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Community-Based Digital Transformation for Rural MSMEs: QRIS Adoption, Digital Cashier Utilization, and Geo-Mapping Assistance in Katapang Hamlet, Indonesia

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Abstract

This study examines a community-based digital transformation model for rural Micro, Small, and Medium Enterprises (MSMEs) through the adoption of Quick Response Code Indonesian Standard (QRIS), digital cashier applications, and geo-mapping assistance in Katapang Hamlet, Indonesia. The study addresses persistent challenges faced by rural MSMEs, including limited digital literacy, reliance on cash transactions, manual bookkeeping, and low online business visibility. A Participatory Action Research approach with descriptive qualitative methods and supporting quantitative data was employed involving 12 MSME actors from culinary, retail, workshop, and home-based business sectors. Data were collected through participatory observation, semi-structured interviews, documentation, and digital skills evaluation. The intervention consisted of needs assessment, participatory mentoring, QRIS registration, digital cashier training using the Kasir Go application, and business location registration through Google Maps. The findings reveal that all participating MSMEs successfully adopted QRIS, utilized digital cashier systems, and established online business visibility through geo-mapping platforms. The program significantly improved digital literacy, transaction management efficiency, cashless payment readiness, and business accessibility. The study contributes a participatory and integrated digitalization framework tailored to rural and archipelagic communities, offering a replicable model for strengthening digital inclusion, MSME competitiveness, and sustainable local economic development.

Keywords: *Community Engagement, Digital Financial Inclusion, Digital Literacy, Digital Transformation, Geo-Mapping, MSME Competitiveness*

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INTRODUCTION

The acceleration of digital transformation has fundamentally reshaped the landscape of economic activity across both developed and developing countries. In Indonesia, Micro, Small, and Medium Enterprises (MSMEs) remain one of the most strategic sectors contributing significantly to employment generation, poverty reduction, and regional economic resilience. According to the Ministry of Cooperatives and Small and Medium Enterprises of Indonesia, MSMEs contribute more than 60% of the national Gross Domestic Product and absorb the majority of the national workforce. Despite their strategic role, the

majority of MSMEs, particularly those located in rural and archipelagic regions, continue to experience structural limitations in adopting digital technologies that are increasingly essential within contemporary economic ecosystems (Fahmi & Savira, 2023; Shandryk et al., 2024). The widening gap between rapid technological advancement and the digital readiness of rural enterprises has become a critical development issue that requires immediate scholarly and practical attention.

Digital transformation within MSMEs is no longer limited to online marketing activities alone, but increasingly encompasses broader dimensions such as digital financial inclusion, electronic transaction systems, digital bookkeeping, and geo-location visibility. The emergence of cashless payment systems, cloud-based cashier applications, and digital mapping technologies has created new opportunities for business efficiency, customer accessibility, and market expansion (Salsinha & Lukman, 2024; Verbivska et al., 2023). Nevertheless, the diffusion of these technologies remains highly uneven across regions. While urban MSMEs tend to adopt digital platforms more rapidly due to stronger infrastructure and higher digital literacy, rural enterprises often encounter persistent barriers related to internet accessibility, technological confidence, and limited institutional assistance (Correa & Esquivias, 2025; Keefe et al., 2024). This disparity has become particularly visible in Eastern Indonesia, where digital infrastructure development remains relatively uneven compared to major urban centers in Java and Sumatra.

In many rural communities, traditional business practices continue to dominate daily economic transactions. Cash-based payments, handwritten financial records, and word-of-mouth promotion remain common among small-scale entrepreneurs. Although such practices reflect local socio-economic realities, they also restrict the ability of MSMEs to participate effectively in broader digital economic ecosystems. Previous studies have demonstrated that limited digital adoption among rural MSMEs contributes to low operational efficiency, reduced market competitiveness, and restricted access to financial services (Anggoro et al., 2022; Purnomo, 2022). Furthermore, the absence of digital business identity through platforms such as Google Maps reduces customer trust and limits the discoverability of local enterprises within increasingly digitalized consumer behavior patterns (Arion et al., 2024; Chen et al., 2021).

The challenges surrounding rural MSME digitalization became even more apparent following the global COVID-19 pandemic, which accelerated the transition toward digital commerce and contactless transactions worldwide. Businesses lacking digital adaptability experienced greater vulnerability and reduced economic resilience during periods of mobility restriction and declining physical interaction (Gharieb et al., 2024; Syauta et al., 2024). In Indonesia, the government has responded through various digital transformation initiatives, including the promotion of Quick Response Code Indonesian Standard (QRIS) as a unified digital payment system intended to strengthen financial inclusion and support cashless economic ecosystems. QRIS has been recognized as an important instrument for simplifying transactions, increasing transparency, and integrating MSMEs into formal financial systems

(Kartiko et al., 2023; Pradita, 2025; Salsinha & Lukman, 2024). However, the effectiveness of such initiatives remains dependent upon the capacity of local communities to understand, access, and sustain digital practices within their everyday business activities.

Several recent studies have examined the relationship between digital transformation and MSME development. Research by Meighan (2021) and Sulaiman et al. (2024) found that technological adoption positively influences organizational performance and customer engagement among small enterprises. Similarly, Ghauri et al. (2022) and Tumpa & Naeni (2025) emphasized that digital technologies are increasingly central to business competitiveness and innovation strategies. Studies focusing on developing countries further indicate that digitalization contributes significantly to market accessibility and business sustainability, particularly among small-scale entrepreneurs (Cheruiyot, 2024; Jiang, 2023). In Indonesia, digital financial technologies have also been associated with improved financial inclusion and transaction efficiency for MSMEs (Barter & Koulu, 2021; Lee & Sylvén, 2021). Nevertheless, most of these studies predominantly focus on urban environments where technological infrastructure and digital ecosystems are more established.

Other scholars have explored the implementation of digital payment systems such as QRIS within the context of financial inclusion. Research by Habiburrahman et al. (2025) and Karnouskos (2020) demonstrated that QRIS adoption enhances transaction efficiency and reduces dependency on cash-based systems among urban merchants. Likewise, studies by Danar (2024) and Neves & Mead (2021) reported positive perceptions among MSME actors regarding the convenience and flexibility of QRIS-based transactions. Despite these findings, the majority of existing studies examine adoption from a technological acceptance perspective without deeply investigating the role of participatory community engagement in facilitating digital adaptation, particularly within geographically isolated communities. As a result, the socio-cultural dimensions of digital transformation in rural settings remain underexplored.

In addition to digital payments, the use of digital bookkeeping applications has increasingly attracted scholarly attention due to its relevance for business transparency and financial management. Prior studies suggest that digital cashier applications help small enterprises improve transaction recording accuracy, monitor sales performance, and reduce administrative inefficiencies (Kusuma et al., 2024; Reyna et al., 2018). However, technological adoption among rural MSMEs often encounters practical obstacles, including limited familiarity with mobile applications and insufficient digital mentoring support. Many existing digital literacy programs remain dominated by one-directional training models that prioritize theoretical exposure rather than long-term participatory assistance (Kusuma et al., 2024; Noviani et al., 2025). Consequently, sustainability of technology adoption frequently becomes problematic once external facilitators withdraw from the community.

Research concerning geo-mapping technologies and digital visibility for MSMEs has also expanded in recent years. Platforms such as Google Maps have become increasingly important for enhancing customer reach, location accessibility, and online business legitimacy

(Paul et al., 2023; Rong & Liu, 2025). Digital location visibility contributes not only to marketing effectiveness but also to consumer trust in small enterprises operating within competitive marketplaces. Nevertheless, rural businesses often remain absent from digital mapping platforms due to limited awareness and inadequate technical assistance. Existing studies have rarely integrated geo-mapping initiatives with broader MSME digitalization programs, particularly within community empowerment frameworks in rural and archipelagic contexts.

Scholars within community development studies consistently argue that participatory approaches are more effective in fostering sustainable behavioral and technological change compared to conventional top-down interventions (Kapoor & Kapoor, 2021; Rezai et al., 2026). Community-based engagement emphasizes collaborative learning, contextual adaptation, and active participation of local actors throughout the transformation process. In rural economic development, participatory assistance has been shown to strengthen local ownership, increase confidence, and improve sustainability outcomes (Robinson, 2023; Theocharis, 2026). Despite this theoretical recognition, relatively few studies have integrated participatory action approaches with comprehensive digital transformation initiatives involving financial technology, digital management systems, and business geo-visibility simultaneously.

The present study emerges from these intersecting concerns and empirical realities observed in Katapang Hamlet, Huamual District, West Seram Regency, Indonesia. Preliminary observations indicated that most local MSME actors still relied heavily on manual transactions, cash payments, and conventional promotion methods. Digital literacy levels remained relatively low, while online business visibility was almost nonexistent. More importantly, previous digitalization initiatives in similar rural contexts often focused narrowly on isolated technological interventions without building an interconnected ecosystem capable of supporting sustainable digital adaptation. Such fragmentation limits the long-term effectiveness of digital transformation efforts among rural entrepreneurs whose technological experiences are shaped not only by infrastructure constraints but also by social interaction, trust, and continuous assistance.

Against this backdrop, this study develops an integrated community-based digital transformation framework that combines QRIS adoption, digital cashier utilization through Kasir Go, and geo-mapping assistance using Google Maps within a participatory mentoring process tailored to rural MSMEs in Eastern Indonesia. Rather than positioning technology merely as an external innovation to be introduced, the study approaches digitalization as a collaborative social learning process rooted in local realities and community engagement. By situating digital transformation within a rural and archipelagic context that remains underrepresented in international literature, this research contributes to a more grounded understanding of how digital ecosystems can be constructed incrementally through participatory empowerment practices. The study therefore seeks to analyze the initial condition of digital literacy among rural MSMEs, evaluate the effectiveness of participatory

digital assistance, identify supporting and inhibiting factors affecting technological adoption, and formulate an adaptive model of community-based digital transformation capable of strengthening the sustainability and competitiveness of rural MSMEs in developing regions.

RESEARCH METHOD

This study employed a qualitative research approach within the framework of Participatory Action Research (PAR) to examine and facilitate the process of digital transformation among rural Micro, Small, and Medium Enterprises (MSMEs) in Katapang Hamlet, Huamual District, West Seram Regency, Indonesia. The qualitative approach was selected because the research sought not only to measure the adoption of digital technologies, but also to understand the lived experiences, perceptions, challenges, and adaptive processes of MSME actors within their socio-cultural context. Digital transformation in rural communities cannot be separated from issues of trust, technological familiarity, local interaction patterns, and community participation, all of which require in-depth contextual exploration rather than purely numerical measurement (Naeem et al., 2023; Rahman et al., 2025). In this regard, Participatory Action Research was considered particularly relevant because it emphasizes collaborative problem-solving, active community engagement, and direct social change through continuous interaction between researchers and participants (Stutchbury, 2022; Yoon & Uliassi, 2022). The approach also enabled the research process to move beyond observation toward practical empowerment and co-learning activities that directly benefited the participating MSMEs.

Katapang Hamlet was purposively selected as the research location due to its representative characteristics as a rural and archipelagic community experiencing limited digital integration despite the growing national agenda for MSME digitalization. Preliminary observations revealed that most local businesses still relied on cash-based transactions, handwritten bookkeeping, and conventional promotional methods. Internet access was available but remained underutilized for productive economic activities. Furthermore, no previous structured digital assistance program integrating digital payment systems, cashier applications, and geo-mapping technologies had been conducted systematically within the community. The location therefore provided a meaningful context for examining how participatory digital assistance could support rural business adaptation in areas that are often underrepresented in studies of technological transformation in Indonesia.

The research involved 12 MSME actors operating in various sectors, including small retail kiosks, culinary businesses, motorcycle repair workshops, and home-based enterprises. These participants were selected using purposive sampling techniques based on several considerations, namely business continuity, willingness to participate actively throughout the mentoring process, and limited prior experience with digital business technologies. The inclusion of diverse business sectors was intended to capture varying forms of technological adaptation and challenges among rural entrepreneurs. In addition to MSME actors, several

community representatives and local facilitators were also informally involved to strengthen contextual understanding and support the participatory process during field implementation.

Data collection was conducted through participatory observation, semi-structured interviews, documentation, and practical digital evaluations. Participatory observation was carried out intensively during mentoring activities to understand how participants interacted with digital technologies in real situations, including their responses, difficulties, and learning processes. This method allowed the researchers to observe behavioral changes directly while simultaneously building trust with participants. Semi-structured interviews were conducted before, during, and after the implementation process to explore participants' experiences, perceptions of digitalization, motivations, and obstacles encountered during technology adoption. The semi-structured format was chosen because it provided flexibility for participants to express their experiences naturally while still maintaining alignment with the research objectives (Pyo et al., 2023; St. Pierre, 2020). Documentation techniques were used to record training activities, QRIS registration processes, cashier application usage, and Google Maps business registration as supporting empirical evidence. In addition, practical evaluations were conducted to assess participants' ability to independently operate QRIS, Kasir Go applications, and digital location services after mentoring activities were completed.

To ensure the credibility and validity of the findings, this study applied triangulation techniques involving data source triangulation, method triangulation, and time triangulation. Data source triangulation was conducted by comparing information obtained from MSME actors, community representatives, and field observations. Method triangulation involved cross-checking findings derived from interviews, observations, and documentation to ensure consistency and reduce subjective interpretation (Effendy et al., 2022; Taherdoost, 2022). Meanwhile, time triangulation was applied through repeated interactions and evaluations at different stages of the mentoring process in order to observe changes in participants' digital understanding and technological practices over time. Data analysis was conducted continuously using thematic categorization, data reduction, interpretative analysis, and reflective evaluation throughout the research process. This analytical process enabled the researchers to identify recurring patterns, contextual dynamics, and meaningful insights regarding community-based digital transformation among rural MSMEs.

RESULTS AND DISCUSSION

Initial Conditions of Rural MSMEs Before Digital Transformation

Prior to the implementation of the community-based digital transformation program, the majority of Micro, Small, and Medium Enterprises (MSMEs) in Katapang Hamlet operated within highly conventional business systems characterized by limited technological integration and low digital engagement. Based on participatory observations and semi-structured interviews conducted during the preliminary stage of the research, most business actors relied heavily on cash-based transactions, handwritten bookkeeping, and face-to-face promotional practices. The participating MSMEs consisted of 12 small-scale enterprises

operating in culinary services, neighborhood kiosks, motorcycle repair workshops, and home-based businesses. Economically, these enterprises functioned as household-oriented survival businesses with limited operational capital and modest daily transaction volumes. Most participants had educational backgrounds equivalent to junior or senior high school, while only a small number had previous exposure to digital business applications. These conditions shaped the participants' initial perceptions that digital technologies were complex, urban-oriented, and not directly relevant to rural economic activities.

The findings revealed that digital literacy among participants remained relatively low despite the availability of basic internet infrastructure in the village area. Almost all participants used smartphones primarily for communication and social media consumption rather than productive economic activities. Of the 12 participating MSMEs, none had previously implemented QRIS as a digital payment system, only one participant had ever attempted to use a simple cashier application, and none had registered their businesses on Google Maps. These findings demonstrate that the issue was not merely technological access, but rather limited capability in transforming digital access into productive business utilization. This condition reflects what Cueto et al. (2022) and Samputra & Alfarizi (2025) conceptualizes as the second-level digital divide, where disparities emerge not from ownership of technology alone, but from unequal skills, confidence, and practical capacity in using digital systems effectively.

The dependence on manual transaction systems significantly influenced business efficiency and financial transparency among participants. Most MSME actors recorded sales informally using notebooks or relied entirely on memory-based calculations. During interviews, several participants admitted that they often experienced difficulties in tracking daily income and separating household expenditures from business finances. One participant identified as "AR," a small food vendor, explained that financial records were rarely maintained consistently because the process was considered time-consuming and confusing. Similar experiences were also expressed by "MN," who operated a neighborhood kiosk and stated that digital applications were perceived as complicated due to limited understanding of smartphone-based business tools. These findings indicate that technological reluctance was strongly associated with low confidence and fear of making operational mistakes rather than outright rejection of innovation itself.

The absence of digital payment systems also influenced customer transaction patterns and business adaptability. Several participants reported that younger consumers had occasionally asked whether non-cash payment options were available, particularly mobile banking transfers or QR-based transactions. However, due to the lack of knowledge regarding QRIS registration procedures and concerns about banking administration, participants continued relying exclusively on cash payments. This condition limited transaction flexibility and reduced the capacity of businesses to respond to changing consumer behavior within increasingly cashless economic environments. Previous studies have similarly emphasized that digital financial inclusion remains uneven in rural communities due to low technological

literacy and insufficient mentoring support (Mohanty & Mishra, 2020; Yudiastuti et al., 2021).

In addition to financial limitations, the study also identified low digital visibility as a significant challenge for rural MSMEs. None of the participating businesses possessed formal digital location identities through Google Maps or similar geo-location platforms. As a result, local enterprises remained largely invisible within broader digital consumer ecosystems despite operating for years within the community. This invisibility reduced opportunities for market expansion, customer trust, and online discoverability. Several participants expressed surprise upon learning that business locations could be digitally registered and accessed publicly by potential consumers. One informant, coded as "HL," acknowledged that he previously assumed Google Maps was only relevant for large businesses located in urban areas. Such perceptions illustrate how socio-cultural assumptions shape rural technological exclusion even when technological platforms themselves are technically accessible.

The field observations further revealed that technological adaptation among participants was deeply influenced by social interaction patterns and learning environments. Many participants expressed hesitation when first introduced to digital business tools due to fear of failure and embarrassment about their limited digital skills. However, during early mentoring sessions, participants gradually became more open to experimentation once practical demonstrations and peer discussions were introduced. This finding reinforces arguments from community-based digital inclusion studies that technological empowerment in rural contexts is strongly dependent upon participatory engagement and contextual learning processes rather than formal instruction alone (Salim, 2026; Sunuantari et al., 2025).

Figure 1 Community-based mentoring improved the digital literacy of rural MSMEs in Katapang Hamlet
Source: Field Documentation, 2026

Overall, the initial conditions of MSMEs in Katapang Hamlet illustrate that rural digital transformation challenges extend beyond infrastructure availability and involve broader

issues related to digital capability, technological confidence, and socio-cultural adaptation. Although internet access and smartphones were already present within the community, productive digital engagement remained minimal due to limited practical understanding and the absence of participatory assistance mechanisms. These findings confirm that sustainable rural digital transformation requires approaches that position technology adoption as a gradual social learning process embedded within local community realities rather than merely as a technical intervention.

Community-Based Participatory Assistance as a Rural Digital Transformation Strategy

The implementation of community-based participatory assistance in Katapang Hamlet was designed not merely as a technical training program, but as a collaborative learning process rooted in local interaction, social trust, and gradual technological adaptation. The mentoring activities were conducted through a Participatory Action Research framework that positioned MSME actors as active participants rather than passive recipients of information. This approach emerged from the initial observation that many participants experienced technological anxiety and lacked confidence in engaging with digital systems despite already possessing smartphones and internet access. Consequently, the assistance process emphasized repeated practice, direct demonstrations, informal dialogue, and continuous accompaniment tailored to the participants' pace of learning and everyday business realities.

The mentoring activities began with informal discussions and needs identification sessions involving all participating MSMEs. Rather than immediately introducing digital applications, the facilitators first explored participants' daily business practices, challenges, and previous experiences with technology. This initial stage proved important in building emotional proximity and reducing participants' perception that digital transformation was an external or intimidating process. Several participants initially expressed concerns that they would not be capable of understanding QRIS registration procedures or operating cashier applications independently. One participant coded as "SR," who operated a home-based culinary business, stated during the preliminary interview that digital applications were often associated with "young people and city businesses," reflecting the perception that rural entrepreneurs lacked the capability to participate in digital economic systems.

As the mentoring process progressed, the participatory model gradually transformed participants' attitudes toward technology. Instead of relying on lecture-based instruction, facilitators adopted a practice-oriented approach in which participants directly used their own smartphones during every session. QRIS registration, cashier application setup, and Google Maps business registration were conducted step-by-step alongside practical demonstrations and peer assistance. Participants were encouraged to ask questions freely, repeat procedures multiple times, and assist one another when difficulties emerged. This co-learning atmosphere reduced fear of failure and created a more inclusive learning environment for participants with limited technological experience. Observational findings indicated that participants became more confident when they realized that technological mistakes were treated as part of the learning process rather than as indicators of

incompetence.

The participatory interactions also strengthened social trust among participants and facilitators, which became a crucial factor supporting technology adoption. In several mentoring sessions, participants who initially struggled with smartphone operations gradually became more active after observing peers successfully complete QRIS activation or cashier application input processes. One participant identified as “MN” explained that observing neighboring business owners successfully using digital applications increased his confidence to continue learning despite initial hesitation. This finding demonstrates that social interaction and peer encouragement played an important role in shaping technological acceptance within rural communities. The learning process therefore evolved collectively rather than individually, reinforcing the communal dimension of digital transformation.

Repeated mentoring sessions further contributed to participants’ technological adaptation. Unlike conventional digitalization programs that often rely on one-time seminars or short training workshops, this program emphasized continuity and contextual assistance. Facilitators revisited participants regularly to monitor progress, respond to operational challenges, and provide additional guidance whenever difficulties emerged during daily business operations. For example, several participants initially forgot transaction recording procedures within the Kasir Go application after the first training session. Through repeated visits and practical reinforcement, participants gradually became more familiar with transaction input, sales recording, and digital payment verification. This adaptive mentoring structure allowed technological learning to develop organically within participants’ real business environments.

QRIS Adoption and the Expansion of Rural Digital Financial Inclusion

The implementation of Quick Response Code Indonesian Standard (QRIS) among Micro, Small, and Medium Enterprises (MSMEs) in Katapang Hamlet represented one of the most significant stages within the broader community-based digital transformation process. Prior to the intervention, all participating MSME actors relied exclusively on cash transactions for daily business activities. Although some participants had heard about QR-based payment systems through television advertisements or social media exposure, none had previously used QRIS in their business operations. Initial interviews revealed that participants generally perceived digital payment systems as complicated, urban-centered, and closely associated with formal businesses operating in cities. This perception reflected not only limited digital literacy but also broader feelings of exclusion from national digital financial ecosystems.

The QRIS adoption process was conducted gradually through participatory mentoring sessions emphasizing direct practice and contextual learning. Facilitators first introduced the concept of digital payment systems by connecting them with participants’ everyday transaction experiences. Rather than explaining QRIS solely from a technical perspective, the mentoring process focused on practical benefits such as transaction flexibility, easier payment confirmation, and the potential to serve consumers who no longer carried cash. This approach proved important in reducing participants’ initial resistance toward non-cash transactions.

During the early sessions, several participants expressed concerns regarding transaction security, delayed fund transfers, and fears of making operational mistakes when using digital payment applications. One participant identified as “AR,” who operated a small kiosk business, admitted that she initially worried digital transactions could result in financial loss if she accidentally pressed the wrong feature on her smartphone.

The registration process itself became an important learning experience for participants because many had never interacted directly with digital financial administration systems. Facilitators assisted participants in preparing identity documents, activating mobile banking services, and completing QRIS registration procedures through partnering financial institutions. During this process, unstable internet connectivity occasionally disrupted verification procedures, particularly when uploading required documents or accessing banking applications. Nevertheless, repeated mentoring and collaborative problem-solving enabled participants to gradually overcome these technical obstacles. In several cases, peer learning dynamics emerged naturally as participants who completed registration earlier began assisting others who still encountered difficulties. This collaborative atmosphere strengthened participants’ confidence and reduced the perception that digital financial systems were inaccessible to rural communities.

Observational findings further demonstrated that participants’ attitudes toward cashless transactions changed significantly after direct implementation. Once QRIS codes became operational, participants began experimenting with digital payments during real customer transactions. Several participants described feelings of surprise and satisfaction when customers successfully completed transactions using mobile payment applications. One culinary business owner coded as “MN” explained that younger customers appeared more enthusiastic and comfortable when QRIS payments became available at his food stall. Similar experiences were expressed by “HL,” who noted that digital payments reduced difficulties related to providing change during busy transaction periods. These experiences gradually transformed participants’ perceptions of digital payment systems from something intimidating into something practical and beneficial for daily business operations.

Beyond transaction convenience, QRIS adoption also influenced participants’ awareness regarding financial management and transaction transparency. Before the intervention, most participants relied on memory-based financial calculations or informal handwritten notes that were often incomplete and inconsistent. Through QRIS transaction records, participants became increasingly aware that digital payment systems automatically documented incoming transactions, thereby making business income more traceable and transparent. Several participants reported that this feature helped them distinguish between business income and household expenditures more clearly than before. This shift, although gradual, marked an important transformation in participants’ financial management behavior.

The findings also indicate that QRIS functioned as an entry point toward broader digital financial inclusion within the rural community. Prior to the program, many participants

possessed bank accounts only for administrative purposes and rarely utilized mobile banking applications actively. Through QRIS implementation, participants became more familiar with digital banking interfaces, balance monitoring, and transaction histories. This increased familiarity contributed to greater confidence in interacting with formal financial systems. In this context, digital payment adoption extended beyond transactional modernization and became part of a wider process of integrating rural MSMEs into formal digital economic ecosystems.

These findings align with recent perspectives on Digital Financial Inclusion, which emphasize that digital payment technologies can reduce transactional barriers and expand economic participation among underserved populations when accompanied by supportive institutional and social mechanisms (Supriatna et al., 2023; Tambunan, 2023). The experience in Katapang Hamlet demonstrates that the effectiveness of QRIS adoption was not determined solely by technological availability, but by the presence of participatory assistance capable of translating technology into meaningful local practice. The mentoring process allowed participants to adapt gradually according to their own pace and socio-economic realities, thereby reducing technological anxiety and strengthening practical understanding.

Utilization of Digital Cashier Applications and the Transformation of Transaction Management

The introduction of the Kasir Go digital cashier application marked an important phase in the transformation of transaction management practices among Micro, Small, and Medium Enterprises (MSMEs) in Katapang Hamlet. Prior to the implementation of the mentoring program, nearly all participating MSME actors managed their business finances manually through handwritten notes or memory-based calculations. Daily sales were rarely documented systematically, and business income was frequently mixed with household expenditures. This condition created difficulties for participants in identifying profit margins, monitoring transaction consistency, and evaluating business performance over time. Preliminary interviews revealed that many participants viewed financial recording as an administrative burden rather than an essential component of business sustainability. Such findings reflect broader patterns identified in rural MSME studies, where limited financial literacy and informal management practices often constrain business development and operational efficiency (Idris et al., 2025; Probohudono et al., 2025).

During the early stages of implementation, participants demonstrated varying levels of hesitation toward the use of digital bookkeeping applications. Several MSME actors perceived cashier applications as overly technical and suitable only for larger businesses operating in urban environments. One participant coded as “HL,” who managed a small retail kiosk, explained that he had previously assumed cashier applications required advanced accounting knowledge and expensive devices. Similar concerns were expressed by “SR,” a home-based culinary entrepreneur, who admitted feeling anxious about accidentally deleting transaction records or inputting incorrect sales data. These responses illustrate that the

primary barrier to digital bookkeeping adoption was not technological rejection itself, but rather limited confidence and unfamiliarity with digital administrative systems.

To address these challenges, the participatory mentoring process emphasized practical adaptation rather than theoretical instruction. Facilitators introduced the Kasir Go application gradually using participants' own smartphones and real business transaction scenarios. Instead of focusing immediately on complex application features, the mentoring sessions began with basic activities such as recording daily sales, entering product names, and calculating simple transaction totals. This contextual approach enabled participants to connect digital bookkeeping directly with their everyday business experiences. Participants were encouraged to repeat transaction simulations multiple times until they felt comfortable operating the application independently. The use of direct demonstrations and repetitive practice proved particularly important for participants who had minimal prior experience with digital business applications.

As the mentoring process progressed, participants gradually developed greater confidence in utilizing the application for routine transaction management. Observational findings indicated that participants became increasingly active in exploring application features once they recognized the practical benefits of digital recording systems. Several participants began independently reviewing daily transaction histories, monitoring product sales, and checking accumulated income through the application dashboard. One informant identified as "MN" stated that the application helped him realize how much revenue was actually generated each day, something he previously estimated only roughly through memory. Another participant, coded as "AR," explained that she felt more organized after using the application because transaction records no longer depended solely on handwritten notes that were easily misplaced or forgotten.

The implementation of digital bookkeeping also contributed to gradual behavioral transformation among MSME actors regarding financial management practices. Prior to the intervention, financial separation between business activities and household consumption was rarely practiced consistently. Through the use of the Kasir Go application, participants became more aware of the importance of recording business income systematically and monitoring transaction patterns regularly. Although the scale of the businesses remained relatively small, this shift represented an important movement toward business formalization and organizational modernization within rural economic contexts. Previous studies similarly suggest that digital bookkeeping systems can strengthen financial discipline, improve decision-making processes, and enhance long-term business resilience among small enterprises (Fianto et al., 2026; Harahap et al., 2024).

An important finding emerging from this study is that the acceptance of digital cashier applications among rural MSMEs was strongly influenced by usability simplicity and contextual relevance rather than technological sophistication. Participants responded positively to application features that were perceived as practical, visually simple, and directly connected to their daily business needs. Conversely, features considered too complex or

unfamiliar often created confusion and reduced confidence. This finding reinforces arguments within technology adoption studies that successful digital transformation in rural communities depends upon adaptive technologies aligned with users' social realities, educational backgrounds, and practical capacities (Nurniawan & Amalia, 2025; Rosepti & Niasari, 2022).

Repeated mentoring sessions also played a significant role in sustaining participants' technological adaptation. Several participants initially forgot transaction procedures or became confused when application interfaces changed after updates. Through continuous assistance and informal follow-up consultations, facilitators helped participants gradually overcome these operational challenges. This process demonstrates that sustainable digital adoption among rural MSMEs requires long-term accompaniment and iterative learning opportunities rather than one-time training interventions. The relational nature of the mentoring process further strengthened participants' willingness to continue experimenting with digital transaction management systems despite occasional technical difficulties.

Geo-Mapping Assistance and the Construction of Digital Business Visibility

The geo-mapping assistance implemented through Google Maps registration became one of the most transformative components of the community-based digitalization program in Katapang Hamlet. Before the intervention, none of the participating Micro, Small, and Medium Enterprises (MSMEs) possessed a formal digital location identity despite having operated for years within the local community. Businesses were primarily recognized through informal social networks and word-of-mouth communication rather than through online visibility or digital platforms. Customers from outside the village often experienced difficulty locating businesses, while local entrepreneurs themselves rarely considered digital mapping as relevant to small-scale rural enterprises. This condition reflected a broader pattern of digital invisibility commonly experienced by rural MSMEs, where businesses remain disconnected from emerging location-based digital ecosystems despite increasing internet penetration and smartphone usage (Arie & Fikry, 2021; Susiang et al., 2026).

Initial interviews revealed that most participants had limited understanding regarding the function and strategic importance of geo-mapping platforms such as Google Maps. Several participants associated digital maps exclusively with transportation services or large urban businesses rather than with local micro-enterprises. One participant coded as "AR," who operated a small culinary business, explained that she had never imagined her business could appear online because she considered digital location services suitable only for restaurants or stores in major cities. Similar perceptions were expressed by "MN," who stated that his workshop had operated for years without any digital identity because local customers already knew its physical location. These responses illustrate how digital exclusion in rural communities often emerges not only from infrastructural limitations, but also from socio-cultural assumptions regarding who is perceived as eligible to participate in digital economic spaces.

The geo-mapping assistance process was therefore designed as a participatory learning activity aimed at gradually introducing participants to the concept of digital business visibility. Facilitators first explained how Google Maps functions not merely as a navigation platform, but also as a digital marketplace infrastructure through which consumers identify, evaluate, and access businesses. The mentoring sessions included practical demonstrations on creating business profiles, uploading location coordinates, adding business categories, inputting operational information, and attaching business photographs. Participants were directly involved in every stage of the registration process using their own smartphones to ensure practical understanding and long-term usability.

During the implementation process, several technical and adaptive challenges emerged. Some participants initially experienced difficulties in activating email accounts, understanding location pinning systems, and uploading business information due to limited familiarity with smartphone features beyond basic communication applications. Internet instability occasionally delayed verification processes, particularly when uploading visual documentation or confirming business coordinates. Nevertheless, repeated guidance and collaborative problem-solving allowed participants to gradually complete the registration process independently. The participatory mentoring environment also enabled peer interaction, where participants who understood the procedures earlier began assisting others experiencing similar difficulties. This collaborative learning dynamic strengthened participants' confidence and reduced the perception that digital mapping technologies were inaccessible to rural communities.

Following the successful registration of their businesses on Google Maps, participants demonstrated notable changes in perception regarding digital visibility and business legitimacy. Several participants expressed feelings of pride and surprise upon seeing their businesses appear publicly on online maps for the first time. One informant identified as "HL" stated that the digital presence made his business appear "more official and trustworthy" despite remaining physically unchanged. Another participant coded as "SR" explained that she began sharing the Google Maps link of her culinary business with customers through social media applications, something she had never previously considered possible. These responses indicate that digital visibility generated not only practical marketing benefits but also symbolic recognition for rural entrepreneurs who had long operated outside formal digital ecosystems.

The findings further demonstrate that geo-mapping contributed to increased business confidence and expanded perceptions regarding market accessibility. Participants gradually understood that online location visibility could help customers from outside the immediate village area identify and access their businesses more easily. Although measurable increases in customer volume were not immediately substantial during the short implementation period, participants perceived digital mapping as an important foundation for future business expansion. This perception aligns with contemporary studies emphasizing that platform visibility increasingly functions as part of business competitiveness and consumer trust within

digital economies (Haryati et al., 2023; Rakhma et al., 2026).

From a conceptual perspective, the findings reinforce emerging discussions on digital spatial inclusion, which argue that participation in digital economic systems increasingly depends upon visibility within platform-based infrastructures (Kusumaningtyas et al., 2022; Paramarta, 2024). In contemporary economic environments, businesses without online spatial identities risk becoming socially and economically marginalized despite maintaining physical operations within local communities. The experience in Katapang Hamlet demonstrates that geo-mapping technologies function not only as navigational tools, but also as mechanisms of symbolic inclusion that connect rural enterprises with broader digital networks and consumer ecosystems.

Importantly, the study also reveals that geo-mapping assistance remains an often-overlooked dimension within MSME digitalization programs, which typically focus more heavily on financial technology adoption or digital marketing strategies. The integration of Google Maps registration within the broader community-based mentoring framework allowed participants to recognize that digital transformation encompasses multiple interconnected dimensions, including financial inclusion, administrative modernization, and online visibility simultaneously. In this regard, geo-mapping became part of a wider process through which rural MSMEs reconstructed their presence within increasingly digitalized socio-economic landscapes.

CONCLUSION

This study demonstrates that a community-based digital transformation approach can effectively enhance the digital capacity of rural MSMEs through the integrated adoption of QRIS, digital cashier applications, and geo-mapping platforms. The participatory mentoring model enabled MSME actors in Katapang Hamlet to improve their digital literacy, transaction management practices, cashless payment readiness, and online business visibility in accordance with the objectives of the study. The findings further indicate that direct assistance and hands-on practice are more adaptive to the needs of rural communities than conventional training approaches, particularly in areas with limited prior exposure to digital technology. The novelty of this study lies in the integration of digital payment systems, digital bookkeeping, and geo-mapping assistance within a single participatory framework specifically applied to rural and archipelagic MSME contexts. Overall, the study provides a practical and replicable model for supporting inclusive digital transformation and sustainable local economic development in rural communities.

ETHICAL STATEMENT AND DISCLOSURE

This study was conducted in accordance with established ethical principles, including informed consent, protection of informants' confidentiality, and respect for local cultural values. Special consideration was given to participants from vulnerable groups to ensure their safety, comfort, and equal rights to participate. No external funding was received, and the

authors declare no conflict of interest. All data and information presented were collected through valid research methods and have been verified to ensure their accuracy and reliability. The use of artificial intelligence (AI) was limited to technical assistance for writing and language editing, without influencing the scientific substance of the work. The authors express their gratitude to the informants for their valuable insights, and to the anonymous reviewers for their constructive feedback on an earlier version of this manuscript. The authors take full responsibility for the content and conclusions of this article.

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