDes, schools, and indigenous leaders. The adoption of e-commerce platforms among rural MSMEs in East Java has significantly improved their access to broader markets and reduced operational costs (Ramadhani et al., 2023).

However, this study has some limitations. First, the research was conducted in a single case study area so that the results could not be generalized to all other 3T areas. Second, the number of informants is limited and most of them come from certain fostered groups, so they do not represent all MSME actors in the region. Third, economic impact measurement is carried out in the short term, so it does not reflect the long-term effects of digital transformation. Therefore, further research with a wider area coverage and longitudinal approach is needed to obtain a more in-depth and representative picture of the effectiveness of MSME digital transformation in disadvantaged areas.

DISCUSSION

Based on these findings, the researchers made several suggestions:

1. Local governments need to strengthen basic ICT infrastructure, especially internet networks in remote districts, as well as provide digital service centers (e.g. village digital houses) as continuous training centers for MSMEs.
2. The Cooperative Office and local partners are advised to develop community-based training modules (peer learning) that are easily accessible to business actors with various age levels and educational backgrounds, using visual, interactive, and local-language approaches.
3. Cross-sector collaboration (such as with secondary schools, universities, BUMDes, and the private sector) needs to be strengthened in order to provide young trainers, adaptive technology, and open up wider access to digital markets.

4. Further research needs to be explored to explore the long-term impact of digital transformation on the economic performance of MSMEs and develop contextual local success indicators in accordance with the 3T region. Our results align with (Daryono et al., 2024), showing that effective digital business model innovation correlates with performance gains—potentially mediated by intellectual capital dynamics.

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