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Digital communication and literacy for MSME empowerment: Evidence from a rural digital village in Indonesia

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Abstract

This study investigates how digital communication technologies and literacy empower micro, small, and medium enterprises (MSMEs) in rural Indonesia, focusing on improving socio-economic outcomes and promoting sustainable local development. Using a qualitative case study approach, the research examines the digital transformation initiative led by BUMDes Padaringan in Langonsari Village, West Java. The research data were collected through field observations, in-depth interviews with MSME owners and stakeholders, and a focus group discussion (FGD) involving community members, academic experts, and government representatives. The study finds that targeted digital literacy training significantly improves MSMEs' abilities to utilize online marketing, networking, and sales platforms. Participants reported increased confidence in using social media and e-commerce tools. Notable outcomes included expanded market reach, improved product presentation, and stronger community collaboration. Challenges remain regarding internet infrastructure, financial barriers, and generational mindset gaps. Digital empowerment in rural communities can foster inclusive economic participation and community resilience. However, sustained support—especially in infrastructure, mentorship, and financial access—is essential to ensure long-term success and equitable digital inclusion. This study provides actionable insights for policymakers, development agencies, and academic institutions involved in digital transformation programs. It highlights the importance of multi-stakeholder partnerships, continuous training, and infrastructure development in closing the rural digital divide and enabling MSME-led sustainable development.

Keywords: Circular economy, Digital literacy, Digital transformation, Rural MSMEs, Sustainable development.

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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1. Introduction

Rural communities in Indonesia are increasingly recognized as essential frontiers for digital transformation. Micro, Small, and Medium Enterprises (MSMEs) form the backbone of Indonesia's economy, accounting for approximately 60–61% of national GDP and employing 97% of the workforce [1]. Despite this significance, many MSMEs remain untapped by digital markets. In 2023, out of an estimated 66 million MSMEs nationwide, only about 22 million (roughly 33.6%) had embraced e-commerce or online business channels [2] . This gap underscores the digital divide between urban and rural enterprises and the need for targeted initiatives to bring traditional businesses into the digital economy. Indeed, the Indonesian government has set ambitious goals to bridge this divide, aiming to onboard 30 million MSMEs into the digital ecosystem by 2024. Achieving such targets requires infrastructure development, technology access, and capacity-building in digital literacy and entrepreneurship at the grassroots level [3].

Padaringan Village-Owned Enterprise (BUMDes) in Langonsari Village, Pameungpeuk Subdistrict, Bandung Regency, offers a compelling case of rural digital transformation. The village's community-managed enterprise, Badan Usaha Milik Desa (BUMDes) Padaringan, was established in 2020 to harness the local economic potential and foster an entrepreneurial, self-sufficient society. BUMDes Padaringan has focused on agriculture and creative industries, supporting local producers of Sundanese handicrafts (e.g., iket woven headcloths and peci caps), culinary products, fashion items, and digital content creation. Early on, the enterprise faced significant challenges limited raw materials for certain products, poor financial management, and traditional marketing that relied on local stalls or WhatsApp messaging. By 2024, these issues had contributed to economic losses, indicating that new strategies were needed to revitalize the village economy [4, 5]. Digital transformation was identified as a strategic solution to these challenges. By leveraging digital marketing and e-commerce, BUMDes Padaringan aimed to expand the market reach of village products beyond the local community.

A SWOT analysis highlighted the opportunity to turn high-quality local products into competitive offerings on wider platforms, provided the community could improve its digital skills and infrastructure. There is still a digital divide in rural areas today, especially in utilizing e-commerce platforms to market goods and services more widely, so efforts are needed to address the digital skills gap among MSMEs [6]. Several training programs for MSMEs should focus on basic digital literacy skills and ensure equal opportunities in digital transformation so that MSMEs can collaborate with educational institutions, industry experts, and government agencies in digital marketing learning [7, 8]. In the era of social media, effective marketing communications are crucial for business success. With the right digital strategies – including content creation and social media engagement – even a small village like Langonsari could position itself as a notable trade and tourism asset.

Past research on MSME digitalization supports this approach: digital adaptation is closely linked to business resilience and performance. For example, Kurniawati et al. [9] found that MSME owners widely accepted online media (such as WhatsApp, Facebook, and Instagram) as tools for sustaining their businesses during the COVID-19 pandemic, which suggests that when given the opportunity and know-how, even micro-entrepreneurs are keen to embrace digital platforms for survival and growth [9]. A study from Wahyundaru et al. [10] examines how e-commerce adoption and financial literacy influence the sustainability performance of Indonesian MSMEs, using data from 478 managers analyzed through Partial Least Squares (PLS) modeling. Their findings demonstrate that both factors have a significant positive impact, suggesting that digital adoption and financial capability are key drivers of sustainable business practices. The study underscores the strategic value of e-commerce in reducing environmental impact and expanding market access while highlighting the role of financial literacy in enabling informed decision-making and long-term resilience for MSMEs [10, 11].

While previous studies have established the positive relationship between digital adoption, financial literacy, and MSME sustainability performance such as the works of Kurniawati, et al. [9] and Wahyundaru, et al. [10], they primarily rely on quantitative models and urban or general national samples, offering limited insight into the contextual dynamics within rural communities. These studies do not sufficiently explore how digital transformation is operationalized at the grassroots level, particularly through collaborative, village-based institutions like BUMDes. The existing literature also overlooks the socio-cultural, infrastructural, and institutional factors mediating digital empowerment in rural MSMEs. This gap highlights the need for place-based, qualitative inquiry into how digital entrepreneurship unfolds in rural contexts, how community enterprises adopt digital tools amid constraints, and how local partnerships especially those involving government and academia facilitate inclusive and sustainable digital transformation. The present study addresses this by examining the Padaringan Digital Village Initiative as a case of integrative, community-driven digital empowerment.

This study explores how digital transformation, implemented via a structured training and mentoring program, has empowered MSMEs and the broader community in Langonsari Village. It expands and enriches the preliminary case observations of BUMDes Padaringan by incorporating qualitative data (interviews, FGD insights) and analyzing the impacts on various stakeholders from individual entrepreneurs and youth to the BUMDes management and local government. The study also situates the case within broader national and global contexts, drawing on reputable sources to discuss how improving digital literacy and connectivity can unlock rural entrepreneurship and support circular economy goals. By examining successes and challenges in the Padaringan initiative, the paper derives lessons on the role of digital tools in rural economic empowerment and the importance of continued government-academic-community collaboration.

2. Background: Digital Transformation in Rural Areas

Digitalization has transformed business operations worldwide, yet rural areas often lag due to infrastructural gaps and limited digital literacy [12]. Bridging this urban-rural digital divide is a development priority in many countries. Studies have shown that integrating digital technologies into rural economies can enhance productivity, open new market access, and improve livelihoods [13]. For instance, a case study in Central Java, Indonesia, revealed how the penetration of the internet into a remote village catalyzed a dramatic shift in livelihoods: Kaliabu village, once predominantly agricultural, saw many residents become online logo designers serving international clients, which significantly increased household incomes and overall well-being in the community. The "Designer Village" of Kaliabu illustrates that digital connectivity can enable rural talent to participate in global markets even without advanced physical infrastructure, fostering local prosperity and social cohesion [14].

However, rural digital transformation faces unique challenges [15]. Connectivity infrastructure is often weaker or costlier in remote areas. Digital literacy levels tend to be lower among rural populations, especially among older and less-educated groups, limiting their ability to adopt new technologies. A recent survey by the Center for Indonesian Policy Studies (CIPS) found that only about 37% of MSMEs had the basic ability to operate computers or use the internet in simple ways [16], which indicates that a majority of small business owners still lack fundamental digital skills, reinforcing the need for training and capacity-building. Moreover, regional disparities are stark – one study noted that while around 41.7% of MSMEs in Greater Jakarta had utilized social media or digital marketing, in areas of Java Island, this figure was only about 16% [17]. Such data highlight a pronounced geographic digital divide: rural enterprises, especially outside Java, are far less integrated into digital networks than their urban counterparts. Therefore, digital transformation efforts in villages must address access and ability.

Government programs in Indonesia have begun to tackle these issues through infrastructure expansion and training initiatives. Projects like the national fiber-optic backbone (Palapa Ring) have extended internet access to many districts, and the Ministry of Communication and IT's National Digital Literacy Movement (Gerakan Literasi Digital Nasional) aims to train tens of millions of citizens in basic digital skills [18]. Under the broader Digital Talent Scholarship (DTS) program, specialized academies such as the Digital Entrepreneurship Academy (DEA) focus on equipping entrepreneurs and MSME owners with the skills to use e-commerce, digital marketing, and even more advanced tools [19]. These policies acknowledge that digital inclusion is essential for equitable development. When rural businesses are left behind, it perpetuates income disparities and means a lost opportunity for national economic growth and innovation. The goal was to develop a "Digital Village" model that supports business growth and the community's circular economy. The concept of a circular economy entails maximizing resource use, minimizing waste, and creating sustainable production and consumption loops [20]. In a village context, this could mean finding new markets for agricultural by-products, promoting recycling or upcycling of materials, and ensuring that economic value circulates locally.

3. Literature Review

3.1. Rural Entrepreneurship and Digital Literacy

The entrepreneurship ecosystem in rural areas differs from that in urban centers. Rural MSMEs often operate in traditional sectors (agriculture, handicrafts, simple food processing) and rely on local markets. Improving digital literacy among rural entrepreneurs can be a game-changer by connecting them with broader demand and new business models [21, 22]. Digital literacy refers to the ability to use devices and understand how to leverage the internet for business from online marketing and sales to digital payments and bookkeeping apps [23, 24]. Research from Tambunan and Busnetti [25] suggests that a lack of digital skills, awareness, and access to finance are among the top barriers to MSME digitalization in Indonesia . Interestingly, their findings also show that awareness of digital opportunities is growing. In a 2022 national MSME survey, 87% of respondents acknowledged being aware of digitalization opportunities, and about 62% had started using digital tools in their operations [25], implying that given the proper support, many micro-entrepreneurs are willing to adopt digital innovations. Peer learning and community-based training are successful strategies to boost digital literacy [26].

MSME owners in villages may learn best from practical, context-specific demonstrations. Programs like digital entrepreneurship deploy workshops often using local case examples and hands-on practice (e.g., setting up a social media page for one's product or listing an item on an e-commerce site during the class) [27]. Such interventions demystify technology and show immediate value, helping overcome psychological barriers or mistrust of online transactions. There is evidence that even simple uses of technology can have an impact: a study in an Indonesian coastal community showed that training a small group of craft producers to market via Facebook and Instagram led to a 30% increase in sales within six months [28] . This empowerment through knowledge and results can create a ripple effect, inspiring other entrepreneurs in the community.

Digital literacy also extends to understanding digital ethics and security, which is increasingly vital as rural businesses come online [29-31]. Entrepreneurs must learn about online customer service, protecting personal and business data, and navigating e-commerce regulations or fees [32, 33]. Building this capacity contributes to sustainable success rather than one-off experiments with technology. In our case study, improving the digital literacy of Langonsari's MSME owners was a primary objective, implemented through training modules on basic skills (smartphone use for business, using social media, creating digital content) and more advanced topics (branding, analytics, online customer engagement). The literature suggests that such interventions are most effective when followed by ongoing mentorship – a lesson from various digital empowerment initiatives is that continuous support helps participants translate new knowledge into consistent practice, transforming how they do business [34, 35].

3.2. Digital Transformation and the Circular Economy in Communities

Linking digital transformation with the circular economy concept is an emerging area of interest, especially in sustainable development discourse [36, 37]. A circular economy emphasizes recycling, reusing, and regenerating materials to reduce waste, unlike the traditional linear "take-make-dispose" model [38]. In rural communities, circular economy practices might include utilizing agricultural waste (e.g., turning crop residues into handicrafts or biofuel), community composting, water recycling for farms, or creating new products from previously discarded materials [39, 40]. Digital tools can facilitate these practices by improving information flow and coordination. Digital platforms allow collaboration and information sharing among various local actors, which can promote circular economy principles and more efficient supply chains [41, 42]. For instance, an online marketplace or WhatsApp group could connect farmers with excess organic waste with entrepreneurs who can process that into fertilizer or animal feed. Similarly, e-commerce can help find buyers for upcycled crafts made from waste materials, expanding the market beyond the immediate village [43, 44]. In the context of BUMDes Padaringan, supporting the circular economy means leveraging digital means to ensure that local products reach consumers (minimizing unsold inventory waste), encouraging resource-sharing among MSMEs, and educating the community on sustainable practices. On a broader scale, if the village's businesses thrive through digital marketing, more value is generated locally, which can be reinvested in the community (a circulation of money that supports local suppliers, youth employment, etc.) [45, 46].

A strong local economy with circular tendencies can make the village more resilient to external shocks, aligning with sustainability goals. Prior research provides a basis for integrating these concepts. A study on agri-food supply chains noted that subsidizing SME digitalization correlates with adopting circular practices in that sector [47, 48] . The reasoning is that digital connectivity exposes businesses to innovative ideas (like waste-to-product innovations) and partners (e.g., NGOs or companies looking for sustainable sourcing) that they would otherwise not access [49, 50]. Additionally, digital monitoring tools (IoT sensors, apps) can help rural producers reduce waste for example, smart farming apps that prevent the overuse of fertilizer or simple mobile applications for tracking inventory and expiration dates to reduce spoilage. While such advanced technologies were beyond the immediate scope of Langonsari's initial program, the foundational step is creating a digitally literate community open to new ideas.

4. Materials and Methods

4.1. Research Design and Approach

This study employed a qualitative case study approach to deeply explore the "how" and "why" of digital transformation in the specific context of Langonsari Village. Case study methodology is appropriate when investigating contemporary phenomena within real-life contexts where the researcher has little control over events [51-53]. By focusing on BUMDes Padaringan's digital village initiative as a bounded system (limited by time, place, and participation), we aimed for an in-depth understanding of processes and outcomes. According to Creswell [54], a case study allows multiple data sources to build a rich description and analysis of the case. We followed these guidelines by gathering data through observations, interviews, and an FGD, enabling triangulation of information.

4.2. Participants and Sampling

The primary unit of analysis is the Padaringan digital village program conducted from mid-2024 to early 2025. Key participants included: (a) BUMDes Padaringan management and village officials who plan and oversee local economic programs; (b) MSME owners in Langonsari Village the trainees and beneficiaries of the digital program; and (c) external experts and mentors, including university lecturers and Komdigi officials involved in training. We used purposive and snowball sampling to identify knowledgeable informants. Initially, the BUMDes director and two village government representatives were interviewed as they had comprehensive insight into the program's background and goals. Subsequently, MSME participants were invited, ensuring a mix of business types (crafts, food vendors, etc.) and varying ages/genders. We conducted in-depth interviews with three key informants (the BUMDes Padaringan director, the BUMDes manager, and senior staff from the BUMDes) and 15 MSME owners who participated in the training.

Additionally, the research team conducted unstructured observations in the village business area to contextualize the environment and observe any immediate changes (such as new digital promotional materials in shops or the presence of new customers). Focus Group Discussion: A highlight of our data collection was a Focus Group Discussion (FGD) held on 21 October 2024 at Telkom University's campus. This FGD brought together 15 Langonsari MSME participants, three digital business transformation experts from Komdigi's Research and Development Agency, one digital marketing practitioner from a media company, and three academic experts (marketing communication lecturers). The research team facilitated the FGD as part of a community service workshop. Its purpose was to elicit diverse perspectives on the digital village initiative's progress, challenges, and future strategy. The research participants are presented in Table 1.

Table 1.
List of Research Participants.

No	Pseudonyms	Gender	Status
1	RO	Male	BUMDes Padaringan director
2	AI	Male	BUMDes Padaringan manager
3	IA	Male	Senior staff of BUMDes Padaringan
4	CH	Female	Digital business transformation experts from Komdigi's Research and Development Agency
5	MP	Male	Digital business transformation experts from Komdigi's Research and Development Agency
6	PB	Male	Digital business transformation experts from Komdigi's Research and Development Agency
7	BA	Male	Digital marketing practitioner from a national media company
8	AS	Female	Digital marketing communication expert (Academician)
9	ZF	Female	Digital marketing communication expert
10	DS	Female	Digital marketing communication expert
11	RA	Female	MSME owners in Langonsari Village
12	YA	Female	MSME owners in Langonsari Village
13	SI	Female	MSME owners in Langonsari Village
14	DI	Female	MSME owners in Langonsari Village
15	TE	Female	MSME owners in Langonsari Village
16	MA	Female	MSME owners in Langonsari Village
17	MM	Female	MSME owners in Langonsari Village
18	VT	Female	MSME owners in Langonsari Village
19	RE	Female	MSME owners in Langonsari Village
20	AS	Male	MSME owners in Langonsari Village
21	JA	Male	MSME owners in Langonsari Village
22	TN	Male	MSME owners in Langonsari Village
23	FE	Female	MSME owners in Langonsari Village
24	MR	Female	MSME owners in Langonsari Village
25	DS	Female	MSME owners in Langonsari Village

4.3. Data Collection and Analysis

Researchers conducted field observations from September 2024 to December 2024, during which training and follow-up activities occurred. We visited Langonsari Village several times to observe MSME daily activities and any integration of digital practices. For instance, we noted whether businesses started posting banners about their social media, if the BUMDes office had new computer equipment, or if community members were seen assisting each other with smartphone tasks. These observations provided contextual understanding and helped validate information obtained from interviews (e.g., an interviewee might claim they use Facebook for marketing, and observation could confirm if that is happening). Interviews were conducted mainly in the local language (Sundanese or Indonesian) and then translated into English for reporting. Each interview lasted about 45–60 minutes. The topics covered included the participants' background in business, prior exposure to digital tools, experiences during the training program, changes in their mindset or business after the program, and their suggestions for improvement. We employed open-ended questions to allow participants to narrate their experiences freely. All interviews were audio recorded and later transcribed verbatim. In our analysis, pseudonyms were used to protect the privacy of individual MSME informants.

The Focus Group Discussion data transcript was especially valuable because it captured interactive commentary [55, 56]. Participants often built on each other's points. For instance, an MSME owner would voice a challenge (like poor signal in the village), and a Komdigi expert would respond with information on planned infrastructure improvements. These dialogues provided insight into stakeholder alignment and any disconnects. We also collected written notes or presentation slides used during the FGD; notably, Komdigi experts shared data on Indonesia's national MSME digitalization status, which we reference for contextual analysis. We followed a thematic analysis approach in the data analysis. In presenting results, we use some of these quotes to give voice to participants. To ensure reliability, two researchers independently coded portions of the data and discussed any differences, refining the codebook. We triangulated across data sources: if an issue was mentioned in interviews, we checked if it also arose in the FGD or observation, which helped confirm the robustness of the findings. For case studies research, we strove to construct a detailed "story" of the case and then relate it to broader theories and contexts in the discussion [57].

As part of the analysis, we also compared the Padaringan case with similar cases documented in the literature (e.g., digital empowerment projects in other villages) to see how our findings align or diverge. Ethical considerations were observed by obtaining informed consent from all participants regarding the research purpose and that their input would be used in an academic publication. Identities of individuals (except public figures like the BUMDes Director or officials who consented to be identified) are kept confidential. The study did not involve any interventions beyond the existing community program, and we have disclosed that no external dataset was generated beyond the qualitative data we gathered. By integrating these

methods, we comprehensively understood the Padaringan digital village initiative. The following section presents the study's results, organized around key themes that emerged from the data, followed by a discussion relating these findings to the literature and drawing out implications.

5. Results and Discussion

5.1. Improved Digital Literacy and Awareness

One of the clearest outcomes was a significant improvement in participants' basic digital skills. Before the program, many MSME owners had minimal exposure to online tools some did not know how to create a social media account, and most considered smartphones as communication devices (for calls or WhatsApp messaging) rather than business tools. After the DEA training, participants reported increased confidence in using digital business platforms. All 15 MSME owners who attended the workshops managed to create at least one business social media account (typically on Facebook or Instagram). For many, this was their first experience establishing an online presence beyond personal chat groups. They learned how to take appealing photos of their products, write simple promotional captions, and post these on social networks. An illustrative quote from MA, a 45-year-old food seller, was:

"I thought it would be difficult, but it turns out I can do it! Now I post pictures of my banana chips on Facebook every week." (Focus Group Discussion in October 2024)

This newfound ability marks a fundamental change in mindset – from perceiving digital technology as intimidating to seeing it as valuable and usable. In addition to social media, participants were introduced to e-commerce marketplaces and basic digital payment systems. By the program's end, 6 of the 15 MSMEs had registered on an online marketplace (such as Tokopedia or Shopee) with assistance. While they had not yet made significant sales there, the fact that rural micro-entrepreneurs were venturing onto national e-commerce platforms is noteworthy. Furthermore, many trainees became aware of concepts like "online customer reviews" and "followers," recognizing the value of building a good online reputation.

In the FGD, one young entrepreneur (who makes handcrafted *iket* headbands) proudly mentioned that her business Instagram had gained over 100 followers in two months and that she received inquiries via direct messages. These are modest numbers in absolute terms, but from the baseline of virtually zero online engagement, it indicates progress in marketing outreach. Despite these improvements, it was evident that digital literacy remained foundational for most participants. They mastered the basics, but complex tasks (for example, analyzing post insights or doing paid advertisements) were still beyond their reach. The training focused on essential skills given the limited duration. Participants themselves expressed eagerness to learn more. TN, a middle-aged handicraft artisan, stated in an interview that:

"Now I know how to use Instagram, but I want to learn how to sell there more deeply – maybe there are strategies or secrets." (Focus Group Discussion in October 2024)

This sentiment was common, indicating that the program successfully ignited a spark of awareness and interest in digital marketing, even if full proficiency will require time and further guidance. Notably, the training also had an empowering effect on youth engagement in the village. A few younger participants (in their 20s) naturally became "digital ambassadors," helping older business owners. For example, the son of a cassava chips seller started handling his mother's product postings and queries online. This intergenerational cooperation was an unintended positive outcome – older MSME owners felt more comfortable asking their digitally savvy children or younger neighbors for help. In contrast, before, youth had little involvement in those traditional businesses. As one BUMDes official observed, *"Young people here have become more attentive to their parents' businesses because of technology. They feel they can contribute."* This points to a potential social shift where digital transformation initiatives also activate local youth to apply their knowledge in meaningful ways for the community.

5.2. Challenges in Adoption: Infrastructure and Mindset Hurdles

While progress was made by BUMDes officials, the initiative also surfaced several persistent challenges that hinder rural MSMEs' digital adoption. A prominent issue was limited internet access and connectivity. Langonsari is not far from Bandung City, yet participants frequently cited unstable signals and slow internet speeds. During training sessions, there were moments when downloading an app or loading a website took unusually long, testing the patience of both trainers and trainees. In the FGD, many MSME owners identified poor connectivity as a key obstacle to online business. For instance, receiving customer orders or uploading product photos could be frustrating when the network drops, indicating that infrastructure gaps remain a foundational barrier that the local community cannot solve alone. Komdigi experts at the FGD acknowledged this and mentioned plans for signal boosters in the area as part of rural telecom support programs. The need for better infrastructure was thus flagged as an external dependency critical to sustaining the digital village momentum. Without reliable internet, the enthusiasm of new digital entrepreneurs can quickly wane. Another challenge was financial constraints.

Many of these micro-entrepreneurs operate on skinny margins. Although joining social media is free, some aspects of digitalization require investment – for example, upgrading to a smartphone with a good camera, paying for data packages regularly, or eventually doing paid promotions. A few MSME interviewees admitted they struggled to set aside money for internet data, as it competes with daily necessities. One craft maker said she still uses her old basic smartphone, which cannot install too many apps, limiting her to just Facebook Lite. The program did not provide devices (it assumed participants had phones), so those with outdated technology are disadvantaged. Moreover, spending on digital advertising or a standalone website was out of the question for most at this stage, which underscores a larger systemic issue: financial inclusion and support (such as microcredit or grants specifically for digital tool adoption) might be needed to help rural MSMEs invest in

technology. Digital transformation may stall among the poorest entrepreneurs without easing the cost burden. A subtler challenge was resistance or mindset issues among a few individuals.

While most were enthusiastic, a couple of the older business owners remained skeptical about the tangible benefits of going digital. In a candid moment, one 60-year-old snack seller said: *"Not everyone in the village shops online. It's enough for me to sell at my stall."* This reflects an understandable caution – after all, their existing customer base was local and face-to-face. Expanding beyond the village via digital means seemed abstract or unnecessary for such participants. They participated in training but had not applied much of it months later, essentially continuing business as usual, which indicates that mindset change can be gradual and not uniform across all individuals. Some may require seeing others succeed first (demonstration effect) before entirely buying in. It also suggests that complementary efforts, like local success stories or continuous encouragement, are needed to convert all participants into active adopters.

Interestingly, the lack of immediate sales on new platforms was a discouragement cited by a couple of MSMEs. After creating an online shop, one entrepreneur noted he didn't receive any orders online in the first month, leading him to question if it was worth the effort. This speaks to expectations – many hoped for quick wins. The training staff had to clarify that building an online presence and customer base takes time and that an initial lack of orders doesn't mean failure. Managing such expectations is crucial to keep participants motivated. It became clear that ongoing mentorship (even if virtual) would help troubleshoot problems and keep spirits up. For example, after the program, a WhatsApp group was formed for alumni and trainers to share updates. In that group, whenever someone felt stuck or unsure (e.g., "*What should I post this week? No one is liking my posts.*"), others, including the mentors, would chip in with ideas and moral support. This peer support network is vital in overcoming early-stage hurdles in digital adoption.

In summary, the main challenges observed were inadequate internet connectivity, limited funds for technology, and varying levels of skepticism or digital mindsets among participants. These challenges tempered the overall outcomes, reminding us that training alone doesn't solve structural issues. However, by identifying them clearly, the community and stakeholders can seek targeted solutions – such as lobbying for better infrastructure (a recommendation that emerged), exploring microfinance for digital tools, and continuing community engagement to shift mindsets gradually.

5.3. Community and Socio-Economic Impacts

It is important to note that not all participants saw measurable business growth in the short term. Some were still in the phase of building their online audience. However, even among these, there were intermediate progress indicators, such as increased engagement (more inquiries or likes, even if not yet translating to sales). The overall sentiment was hopeful – many felt they now had tools to try new things and were optimistic about future growth. From the perspective of the BUMDes Padaringan, the digital initiative also opened a potential revenue stream for the BUMDes. Seeing the demand for continuous support, the BUMDes management is considering establishing a small digital services unit – essentially acting as an agency to help local MSMEs maintain social media, do product photography, or manage online orders for a minimal fee or commission.

During the FGD, this idea was floated: the BUMDes director noted that since not all entrepreneurs will have the time or skill to handle online marketing consistently, the BUMDes could offer that service by employing local youth skilled in digital media. If implemented, it would sustain the momentum (ensuring MSMEs remain online and active) and generate some income for the BUMDes and the youth employed. This reflects the evolving role of the BUMDes, which has changed from just a passive facilitator to an active player in the village's digital economy. To summarize, the business impacts of the program included moderate sales increases for early adopters, expansion of the customer base beyond the town, improved marketing and product presentation practices, and new business ideas spurred by digital engagement. Though varied across participants, these results demonstrate the concrete economic empowerment that digital transformation can achieve in a rural setting when MSMEs are given the opportunity and knowledge to leverage technology.

Beyond individual businesses, the digital village initiative had ripple effects on the broader community in Langonsari. One notable impact was on community engagement and social capital. The training and follow-up activities created a sense of collective endeavor – MSME participants formed a tight-knit group who continued to share experiences and help one another. For example, they made a joint promotional hashtag for Langonsari products and occasionally promoted each other's items on their social media pages (cross-sharing to increase visibility). This kind of peer support was not common before the program; businesses mainly operated in silos or even in competition. The digital initiative inadvertently fostered a more collaborative spirit. As one participant said: *"It feels like we are a team now, learning and progressing together."* Such enhanced social cohesion can have lasting benefits, encouraging information exchange (about suppliers, markets, etc.) and possibly joint ventures in the future. The involvement of youth and women also carries socio-economic significance.

Empowering women-owned MSMEs through digital skills can lead to greater financial independence and status in the household. A couple of the women mentioned that their families were proud of them for learning "modern skills" and contributing more to income. Similarly, engaging youth in village enterprises can provide local employment and reduce the need for rural-urban migration. In Langonsari, at least two young people who were previously unemployed have now taken on roles as part-time digital marketers for their family businesses and potentially others. If the BUMDes digital services unit idea materializes, it could formalize such roles, providing structured opportunities for the village youth. Keeping talent in the village by providing them with meaningful work is a positive community outcome, aligning with Indonesia's goal of balanced regional development. In essence, the Padaringan digital village initiative has done more than affect individual MSMEs – it has begun to knit a more connected community, empower typically underrepresented groups (women, youth), and put the village on a path of greater sustainability and outward engagement. These social impacts complement the economic outcomes,

suggesting that digital empowerment at the village level can contribute to broader rural development goals, including building social capital and working toward sustainability.

5.4. Stakeholder Feedback and Recommendations

Throughout the data collection, stakeholders offered feedback and ideas on how to improve the initiative moving forward. In summary, we highlight key recommendations from participants, which also align with our case analysis: First, improve Internet infrastructure. Virtually all stakeholders agreed on the need for better connectivity in Langonsari. The recommendation is for relevant authorities (Komdigi, telecommunication providers, or local government) to invest in infrastructure such as signal towers or community Wi-Fi. Without this, the digital gains could plateau. This recommendation echoes common findings that rural digital programs must be accompanied by infrastructure development. In the FGD, Komdigi experts took note and indicated they would report the connectivity issue upstream. The village government also pledged to use part of its budget or lobbying power to facilitate improvements, possibly by partnering with telecom companies for a CSR project.

Second, ongoing training and mentorship. One-off training is not enough; participants strongly requested continuous mentorship. They suggested having a monthly meet-up or online check-in with the trainers to ask questions and learn advanced topics once they are ready. The idea of forming a local "digital marketing club" was floated, where the MSMEs could gather and troubleshoot together regularly. Sustained engagement like this is essential to ensure long-term impact, which not only helps the entrepreneurs but also gives practical experience to the students – a win-win scenario—third, financial support for MSMEs. To address the financial barrier, stakeholders recommended creating schemes to help MSMEs invest in technology. For example, microloans or grants designated for buying a smartphone, data subsidies, or even a small grant to kickstart online advertising. The village administration is considering using the Village Fund (Dana Desa) for an ICT grant program if it is allowed by regulations. Collaboration with microfinance institutions (like the state-owned Bank UMKM) could also yield a tailored loan product. Given the government's emphasis on MSME digitalization, there might be national funding that Langonsari can tap into. This recommendation aligns with broader calls for subsidizing SME digital adoption to unlock their potential.

Fourth, marketing and network expansion. Another suggestion was to actively link the Langonsari MSMEs with larger marketplaces or digital campaigns. For instance, they can get their products featured in popular e-commerce flash sale events or register the village as a seller in Indonesia's emerging "digital village marketplace" platforms (some provinces have special online stores for showcasing village products). Expanding networks so that the digital presence of these MSMEs translates into real market access could involve partnering with influencers (some participants learned about the concept of influencers during training and thought it might help if a local influencer endorsed their products) or joining with other villages to create a collective brand. BUMDes Padaringan could play a role in orchestrating collaborations such as monitoring and evaluation. From the academic perspective, it was recommended to set up simple metrics to track progress over time e.g., the number of MSMEs active online, online sales volume, etc. Regular evaluation can help justify the program's continuation and inform any tweaks needed. The BUMDes agreed to maintain a roster of MSMEs and periodically survey them. This data could be used to secure further support from government programs by showcasing the impact (evidence-based advocacy).

6. Discussion

6.1. Digital Empowerment for Rural MSMEs

The case of BumDes Padaringan's digital village initiative provides valuable insights into the role of digital transformation in empowering rural MSMEs and communities. In this discussion, we integrate our findings with the broader literature and examine the implications for theory and practice. First and foremost, our study reinforces the crucial role of digital literacy as a gateway to empowerment. Consistent with global observations [58, 59], the Langonsari experience showed that when small entrepreneurs acquire even basic digital skills, it alters their economic trajectory. Pre-training, these MSMEs were confined to local markets and traditional methods; post-training, they started tapping into broader markets and showing entrepreneurial creativity (new products, better packaging, etc.). This transition from a local to a global mindset underscores what Sen's capability approach would describe as an expansion of freedoms, digital know-how became a new capability that allowed individuals to do and achieve more. Our findings echo those of Kurniawati et al. [9], who noted that MSMEs broadly accept and use online media when allowed to sustain their businesses through crises like the pandemic. In Langonsari's case, while the adoption is nascent, it has already aided business continuity and growth. The implication is clear: scaling digital literacy programs in rural areas can unlock significant MSME potential, contributing to national economic inclusion goals. Policymakers should thus integrate digital skills training into rural development and SME support schemes as a standard component.

However, our case also highlights that change is incremental and uneven. Not every participant became a digital success story, and underlying disparities (age, education, resources) influenced outcomes. This nuance is important. It reminds us that the digital divide is not just about infrastructure but also human factors attitudes, trust, and habits built over the years. For instance, older business owners were slower to adapt, which aligns with literature noting generational differences in technology uptake. Trust in e-commerce and digital payments is another layer; some rural consumers and sellers remain wary of online fraud or scams, which can impede the growth of digital transactions [60, 61]. Programs must, therefore, be sensitive to these human dimensions. In practice, this could mean providing differentiated support: more hand-holding and demonstration for elders, assurance mechanisms for those worried about fraud (such as introducing escrow services or cash-on-delivery options to build trust), and showcasing peer examples to overcome skepticism. The finding that youth

involvement can assist older entrepreneurs is encouraging, it suggests an internal community solution where digital natives mentor the digital immigrants, strengthening community bonds in the process.

The partnership between universities and Governments like Komdigi in this initiative illustrates a model that could be replicated elsewhere. Government agencies often have a scale but require on-the-ground implementers; universities have the expertise and local credibility. This synergy was pivotal in Padaringan's case, as was the lending structure and adaptiveness of the program. Through the FGD and continuous engagement, the collaboration took on a quadruple helix character, incorporating community voices into the discussion alongside government, academia, and media/industry. Such inclusion ensured the strategies remained context-appropriate (for example, trainers adjusted content on the fly when they realized certain concepts weren't resonating, using local analogies instead). The discussion and literature indicate that multistakeholder involvement leads to more robust outcomes. It fosters accountability – each stakeholder monitors progress from their angle (the village checks community satisfaction, the university checks learning outcomes, and the ministry checks alignment with national targets). It also pools resources and knowledge. From a broader perspective, this case adds evidence of the effectiveness of public-private-people partnerships (PPPP) in digital inclusion projects. According to Boniotti [62], applying public-private-community partnerships (P4) in community-based economic management can encourage local stakeholder participation, align projects with community values, and create a collaborative framework that integrates institutional support with private sector resources and community participation.

6.2. Towards Sustainable and Resilient Rural Economies

We observed meaningful economic impacts, but their scale is still modest. Our case suggests that once a core group in the village is empowered, they can become change agents, attracting more participants (the demonstration effect). If the Padaringan initiative continues and expands to neighboring villages, it could create a local network of digital-ready MSMEs that bolster each other's markets (perhaps through joint promotions or sharing logistics). There is potential for cluster development akin to an industrial cluster but virtually connected, where a region's villages collectively brand their products and reach markets. Such clustering could amplify the economic impact beyond individual increases.

Regarding the circular economy, our findings are preliminary but promising. Digital transformation can support circular practices [36] as seen by improved coordination for recycling and the prospect of reducing waste via better inventory management (thanks to online sales reducing unsold goods). While our participants did not explicitly focus on environmental goals, the underlying principle of efficiency that comes with digital tools naturally complements circular economy objectives. Additionally, as knowledge flows improve, villagers might learn new ways to repurpose materials (perhaps through YouTube tutorials or networking with eco-communities online). The discussion from the FGD, which explicitly framed the initiative in terms of supporting a circular economy, likely instilled some awareness of sustainability alongside the business talk, which is noteworthy – it means from the outset, the academic partners tried to integrate sustainability mindset, which could plant seeds for future environmentally conscious innovation in the village. In literature, digitalization is often cited as an enabler for the circular economy [63, 64] by connecting supply and demand for secondary materials. Our case gives a real-world echo, albeit in the early stages.

Another discussion point is the role of digital empowerment in building resilience [65]. Although not directly tested in our timeframe, one can extrapolate that digital avenues make the community more resilient to shocks (like pandemics or market disruptions). During COVID-19, many MSMEs with online channels survived better than those without [66]. By bringing Langonsari MSMEs online, we essentially equipped them with a buffer – if foot traffic falls, they have other ways to sell. One could argue this is a critical rationale for such programs beyond growth alone. It aligns with national agendas for the digital economy to sustain businesses. The participants might not fully realize this benefit until a situation tests it, but it's an important outcome that policymakers and community leaders should recognize. While our study is a single case, it shares characteristics with many rural areas in Indonesia and similar developing countries: a mix of agricultural and craft economy, community enterprise involvement, moderate connectivity, and support from government initiatives. Therefore, several lessons could be generalizable.

The importance of continuous mentorship, the efficacy of combining training with community discussion (FGD), and the multi-stakeholder approach are likely applicable broadly. Likewise, challenges like infrastructure and costs are universal in rural digital programs. However, specifics such as cultural responses, product types, and existing social structures can vary. For instance, a more remote village with less prior exposure to the Internet might need longer introductory phases. Or a village without a BUMDes or cooperative might need a different organizing entity (perhaps a local NGO or a school to gather participants). Our case benefited from having a formal BUMDes to anchor the initiative. It suggests that leveraging existing community institutions (a co-op, village council, or religious group) is key to implementing digital training effectively, as they offer trust and organizational capacity.

Theoretically, our findings contribute to understanding the micro-processes of rural digital transformation. They illustrate how empowerment theory manifests [67]: providing access (resources), agency (skills, self-efficacy), and opportunity (market linkages) leads to empowerment outcomes (increased income, confidence, community action). The case also touches on innovation diffusion theory – we saw early adopters (youth, more educated) spearhead the change, with others following when they saw results. Over time, we may witness a classic diffusion S-curve in the village's technology adoption. It would be interesting in future research to classify participants by adopter categories (innovators, early majority, late majority, etc.) and tailor strategies accordingly.

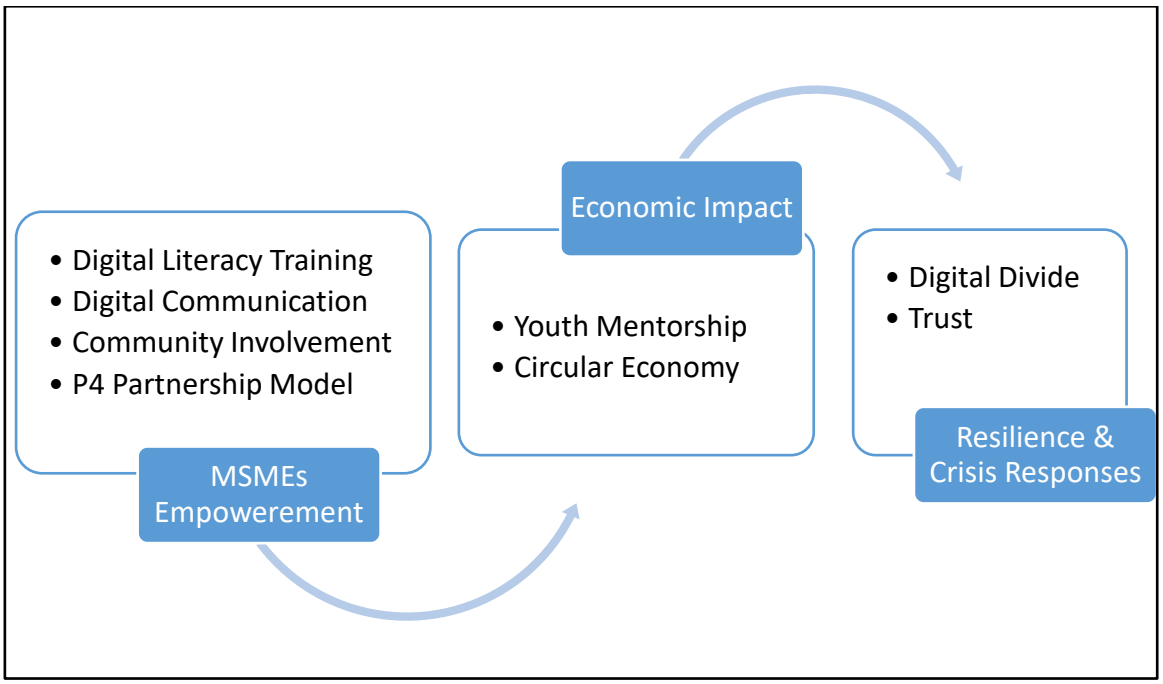

Figure 1.
Digital Transformation & MSME Empowerment in Rural Communities.

As shown in Figure 1, the interplay of digital transformation with social capital in the village is notable; digital tools provided economic gains and strengthened social networks (online and offline), which supports arguments by development scholars that ICT interventions in communities can build bonding and bridging capital, which itself is developmentally beneficial (Granovetter's theory of network strength [68, 69] in finding opportunities, etc.). Finally, linking to the circular economy concept introduces an interdisciplinary perspective: combining ICT for development with sustainable development. Our initial evidence suggests they can be mutually reinforcing – a digitally connected village can manage resources better and find creative, sustainable solutions. In contrast, a village that values sustainability can enhance its efforts via digital innovations.

7. Conclusion

Digital transformation holds significant promise for empowering MSMEs and rural communities, as the Padaringan Digital Village Initiative in Langonsari demonstrated. Through targeted digital literacy training, mentorship, and collaborative support, even small village enterprises began to overcome longstanding barriers of market isolation and limited growth. The case study showed that once equipped with digital tools and knowledge, rural entrepreneurs could expand their customer base beyond local boundaries, improve their business practices, and increase income. Perhaps equally important, the initiative spurred greater social cohesion and confidence within the community – from youth taking active roles in the local economy to peer entrepreneurs supporting one another in the digital learning journey. These socio-economic changes contribute to building a more resilient and self-reliant rural community. The role of government and academic collaboration was pivotal in this success. By combining policy-driven programs with grassroots execution and research-based insights, the initiative ensured both reach and relevance. It exemplifies how multi-stakeholder partnerships (government, academia, community, and private sector) can effectively drive digital transformation at the village level. Such partnerships can be a model for scaling similar programs across other rural areas, adapting to local contexts while maintaining core elements of training, infrastructure support, and mentorship.

The Padaringan initiative also illustrates that digital empowerment in villages is not an overnight process. Challenges such as infrastructure deficiencies, financial constraints, and varying mindsets mean that interventions must be sustained and adaptive. Continuous support – whether through follow-up training, improved internet facilities, or economic inclusion measures – is required to maintain momentum and ensure that initial gains translate into long-term development. Despite the challenges, the trajectory in Langonsari is positive and promising. There is evidence of movement towards a digitally enabled circular economy in the village, where resource use is optimized, and economic value circulates locally with the help of technology.

7.1. Implications

In conclusion, the BumDes Padaringan case affirms that with strategic support, rural MSMEs can leverage digital transformation to become agents of economic growth and social progress. Digital tools serve as enablers that amplify villages' innate entrepreneurial spirit and resourcefulness. For policymakers and development practitioners, the key takeaway is to create enabling environments – through infrastructure, education, and partnerships – that allow these small actors to thrive in the digital era. As rural communities like Langonsari become more connected and empowered, the benefits extend beyond individual businesses to society, contributing to national goals of inclusive growth and sustainable development. The lessons

from this case study contribute to the growing body of knowledge on effectively bridging the digital divide and unleashing the potential of rural entrepreneurship in Indonesia and similar developing contexts.

Governments should integrate digital literacy and entrepreneurship training into rural development programs nationwide. The demonstrated success in Langonsari suggests that scaling such initiatives could significantly boost the rural economy. Policies must also address infrastructure, including rural broadband development in national budgets and public-private partnerships. Moreover, creating multi-stakeholder task forces at regional levels (involving local universities, ICT agencies, and community leaders) could replicate the collaborative model seen here. Empowering rural MSMEs digitally can contribute to reducing urban-rural economic disparities. As more villages come online and partake in broader markets, rural regions can develop new value chains and contribute to exports (for unique crafts or specialty foods), which helps distribute economic growth more evenly and prevents excessive urban migration by creating viable livelihoods in villages.

7.2. Limitations

This study, while comprehensive in its qualitative exploration, has some limitations. It focuses on a single village case, which may limit generalizability. Each rural community has unique characteristics; results could differ in areas with different cultures or economic bases. The observation timeframe of the research was also relatively short (covering the immediate months during and after the program), and longer-term effects and the durability of changes could not be fully assessed. There is also a possibility of positive response bias, as participants aware of the researchers' university affiliation might have emphasized successes more than failures. We mitigated this by ensuring confidentiality and encouraging honest sharing (and indeed, challenges were candidly discussed), but some biases cannot be ruled out. Lastly, we did not quantitatively measure the exact increase in incomes or perform a cost-benefit analysis of the program – our data on sales improvements were self-reported and illustrative. Future research could strengthen this by collecting financial records or using control groups to attribute changes more definitively to the intervention. Based on this case study, future research could explore several avenues by examining similar digital village initiatives in other regions (within Indonesia or other developing countries) to identify common success factors or cultural differences. A comparative approach could validate which findings are universal and which are context-specific.

References

[1] A. Nurprabowo and M. M. Meilani, *Strategic study green energy series: Formal sector MSME investment strengthens pillars of national economic resilience*. Jakarta, Indonesia: Agency for the Assessment and Application of Technology (BPPT), 2023.

[2] INDEF, *The role of digital platforms in the development of MSMEs in Indonesia*. Jakarta, Indonesia: Institute for Development of Economics and Finance (INDEF), 2024.

[3] I. Fodranová and M. Antalová, "How can digital sharing economy reduce unemployment?," *Journal of Technology Management & Innovation*, vol. 16, no. 1, pp. 51-57, 2021. https://doi.org/10.4067/s0718-27242021000100051

[4] S. Satoto, E. Nuriyatman, R. Mushawirya, M. M. Mujib, and M. I. Haq, "Revitalization of village-owned enterprises to strengthen the community economy in Indonesia: Between policy and prosperity," *Jambe Law Journal*, vol. 7, no. 2, pp. 509–537, 2024. https://doi.org/10.22437/jlj.7.2.509-537

[5] K. Kim, Y. You, and H. Choi, "Development of tourism village for the revitalization of regional economy: A case study," *Journal of Logistics, Informatics and Service Sciences*, vol. 8, no. 1, pp. 20–34, 2021. https://doi.org/10.33168/LISS.2021.0102

[6] A. Adel and A. Aldaarmi, "Digital transformation in SME financing in Saudi Arabia: Leveraging digital financial intermediation to overcome challenges, maximize benefits, and foster sectoral growth," *International Journal of Innovative Research in Science and Studies*, vol. 8, no. 2, pp. 517–530, 2025. https://doi.org/10.53894/ijirss.v8i2.5203

[7] S. S. Wulandari, M. L. B. M. Diah, and A. Asari, "Digital proficiency and entrepreneurial mindset for sme success through market savvy and tech literacy," *Aptisi Transactions on Technopreneurship*, vol. 7, no. 1, pp. 26–36, 2025.

[8] P. Kumar, A. Chandra, S. Shivani, and V. Pillai, "Evaluating the impact of digital and financial literacy on MSME performance," *Journal of the International Council for Small Business*, vol. 6, no. 2, pp. 284-296, 2025. https://doi.org/10.1080/26437015.2024.2405548

[9] E. Kurniawati, U. H. A. Kohar, and K. Pirzada, "Change or destroy: The digital transformation of indonesian msmes to achieve sustainable economy," *Polish Journal of Management Studies*, vol. 26, no. 2, pp. 248–264, 2022. https://doi.org/10.17512/pjms.2022.26.2.15

[10] S. D. Wahyundaru, W. Putra, M. Wibowo, E. Ivada, P. Nurastuti, and D. Yuzaria, "Linking the role of e-commerce and financial literacy on MSME's sustainability performance during the digital era," *International Journal of Data and Network Science*, vol. 8, pp. 2651–2662, 2024. https://doi.org/10.5267/j.ijdns.2024.4.013

[11] A. Molina-Garcia, M. T. Galache-Laza, V. Gonzalez-Garcia, and J. Diéguez-Soto, "Financial literacy and environmental sustainability in SMEs: process innovation as an association mechanism," *Eurasian Business Review*, pp. 1-38, 2025. https://doi.org/10.1007/978-3-031-01234-5

[12] L. Anatan and Nur, "Micro, small, and medium enterprises' readiness for digital transformation in Indonesia," *Economies*, vol. 11, no. 6, p. 156, 2023. https://doi.org/10.3390/economies11060156

[13] A. Monda, R. Feola, R. Parente, M. Vesci, and A. Botti, "Rural development and digital technologies: a collaborative framework for policy-making," *Transforming Government: People, Process and Policy*, vol. 17, no. 3, pp. 328-343, 2023. https://doi.org/10.1108/TG-12-2022-0162

[14] R. C. Rina, "Kaliabu and Salaman, when the internet has touched you: Stories about village designers in Indonesia," *Portal: Journal of Multidisciplinary International Studies*, vol. 13, no. 2, pp. 1-5, 2016. https://doi.org/10.5130/portal.v13i2.5025

[15] P. Gregori and P. Holzmann, "Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation," *Journal of Cleaner Production*, vol. 272, p. 122817, 2020. https://doi.org/10.1016/j.jclepro.2020.122817

[16] R. A. Aaron and R. F. Firdausi, *Impact of trade policies on the MSMEs' competitiveness in Indonesia: The case of e-commerce import restrictions*. Jakarta, Indonesia: Universitas Indonesia Press, 2024.

[17] A. Molle, *The importance of social media marketing for MSMEs in Jakarta to meet the challenges in the new normal era* (Contemporary Research on Business and Management). Boca Raton, FL.: CRC Press, 2021.
[18] P. I. Savitri, "Ministry of communication and information emphasizes ethics in the National Digital Literacy Movement. Antara News," Retrieved: https://www.antaranews.com/berita/39926. [Accessed 2021.
[19] Ministry of Communication and Digital, *Program digital entrepreneurship academy (DEA)*. Jakarta, Indonesia: Digitalent Komdigi, 2025.
[20] O. Okorie, K. Salonitis, F. Charnley, M. Moreno, C. Turner, and A. Tiwari, "Digitisation and the circular economy: A review of current research and future trends," *Energies*, vol. 11, no. 11, p. 3009, 2018. https://doi.org/10.3390/en11113009
[21] Y. Zhang and W. Bao, "Internet platform enterprises and farmers digital literacy improvement," presented at the SHS Web of Conferences, 2023.
[22] M. Negri, E. Cagno, C. Colicchia, and J. Sarkis, "Integrating sustainability and resilience in the supply chain: A systematic literature review and a research agenda," *Business Strategy and the environment*, vol. 30, no. 7, pp. 2858-2886, 2021. https://doi.org/10.1002/bse.2776
[23] C. Nugroho and K. Nasionalita, "Digital literacy index of teenagers in Indonesia," *Pekommas*, vol. 5, no. 2, pp. 215-223, 2020. https://doi.org/10.30818/jpkm.2020.2050210
[24] J. Chen, H. Hou, Z. Liao, and L. Wang, "Digital environment, digital literacy, and farmers' entrepreneurial behavior: A discussion on bridging the digital divide," *Sustainability*, vol. 16, no. 23, p. 10220, 2024. https://doi.org/10.3390/su162310220
[25] T. T. H. Tambunan and I. Busnetti, "Recent evidence on the digitalization process in Indonesia's micro and small enterprises," *International Journal of Current Science Research and Review*, vol. 7, no. 8, pp. 6031–6049, 2024. https://doi.org/10.47191/ijcsrr/V7-i8-18
[26] J. McDougall, M. Readman, and P. Wilkinson, "The uses of (digital) literacy," *Learning, Media and Technology*, vol. 43, no. 3, pp. 263-279, 2018. https://doi.org/10.1080/17439884.2018.1462206
[27] A. Capri, *Micro and small businesses in Indonesia's digital economy: Keys to developing new skills and human capital*. Jakarta: The Asia Pacific Foundation Of Canada, 2019.
[28] R. Putri, M. C. Amrulloh, J. Sutrisno, S. Saptana, and N. L. Dani, "Government policy strategy towards empowering MSMEs in the Covid-19 pandemic at the Bulak Fish Market Center, Surabaya City," *Athena: Journal of Social, Culture and Society*, vol. 1, no. 3, pp. 93-101, 2023. https://doi.org/10.58905/athena.v1i3.43
[29] M. Akbar and G. Wijaya, "Digital literacy of rural areas in Indonesia: Challenges and opportunities," in *Proceedings of the 4th International Conference on Rural Socio-Economic Transformation, RUSET 2023, 1 November 2023, Bogor, Indonesia*, 2024.
[30] C. He, R. Shi, H. Wen, and J. Chu, "Impact of digital literacy on rural residents' subjective well-being: An empirical study in China," *Agriculture*, vol. 15, no. 6, p. 586, 2025. https://doi.org/10.3390/agriculture15060586
[31] E. Roberts, D. Beel, L. Philip, and L. Townsend, "Rural resilience in a digital society," *Journal of Rural Studies*, vol. 54, pp. 355-359, 2017. https://doi.org/10.1016/j.jrurstud.2017.06.010
[32] P. Tiwasing, B. Clark, and M. Gkartzios, "How can rural businesses thrive in the digital economy? A UK perspective," *Heliyon*, vol. 8, no. 10, p. e10745, 2022. https://doi.org/10.1016/j.heliyon.2022.e10745
[33] K. Salemink, D. Strijker, and G. Bosworth, "Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas," *Journal of Rural Studies*, vol. 54, pp. 360-371, 2017. https://doi.org/10.1016/j.jrurstud.2015.09.001
[34] M. Mäkinen, "Digital empowerment as a process for enhancing citizens' participation," *E-Learning and Digital Media*, vol. 3, no. 3, pp. 381-395, 2006. https://doi.org/10.2304/elea.2006.3.3.381
[35] L. Lingling and L. Ye, "The impact of digital empowerment on open innovation performance of enterprises from the perspective of SOR," *Frontiers in Psychology*, vol. 14, p. 1109149, 2023. https://doi.org/10.3389/fpsyg.2023.1109149
[36] C. Chauhan, V. Parida, and A. Dhir, "Linking circular economy and digitalisation technologies: A systematic literature review of past achievements and future promises," *Technological Forecasting and Social Change*, vol. 177, p. 121508, 2022. https://doi.org/10.1016/j.techfore.2022.121508
[37] S. Z. Ahmad, A. R. Abu Bakar, and N. Ahmad, "Social media adoption and its impact on firm performance: the case of the UAE," *International Journal of Entrepreneurial Behavior & Research*, vol. 25, no. 1, pp. 84-111, 2019. https://doi.org/10.1108/IJEBR-08-2017-0299
[38] A. Neri *et al.*, "The relationship between digital technologies and the circular economy: A systematic literature review and a research agenda," *R&D Management*, vol. 55, no. 3, pp. 617–713, 2024. https://doi.org/10.1111/radm.12715
[39] T. Perdana, K. Kusnandar, H. H. Perdana, and F. R. Hermiatin, "Circular supply chain governance for sustainable fresh agricultural products: Minimizing food loss and utilizing agricultural waste," *Sustainable Production and Consumption*, vol. 41, pp. 391-403, 2023. https://doi.org/10.1016/j.spc.2023.09.001
[40] E. R. Cahyadi, N. Hidayati, N. Zahra, and C. Arif, "Integrating circular economy principles into agri-food supply chain management: A systematic literature review," *Sustainability*, vol. 16, no. 16, p. 7165, 2024. https://doi.org/10.3390/su16167165
[41] O. Blackburn, P. Ritala, and J. Keränen, "Digital platforms for the circular economy: exploring meta-organizational orchestration mechanisms," *Organization & Environment*, vol. 36, no. 2, pp. 253-281, 2023. https://doi.org/10.1177/10860266221130717
[42] S. Danvers, J. Robertson, and A. Zutshi, "Conceptualizing how collaboration advances circularity," *Sustainability*, vol. 15, no. 6, p. 5553, 2023. https://doi.org/10.3390/su15065553
[43] J. Singh, K. Sung, T. Cooper, K. West, and O. Mont, "Challenges and opportunities for scaling up upcycling businesses–The case of textile and wood upcycling businesses in the UK," *Resources, Conservation and Recycling*, vol. 150, p. 104439, 2019. https://doi.org/10.1016/j.resconrec.2019.104439
[44] A. Bourlier and G. Gomez, *Strategies for expanding into emerging markets with E-commerce*. New York, USA: Euromonitor International, 2016.
[45] A.-A. A. Sharabati, A. A. A. Ali, M. I. Allahham, A. A. Hussein, A. F. Alheet, and A. S. Mohammad, "The impact of digital marketing on the performance of SMEs: An analytical study in light of modern digital transformations," *Sustainability*, vol. 16, no. 19, p. 8667, 2024. https://doi.org/10.3390/su16198667
[46] H. Lawelai, A. Suherman, A. Sadat, A. A. M. Wijaya, and L. Hanifa, "Digital marketing training to increase business competitiveness for village-owned enterprises (BUMDes) in South Buton Regency," *Society: Jurnal Pengabdian Masyarakat*, vol. 2, no. 1, pp. 31-37, 2023. https://doi.org/10.55824/jpm.v2i1.233

[47] M. Mura, M. Longo, and S. Zanni, "Circular economy in Italian SMEs: A multi-method study," *Journal of Cleaner Production*, vol. 245, p. 118821, 2020. https://doi.org/10.1016/j.jclepro.2019.118821
[48] I. Ozturk, O. Alqassimi, and S. Ullah, "Digitalization and SMEs development in the context of sustainable development: A China perspective," *Heliyon*, vol. 10, no. 6, p. e27936, 2024. https://doi.org/10.1016/j.heliyon.2024.e27936
[49] L. Chen, "Improving digital connectivity for e-commerce: A policy framework and empirical note for ASEAN," ERIA Discussion Paper Series, no. March 2020, Economic Research Institute for ASEAN and East Asia (ERIA), Jakarta, Indonesia, 2020.
[50] A. A. Vărzaru and C. G. Bocean, "Digital transformation and innovation: The influence of digital technologies on turnover from innovation activities and types of innovation," *Systems*, vol. 12, no. 9, p. 359, 2024. https://doi.org/10.3390/systems12090359
[51] R. K. Yin, *Case studies: Design & methods*, 1st ed. Jakarta, Indonesia: PT. RajaGrafindo Persada, 2005.
[52] N. K. Denzin and Y. S. Lincoln, *The Sage handbook of qualitative research*, 3rd ed. California: Sage, 2011.
[53] C. Nugroho, R. Haqqu, C. W. Priastuty, A. Wulandari, Z. Qathrunnada, and J. A. Pramesthi, "Prevention of disinformation dissemination based on local wisdom: Case study of the mystical sect 'Perjalanan' West Java Indonesia," presented at the 2024 IEEE Digital Platforms and Societal Harms (DPSH), 2024.
[54] J. W. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*, 4th ed. SAGE Publications. https://doi.org/10.4135/9781849208956, 2016.
[55] O. T. Nyumba, K. Wilson, C. J. Derrick, and N. Mukherjee, "The use of focus group discussion methodology: Insights from two decades of application in conservation," *Methods in Ecology and evolution*, vol. 9, no. 1, pp. 20-32, 2018. https://doi.org/10.1111/2041-210X.12860
[56] P. Van Eeuwijk and Z. Angehrn, *How to… conduct a focus group discussion (FGD). Methodological Manual*. Amsterdam, Netherlands: Wageningen University, 2017.
[57] J. W. Creswell and V. L. P. Clark, *Designing and conducting mixed methods research*. Los Angeles, CA:: Sage Publications, 2017.
[58] M. Viswanathan, N. Umashankar, A. Sreekumar, and A. Goreczny, "Marketplace literacy as a pathway to a better world: Evidence from field experiments in low-access subsistence marketplaces," *Journal of Marketing*, vol. 85, no. 3, pp. 113-129, 2021. https://doi.org/10.1177/0022242921998385
[59] N. I. Egbuka, O. D. Dabo, V. O. Akinyele, and O. D. Azino, "The impact of digital literacy on women's economic empowerment: A study of Owerri municipal," *World Journal of Advanced Research and Reviews*, vol. 24, no. 2, pp. 1864–1876, 2024. https://doi.org/10.30574/wjarr.2024.24.2.3508
[60] D. Bijwaard, "Survey on "Scams and fraud experienced by consumers"-Final Report," Retrieved: https://coilink.org/20.500.12592/96n468. [Accessed 2020.
[61] R. Ramayanti, N. A. Rachmawati, Z. Azhar, and N. H. N. Azman, "Exploring intention and actual use in digital payments: A systematic review and roadmap for future research," *Computers in Human Behavior Reports*, vol. 13, p. 100348, 2024. https://doi.org/10.1016/j.chbr.2023.100348
[62] C. Boniotti, "The public–private–people partnership (P4) for cultural heritage management purposes," *Journal of Cultural Heritage Management and Sustainable Development*, vol. 13, no. 1, pp. 1-14, 2023. https://doi.org/10.1108/JCHMSD-12-2020-0186
[63] M. F. Arroyabe, C. F. Arranz, and J. C. F. de Arroyabe, "The integration of circular economy and digital transformation as a catalyst for small and medium enterprise innovation," *Business Strategy and the Environment*, vol. 33, no. 7, pp. 7162-7181, 2024. https://doi.org/10.1002/bse.3858
[64] J.-P. Schöggl, M. Rusch, L. Stumpf, and R. J. Baumgartner, "Implementation of digital technologies for a circular economy and sustainability management in the manufacturing sector," *Sustainable Production and Consumption*, vol. 35, pp. 401-420, 2023. https://doi.org/10.1016/j.spc.2022.11.012
[65] A. Mehan, "The role of digital technologies in building resilient communities," *Bhumi, The Planning Research Journal*, vol. 10, no. 1, pp. 33–40, 2023. https://doi.org/10.4038/bhumi.v10i1.92
[66] OECD, "Pisa 2022 results," 2023.
[67] A. R. Quisumbing *et al.*, "Enhancing agency and empowerment in agricultural development projects: A synthesis of mixed methods impact evaluations from the Gender, Agriculture, and Assets Project, Phase 2 (GAAP2)," *Journal of Rural Studies*, vol. 108, p. 103295, 2024. https://doi.org/10.1016/j.jrurstud.2024.103295
[68] M. S. Granovetter, "The strength of weak ties," *American Journal of Sociology*, vol. 78, no. 6, pp. 1360-1380, 1973. https://doi.org/10.4324/9780429499821-43
[69] A. Tutić and H. Wiese, "Reconstructing Granovetter's network theory," *Social Networks*, vol. 43, pp. 136-148, 2015. https://doi.org/10.1016/j.socnet.2015.05.002