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Research Paper

Empowerment Theory and Digital Village: Insights from West Java's Digital Village Programme

Dyana Chusnulitta Jatnika[1*], Muhamad Burhanudin[2], Meilanny Budiarti Santoso[3], and Shafira Putri Septiyanti[4]

[1,3]Department of Social Welfare, Faculty of Social and Political Science, Universitas Padjadjaran, Sumedang, Indonesia
[2]Department of Village and Community Empowerment of West Java Province, Bandung, Indonesia
[4]Jabar Digital Service, Bandung, Indonesia

***Correspondence author**: dyana.jatnika@unpad.ac.id*

Abstract

The advancement of digital technology influences rural development, requiring communities to adapt by not only relying on infrastructure but also maximizing digital technologies for social and economic empowerment. The West Java Digital Village Program serves as a case study in this research, explored through the framework of Empowerment Theory to understand its impact on individual empowerment, particularly for rural beneficiaries. This study employed qualitative methods, specifically in-depth interviews with beneficiaries of the program selected from four regencies in West Java, including Ciamis, Bandung, Sumedang, and Garut. Findings indicate that beneficiaries of the Digital Village Program experienced changes in self-concept due to increased confidence from new digital skills, along with skill development and greater perceived control. Among the indicators related to empowerment, further exploration is needed on how to create a supportive digital ecosystem in villages to maximize sustainable empowerment for beneficiaries. This research contributes to the discourse on digital transformation in rural development, offering insights for policymakers to design inclusive programs that maximize long-term benefits for rural populations.

Keywords: Digital Village; Community Empowerment; Digital Talent.

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Address: Jalan Proklamasi 70, Central Jakarta, Indonesia 10320
Phone: +62 21 31928280/31928285
Fax: +62 21 31928281
E-mail: journal.pusbindiklatren@bappenas.go.id

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1. Introduction

The rapid advancement of digital technology influences rural development by reshaping how people in villages interact with each other in both social and economic activities, creating new opportunities for growth (Agusta, 2023; Wang et al., 2022). This shift potentially enhances public access to information, better public service delivery, and better participation in governance processes (Chen et al., 2024; Kumar, 2012). In terms of economic opportunities, this enables rural businesses to reach broader markets through e-commerce or online entrepreneurship (HAJI, 2021). Some rural communities have better adoption for digital technologies and the others face specific challenges. Indeed, the successful adoption of digital technologies does not only rely on infrastructural advancements, such as internet connectivity, but also on ensuring adequate digital literacy and competencies among rural populations, enabling them to access, use, and optimize available digital tools (Komorowski & Stanny, 2020).

In this context, some research shows that the key lies in people as key beneficiaries, indicating how rural communities can leverage digital technology for their own empowerment (Parks et al., 2021; Roberts et al., 2015; Tim et al., 2021; Visvizi & Lytras, 2018). By effectively using digital tools, rural residents can enhance their social and economic capacities, increasing their access to resources, information, and opportunities (Naldi et al., 2015). This digital empowerment enables them to participate more fully in a better livelihood and foster social inclusion within their communities (Wang & Li, 2021). Having said that, not all rural residents have the ability to access and utilize available digital technology, exacerbating existing inequalities and missing out on opportunities for social and economic advancement (Hansen et al., 2023; Rothe et al., 2023; Smidt, 2021; Wilson-Menzfeld et al., 2024).

In this case, governments are one of the key actors playing a critical role as agents of empowerment in the digital era (Bleumers et al., 2012; Dahal & White, 2022; Kunwedomo et al., 2024). Since 2014, Indonesia has implemented Law No. 6 of 2014 on Villages, which aims to advance the economic conditions of rural communities and reduce national development disparities by strengthening villages as key agents in the development process (Eko et al., 2014). The law emphasizes the role of villages as critical components of national development, positioning them as essential actors in driving change and progress (Lindawati & Parwoto, 2021). In line with this view, rural community empowerment is an effort aimed at developing the independence and welfare of communities by enhancing knowledge, attitudes, skills, behavior, capabilities, and awareness, as well as by utilizing the resources within the community. This is pursued through policy establishment, programs, activities, and assistance tailored to address the core issues and priorities that meet the needs of rural communities (Indonesia, 2014).

By implementing programmes and policies that promote digital inclusion, governments can bridge these needs with digital technology adoption to create a more sustainable digital ecosystem (Poku & Vlosky, 2002; Taylor, 2020). For many governments, digitalization is not just a tool for economic growth, but also a pathway for social development, enhancing the quality of life and resilience of rural communities (Castro & Lopes, 2022). Also, one effort to accelerate rural development in line with the era of the industrial revolution towards 5.0 is empowering communities through the use of information and communication technology (ICT). In this era of rapid technological advancement, communities are required to adapt to these changes as they evolve over time. On the other hand, ICT usage has become widespread, encompassing nearly every aspect of societal life (Bansal & Choudhary, 2024; Wibowo et al., 2014), making it a highly relevant alternative tool for community empowerment. This approach enables outreach to all segments of society, especially those often difficult to reach through direct face-to-face interaction (Philip et al., 2017).

One of the examples of this approach is the West Java Digital Village Programme, which serves as a case study in using digitalization to empower rural communities. This initiative, led by the West Java provincial government, aims to close the digital divide in rural areas by providing internet access, digital literacy training, and socio-economic support. By targeting individuals, community groups, and organizations, the programme plays a critical role in advancing digital inclusion in the province, particularly in rural areas. This program has been implemented since 2019, targeting a range of beneficiaries, including local village governments, entrepreneurs, as well as various professional groups in rural areas such as farmers, educators, and others. This multifaceted approach allows for an assessment through Empowerment Theory, in which the interconnectedness across levels, from individuals to groups

and communities, can be integrated into a unified approach to empowerment (Zimmerman, 1995; Zimmerman, 2000). In addition, assessing empowerment at the individual level becomes particularly crucial to ensure that each program beneficiary is better equipped to participate in collective decision-making processes and drive sustainable development within their local communities (Craig, 2002; Pandey et al., 2024).

Evaluating how the program has an impact on its beneficiaries reveals how it enhances their control, competence, and participation, thereby supporting overall community growth and resilience as part of the empowerment process. Beyond infrastructure (Afzal et al., 2023; Morris et al., 2022), it is crucial for people to recognize the value of digital applications and engage actively with them to ensure meaningful adoption (Jakobsen et al., 2023). According to Parsons (1991), empowerment is a process that emphasizes individuals gaining sufficient skills, knowledge, and power to influence their own lives as well as the lives of those they care about. Meanwhile, Ife (1995) describes empowerment as a process aimed at preparing communities by providing resources, opportunities, knowledge, and skills to enhance their capacity to shape their own future and actively participate in and influence life within their community. In essence, both experts highlight that empowerment involves individuals gaining skills, knowledge, and power, facilitated by surrounding resources and opportunities, along with the chance to deepen their skills and knowledge—ultimately aimed at benefiting themselves and those around them.

Furthermore, Zimmerman (1995, 2000) model of psychological empowerment frames control, competence, and participation mentioned as essential components and distinguishes between the empowerment process and the achieved state of being empowered. As empowerment involves both the process and outcomes of gaining control and power to improve one's life (Cattaneo & Chapman, 2010), an individual needs to acquire sufficient skills, knowledge, and power to influence both their own lives and the lives of others around them (Parsons, 1977). Similarly, Ife (1995) views empowerment as the process of equipping communities with resources, opportunities, knowledge, and expertise, enabling them to build their capacity to shape their futures and actively participate in community life. By providing digital tools and training, the program can enhance personal empowerment by increasing individuals' digital skills and self-efficacy, which are crucial for improving personal capabilities and opportunities (Gutierrez, 1990; Zimmerman, 2018).

This research addresses a critical gap by focusing on how digital empowerment can be achieved at the individual level through the lens of Empowerment Theory. While previous studies have explored the broad impacts of digital transformation on rural development (Smidt, 2021; Visvizi & Lytras, 2018), limited attention has been given to understanding how digital adoption affects self-concept, skills development, and perceived control among individual beneficiaries. The novelty of this study lies in its application of Empowerment Theory to assess the specific impacts of the West Java Digital Village Program on farmers in the agricultural sector, a cornerstone of rural economies in the region. By examining individual-level empowerment, this study provides unique insights into how targeted interventions can maximize the benefits of digital transformation for rural communities. Furthermore, the methods and participant selection, designed to capture diverse perspectives across key stakeholders, offer a comprehensive approach that contributes significant new knowledge to the discourse on digital inclusion and rural empowerment.

2. Methods

This research employed a qualitative methodology, with a focus on semi-structured interviews, which are particularly effective for exploring complex social phenomena (Schmid, 1981). The qualitative approach allowed for the collection of rich, detailed data and nuanced perspectives on the program's effectiveness and its impact on the local communities as beneficiaries (Bryda & Costa, 2023). In-depth interviews were conducted with a diverse range of beneficiaries and stakeholders involved in the Digital Village Programme in West Java Province, offering insights into both the successes and challenges experienced at various levels of implementation. In addition, to enrich the data, this research used

secondary data with its sources being documents, annual reports of government organizations, articles, and publications from all relevant sources.

To ensure a robust and comprehensive analysis, the research adopted a purposive sampling strategy, selecting 20 (twenty) key participants as beneficiaries of the West Java Digital Village Programme from four different regencies in West Java, including Ciamis Regency, Bandung Regency, Sumedang Regency, and Garut Regency. This selection aimed to capture a broad spectrum of experiences and contexts, reflecting the geographic and socio-economic diversity within the province. Interviewees included critical stakeholders such as village heads, heads of agricultural groups, and relevant local government officials. These individuals were chosen due to their leadership roles and direct involvement in the program, making them well-positioned to offer in-depth reflections on the program's impact and implementation.

To analyze the qualitative data collected, this study employed a thematic analysis guided by empowerment theory (Perkins & Zimmerman, 1995). This allowed for the systematic identification and interpretation of patterns within the data, focusing on key constructs of empowerment such as access to resources, participation in decision-making, and self-efficacy. This process involved transcribing the interviews, followed by iterative coding and theme development centered around empowerment themes. By integrating empowerment theory with thematic analysis, the study was able to explore the empowerment elements experienced by the beneficiaries (Braun & Clarke, 2006; Nowell et al., 2017). This combined approach ensured that stakeholders' perspectives were thoroughly captured and analyzed, aligning the findings with the study's focus on empowerment elements experienced by beneficiaries of the digital village programme in West Java Province.

This research model differs from previous studies in several key ways. While earlier studies often focused on community or institutional impacts of digital transformation, this research uniquely examines empowerment at the individual level, particularly among farmers as the primary beneficiaries in rural areas. By applying Empowerment Theory to assess constructs such as self-concept, self-efficacy, and perceived control, the study highlights how digital tools influence individual agency and capacity. Additionally, this study incorporates a comprehensive approach by combining primary data from in-depth interviews with secondary data from official reports and publications, ensuring a richer and more validated dataset. The use of purposive sampling across diverse regencies adds a geographically and socio-economically nuanced understanding of the program's impact, distinguishing this research as context-specific. Furthermore, by focusing on the West Java Digital Village Programme, this study explores the application of digital technology within the agricultural sector, offering insights that fill the research gap regarding the intersection of digital transformation and individual empowerment in rural economies.

3. Results and Discussions

3.1 Results

This research aims to provide a comprehensive analysis of the empowerment aspects experienced by beneficiaries of the digital village program, particularly farmers as the main beneficiaries from digital village agriculture in West Java Province. The findings presented here are derived from responses gathered from 20 key stakeholders, including farmers, village heads, and regional government officials who initiate and evaluate the program's implementation. The majority of farmer respondents were aged between 40 and 55 years, with most having completed primary or secondary education, while village heads and government officials generally held higher education degrees. Geographically, the respondents were selected from four regencies—Ciamis, Bandung, Sumedang, and Garut—to ensure representation of diverse socio-economic and infrastructural contexts across West Java. This diversity in demographic, educational, and geographic backgrounds provides a comprehensive understanding of the varying challenges and opportunities faced by the beneficiaries, particularly in adopting digital tools for agricultural practices.

The following three themes were identified: (i) changes in self-concept due to increased confidence from new digital skills; (ii) better skill development; and (iii) greater perceived control. The description of the participants is shown in Table 3.1. outlines the roles and responsibilities of different participant groups involved in this research, including farmers, village government, and regional government. Farmers, as

primary beneficiaries, learn and apply digital tools recommended by the regional government to improve their agricultural practices. Village governments play a key role in supporting the sustainability of digital village programmes in their villages, including ensuring regulation needed for digital adaptation. Meanwhile, regional governments are the initiator of the programme, oversee policy development, funding, and infrastructure needs to enable digital transformation across rural areas.

Table 3.1 List of participants, their descriptions, and regencies of origin.

Participant (anonym)	Descriptions
Participant 1	Farmer, 45 years old, primary education, from Ciamis
Participant 2	Farmer, 50 years old, secondary education, from Bandung
Participant 3	Farmer, 43 years old, secondary education, from Sumedang
Participant 4	Farmer, 46 years old, primary education, from Garut
Participant 5	Farmer, 40 years old, primary education, from Ciamis
Participant 6	Fish farmer, 55 years old, secondary education, from Bandung
Participant 7	Fish farmer, 42 years old, secondary education, from Sumedang
Participant 8	Fish farmer, 48 years old, primary education, from Garut
Participant 9	Fish farmer, 44 years old, primary education, from Bandung
Participant 10	Fish farmer, 50 years old, secondary education, from Sumedang
Participant 11	Village head, 52 years old, higher education, from Sumedang
Participant 12	Village head, 49 years old, higher education, from Garut
Participant 13	Village head, 51 years old, higher education, from Bandung
Participant 14	Government official, 47 years old, higher education, from Garut
Participant 15	Government official, 53 years old, higher education, from Bandung
Participant 16	Government official, 50 years old, higher education, from Sumedang
Participant 17	Farmer, 41 years old, secondary education, from Garut
Participant 18	Farmer, 43 years old, primary education, from Ciamis
Participant 19	Farmer, 45 years old, secondary education, from Sumedang
Participant 20	Farmer, 44 years old, primary education, from Garut

S**ource:** Author's own analysis based on field survey data, 2024.

Self-Concept

The findings reveal that beneficiaries, particularly those in leadership roles such as village heads and heads of agricultural groups, experienced improvements in self-concept as a result of acquiring new skills in digital adoption. Some beneficiaries reported feeling enjoyment in influencing others in their communities to adopt the same digital practices, reinforcing their leadership roles.

For example, *Respondent 3 (Village Head in Bandung Regency, male, 52 years old)* shared:

> *"Now, I feel capable of encouraging other farming groups, even with economic limitations, to adopt the digital technology I use, helping them achieve higher agricultural yields. Currently, at least 7 farming groups have been able to replicate the approach independently. I am now more confident in influencing other farming groups to use the same tools."*

For other beneficiaries, particularly farmers, the West Java Digital Village Program has broadened their perspective on agriculture and technology. Previously, most farmers viewed agriculture as merely a

means to meet their families' basic daily needs, often with barely enough to get by. Farming has traditionally been regarded as a practice rooted in age-old methods, separate from the rapid advancements of modern technology, which are often perceived as complex and out of reach for rural communities. This disconnect has, over time, reinforced the belief that agriculture and technological progress cannot easily intersect. However, with the introduction of the Digital Village Program, farmers are beginning to realize the potential for agriculture and technology to complement each other. This new perspective has sparked a sense of optimism, as farmers now envision a future where digital tools can help improve crop yields.

As *Respondent 1 (Farmer, male, 45 years old, from Ciamis)* noted:

> *"Technology once seemed like something out of reach. Now, I see how it can improve my crops and make farming less tedious. This is my first time using IoT, but the application is easy to use, so I didn't need much time to learn it. Before, I had no idea about the apps or how to use them. Now, I know, and it feels like a reduction in workload. What used to require me to go to the fish pond every day, now I can manage through the app from home."*

Similarly, *Respondent 2 (Farmer, female, 42 years old)* explained:

> *"Learning how to use mobile apps has made me more optimistic about my farming future. I've even started teaching my neighbors what I've learned. Alhamdulillah, it has been very helpful because it has made things more automated. It has significantly improved the efficiency of feeding, allowing us to save 5-10% of the feed compared to using the manual method."*

Another notable finding is that beneficiaries, after gaining confidence in basic digital skills, were increasingly open to exploring a broader range of digital applications. As they became proficient with specific tools provided during the training, their perceived ease of use (Davis, 1989) and new-found competence encouraged them to venture into more advanced applications. This shift in perspective has also been recognized by stakeholders involved in the Digital Village Program.

Village heads and regional government officials have highlighted the importance of fostering an environment where farmers feel empowered to innovate within their communities. They believe that enhancing self-concept among farmers is crucial for driving sustainable agricultural practices. However, it is essential to address certain gaps that remain. For example, not all beneficiaries have the opportunity to take on leadership roles within their communities, which affects their self-perception as change agents.

Respondent 13 (Village Head, male, 51 years old) proposed:

> *"Not all farmers have the chance to lead, and it makes a big difference in how they see themselves. Some of them feel left out of the decision-making process."*

Additionally, some farmers are hesitant to fully embrace technology due to a fear of failure or making mistakes, which undermines their confidence in trying new methods.

As *Respondent 7 (Fish Farmer, male, 55 years old)* expressed:

> "Sometimes, I still hesitate to use the tools. So far, there haven't been any major issues with the app, though I have faced network problems. As for the tools, there was an instance where a cable was damaged, causing the equipment to stop working. During that time, the irrigation line got blocked and I couldn't monitor it, leading to plants not receiving water. As a result, some plants died, and my income decreased."

This underscores the need for ongoing training and support systems that can help bridge these gaps, enabling farmers to not only adopt digital tools but also overcome their fears, instilling a sense of

competence and resilience as they engage with technology (Arintyas, 2024; Susanto et al., 2022; Sutherland & Marchand, 2021).

Respondent 14 (Government Official, male, 47 years old) proposed:

> *"More follow-up sessions focusing on psychological support could ensure that participants remain confident and motivated to use technology. In response to this, the government needs to ensure that the infrastructure is adequate to support the implementation of digital village programs. Often, farmers are hesitant to share the technology with other groups because they fear the program won't work due to the limitations of digital infrastructure. As a result, the program risks failing if the infrastructure isn't reliable."*

Better Skill Development

The findings of this study highlight the impact of the West Java Digital Village Programme on its beneficiaries, particularly farmers and community leaders. The program has been instrumental in developing both hard and soft skills, which have contributed to agricultural practices. One of the most notable outcomes of the program is the development of digital competencies among farmers. Many participants learned how to effectively use and navigate mobile applications, which enabled them to access essential agricultural information. As one farmer shared,

Respondent 18 (Farmer, male, 43 years old) shared:

> "Before the program, I only used my phone for WhatsApp. Now, I can also use it for work, managing my farm tasks right from home."

This shift from traditional, one-way information exchange to a more interactive, technology-driven approach has not only enhanced the beneficiaries' capacities but has also positioned them as key knowledge hubs within their communities.

A farming group leader noted,

> "Now, I'm able to teach other farmers what I've learned about using digital tools, and they come to me for advice on how to improve their practices."

One of the program's contributions was the facilitation of skill development, enabling beneficiaries to navigate and apply digital tools in agricultural and community contexts. Farmers who previously relied on traditional practices found themselves equipped with new capabilities to improve efficiency and productivity. Participants highlighted their newfound ability to utilize mobile applications for a range of purposes, from accessing real-time weather updates to receiving automated recommendations on planting schedules.

Respondent 4 (Farmer, male, 45 years old) noted:

> *"Before this, I relied on the advice of other farmers, which wasn't always accurate. Now, the app tells me exactly when to plant or water my crops."*

In addition to mobile applications, the program introduced Internet of Things (IoT) devices to help farmers monitor soil moisture and temperature, further enhancing productivity and promoting data-driven decision-making. A participant explained,

"I use IoT devices to track soil moisture levels, and it helps me know exactly when to water my plants, which saves water and increases yield."

This ability to remotely monitor and manage farm conditions has allowed farmers to make more informed decisions, leading to improved crop yields and operational efficiency. However, the program's success in skill development has not been uniform across all beneficiaries. While some farmers have fully embraced these digital tools, others, particularly older participants, still struggle with basic digital literacy. As one farmer admitted,

"I know how to use my phone for basic things, but I'm still not comfortable with all the apps that could help me."

This inconsistency in skill development highlights the need for continuous support to ensure that all beneficiaries can maximize the benefits of the program.

Beyond technical skills, the program has also contributed to the development of important soft skills, particularly in communication and collaboration. Beneficiaries now share their newfound knowledge and digital insights with their communities, positioning themselves as local educators for digital literacy. One participant reflected,

"We now have better communication with each other. Before, we only talked about farming during community meetings, but now we're also excited to share our knowledge with communities outside the village. Our farming practices are often used as a model by the Ministry and other districts and cities that come to learn from us. This makes us proud and motivates us to spread the impact even further."

Furthermore, some farmers reported that their practices have become models for others outside their communities. As one farmer proudly shared,

"Our farm is now a reference for other villages. Government officials from other districts come to learn from us. It's a great feeling to know that we are helping others improve."

This network-building not only contributes to individual empowerment but also strengthens collective agency within farming communities. This improvement in communication has fostered greater collaboration among farmers, enabling them to share best practices and collectively solve problems. The collaborative spirit fostered by the program has not only strengthened the farming community but has also helped to integrate digital practices into other aspects of rural life, positioning farmers as digital leaders in their villages. As a village head stated,

"The program has not only improved farming techniques but has also encouraged farmers to take the lead in introducing technology to other parts of the village. They are now seen as role models."

The development of self-confidence has also been a significant outcome. As farmers gained proficiency in digital tools, many reported feeling more confident in managing their farms independently. However, as with technical skills, the development of self-confidence was not uniform across all beneficiaries. While some farmers felt empowered by their new skills, others remained hesitant to fully embrace technology, often due to fear of failure or making mistakes. This underscores the importance of providing ongoing psychological and technical support to ensure that farmers can overcome their fears and continue to build their confidence in using digital tools.

The program has made strides in providing tiered training that caters to different levels of digital proficiency, but continuous support is necessary to ensure that all participants, regardless of their initial digital literacy, can fully benefit from the program. A government official highlighted,

> "We are working closely with local experts to make sure the training is accessible to all farmers, regardless of their starting point with technology."

The program's ability to bridge these gaps will be crucial in ensuring its long-term success and the sustainability of its impacts on agricultural practices and rural development.

In conclusion, the findings suggest that the West Java Digital Village Programme has empowered farmers by equipping them with valuable digital skills. However, it will be essential to continue providing support to address the digital literacy gaps and ensure that all beneficiaries are fully able to embrace and benefit from the digital tools introduced through the program.

Greater Perceived Control

The majority of farmers involved in the program reported positive changes in confidence and self-efficacy in their decision-making processes, largely due to their exposure to digital technologies that enable data-driven agricultural practices. This newfound capability is evidenced by their ability to use digital tools for real-time monitoring and management of their farming activities. For example, many participants shared that before the program, they would visit their fields daily to check on water levels and soil conditions, which was both time-consuming and physically demanding. One participant noted,

> *"Before, I had to go to the field every day to check the irrigation manually. Now, I can control it from my phone and save so much time. The app shows me exactly what the soil needs. I can add nutrients right away, which prevents problems from escalating."*

The access to real-time soil health data and the ability to control irrigation systems remotely have empowered these farmers to make more informed decisions, leading to improvements in resource management. As one participant explained,

> *"I can now use my phone to manage the irrigation system. If the water levels are low, I activate it right from home. It makes everything more efficient and saves time."*

This shift from manual monitoring to digital management has not only reduced labor costs but also improved the efficiency of resource allocation, as farmers can make precise decisions regarding water usage, nutrient addition, and the scheduling of activities. The ability to manage these tasks remotely also lessens the need for external labor, as previously, farmers had to hire additional workers to monitor the fields and perform these manual tasks. One participant highlighted,

> *"We no longer need extra help for daily monitoring. Technology has reduced our dependency on external labor. I only bring in extra help when the app predicts a higher workload. This has saved me money and made operations smoother."*

Moreover, the participants reported that digital tools have made them more effective in managing their time and resources. By using mobile applications that provide scheduling information for field activities, farmers can plan their tasks more effectively and avoid unnecessary visits to the fields. One participant explained,

> *"Now I don't have to go to the fields all the time. The app tells me when to fertilize, when to check the irrigation, and when to bring in extra help. It makes everything so much easier and more organized."*

This capability not only saves time but also enables farmers to allocate resources more efficiently, reducing costs and increasing operational efficiency.

The positive outcomes of the program have also been observed by local and regional government officials. One government officer remarked,

> *"The empowerment of farmers through digital tools has improved the overall agricultural practices in the region. Farmers are now more autonomous, and their ability to share knowledge with others has created a ripple effect in surrounding communities."*

This feedback highlights how the program's focus on digital technology has fostered a sense of collective empowerment, as farmers use their newfound knowledge to drive positive change in their communities. The ability to make informed decisions, plan effectively, and share knowledge has not only enhanced the farmers' self-efficacy but also contributed to broader community resilience.

However, it is important to note that the level of empowerment and control varies among participants, with some farmers still facing challenges in fully integrating digital tools into their practices. While many farmers have embraced the technology and experienced significant improvements, others, particularly those with lower levels of digital literacy, continue to struggle with using the tools effectively. One farmer admitted,

> *"I'm still learning how to use the apps properly. It's not easy, but I'm trying. When the signal drops, everything stops. It's hard to rely on technology when it's not consistent."*

This suggests that ongoing training and support will be crucial in ensuring that all farmers can fully benefit from the empowerment process and maximize the positive impact of digital technologies on their agricultural practices.

In conclusion, the findings suggest that the West Java Digital Village Program has affected positively on beneficiaries' perceived control and autonomy, empowering them to make more informed, strategic decisions and manage their resources more efficiently. These findings align with empowerment theory, which emphasizes the role of self-efficacy, autonomy, and perceived control in the empowerment process, and they highlight the importance of digital literacy and knowledge-sharing in fostering long-term empowerment among rural communities.

3.2 Discussions

The study on the West Java Digital Village Program, framed through the lens of Empowerment Theory, highlights several key findings that underscore the program's impact on individuals as beneficiaries. Our analysis reveals both positive impacts and gaps in each aspect of empowerment. While many participants reported improvements in their self-concept, skills development, and greater control over their agricultural practices, it is important to acknowledge that there are still unmet needs that hinder the full realization of empowerment. Self-concept improves as the beneficiaries gain confidence from new digital skills, enhancing their effectiveness as leaders. Skill development is crucial, as the program equips beneficiaries with essential digital competencies, increasing their efficiency in managing tasks and implementing technologies. Greater perceived control emerges as participants feel more capable of making informed decisions and leading with increased autonomy, which supports their role in driving community improvements.

Regional and village governments report increased farmer engagement in local governance, with farmers becoming influential knowledge hubs in their communities. These improvements were complemented by increased collaboration and knowledge-sharing among farmers, strengthening community resilience and fostering a sense of collective empowerment. Skill development has enhanced agricultural standards, enabling data-driven decisions and sustainable practices. However, disparities in digital literacy persist, with some farmers lacking basic skills, limiting their effectiveness. These findings underscore the need for consistent support and community networks to strengthen digital empowerment across rural areas.

Digital literacy emerged as a critical factor influencing the extent of empowerment across different participants. As the participants predominantly aged between 40 and 55 years, another research needed to provide insights on varying experiences and challenges compared to other types of beneficiaries. This

demographic nuance may influence their adaptability to digital tools and technologies, underscoring the need for tailored approaches to enhance empowerment across all age groups.

1. Positive Changes in Self Concept

Firstly, the findings reveal that beneficiaries, particularly those in leadership roles such as village heads and heads of agricultural groups, experienced improvements in self-concept as a result of acquiring new digital skills. This aligns with Zimmerman's (1995) psychological empowerment model, where self-efficacy and perceived competence play a pivotal role in individual empowerment. Some beneficiaries reported feeling enjoyment of influencing others in their communities to adopt the same digital practices, reinforcing their leadership roles and enhancing their ability to create larger-scale community improvements (Zimmerman & Warschausky, 1998).

For other beneficiaries, farmers believe that the government's digital village program has broadened 2022 their perspective on agriculture and technology. Previously, most farmers viewed agriculture as merely a means to meet their families' basic daily needs, often with barely enough to get by. Farming has traditionally been regarded as a practice rooted in age-old methods, separate from the rapid advancements of modern technology, which are often perceived as complex and out of reach for rural communities. This disconnect has, over time, reinforced the belief that agriculture and technological progress cannot easily intersect. However, with the introduction of the digital village program, farmers are beginning to realize the potential for agriculture and technology to complement each other. This new perspective has sparked a sense of optimism, as farmers now envision a future where digital tools can help improve crop yields. The program has influenced a mindset shift, encouraging farmers to see agriculture as a viable pathway for economic growth and resilience by using digital technology.

Another notable finding is that beneficiaries, after gaining confidence in basic digital skills, were increasingly open to exploring a broader range of digital applications. As they became proficient with specific tools provided during the training, their perceived ease of use (Davis, 1989) and new-found competence encouraged them to venture into more advanced applications. This growing curiosity and confidence to explore digital technologies further reflect the empowerment process described by Zimmerman (2000), where individuals move from gaining basic skills to broader application, thereby increasing their control over their environment.

This shift in perspective has also been recognized by stakeholders involved in the digital village program. Village heads and regional government officials have highlighted the importance of fostering an environment where farmers feel empowered to innovate and lead within their communities. They believe that enhancing self-concept among farmers is crucial for driving sustainable agricultural practices. However, it is essential to address certain gaps that remain. For example, not all beneficiaries have the opportunity to take on leadership roles within their communities, which affects their self-perception as change agents. Additionally, some farmers are hesitant to fully embrace technology due to a fear of failure or making mistakes, which undermines their confidence in trying new methods. This underscores the need for ongoing training and support systems that can help bridge these gaps, enabling farmers to not only adopt digital tools but also overcome their fears, instilling a sense of competence and resilience as they engage with technology (Arintyas, 2024; Susanto et al., 2022; Sutherland & Marchand, 2021).

2. Skill Development

Skill development is one of the key outcomes of the West Java Digital Village Programme, equipping beneficiaries with essential competencies that enhance their efficiency in managing tasks and implementing technologies (Cattaneo & Chapman, 2010). The skills gained through the digital village program lead to better agricultural standards, leading to higher quality produce and more competitive farmers. Participants have learned to navigate mobile applications effectively, enabling them to access essential agricultural information, including planting schedules and pest management advice. Participants have learned to navigate mobile applications effectively, enabling them to access essential agricultural information, including planting schedules and pest management advice. In the past, information exchange

was limited to their social circles and was largely one-way. With the use of digital applications, however, farmers are now recognized by participants as a key digital learning source for the surrounding community, sharing valuable insights and fostering a more interactive exchange of agricultural knowledge. By transitioning from one-way information flow within limited social circles to becoming active knowledge hubs, the beneficiaries of West Java Digital Village Programme not only enhance their own capacities but also drive community-wide learning and resilience (Gómez-Carmona et al., 2023; Zimmerman, 1995).

Moreover, in the West Java Digital Village programme, farmers as the main beneficiaries have gained ability to utilize Internet of Things (IoT) devices to monitor soil moisture and temperature, facilitating data-driven decision-making that enhances productivity. For example, heads of farming groups, such as Ketua Gabungan Kelompok Tani (Gapoktan), learned to optimize smartphones and other devices to access a variety of digital services. As a result, farmers are now actively contributing to the implementation of sustainable agricultural practices, positioning themselves as catalysts for community growth. This skill development allows beneficiaries to improve their operational efficiency and decision-making processes, fostering greater autonomy and confidence (Wu & Peng, 2024; Zimmerman, 1995).

The process of enhancing beneficiaries' knowledge and skills in utilizing digital technology presents a challenge for the program initiator, the regional government. Beneficiaries possess varying levels of digital proficiency, ranging from basic internet usage to advanced understanding of IoT applications. To bridge these skill gaps, a range of digital literacy programs has been organized in collaboration with academics, non-governmental partners, and local village governments. These programs are designed to offer tiered training that aligns with the beneficiaries' needs and skill levels.

In addition to hard skills, key findings indicate that beneficiaries of the West Java Digital Village Program have also developed some essential soft skills. These include enhanced communication abilities, as farmers now are more able to share new insights and digital knowledge with others in their communities, positioning themselves as local digital educators. This was highlighted by research from both local and regional governments. Through improved communication skills, they can effectively convey what they have learned from utilizing digital technology and inspire others to adopt similar tools (Zenda & Dlamini, 2023). Additionally, their collaboration skills have improved through active engagement with peers, sharing techniques and strategies learned from the program. Increased self-confidence and adaptability also emerged, as farmers gained the ability to navigate digital tools and make informed, data-driven decisions that foster community growth and resilience.

However, it is important to note that the level of skill development among farmers is inconsistent. While some have successfully integrated digital tools into their practices, others still lack basic digital literacy, which hinders their overall effectiveness (Choruma et al., 2024; Neumeyer et al., 2020). Addressing these shortcomings will be crucial in ensuring that all beneficiaries can benefit from the empowerment process and maximize the positive impacts of the digital village program on their agricultural endeavors.

3. Greater Self Control

Another key aspect of empowerment observed in the study is greater perceived control, which has emerged as an additional dimension of empowerment among the participants. Beneficiaries of the West Java Digital Village Program in this research feel more capable of making informed decisions and leading with increased autonomy, which in turn enhances their roles in driving community improvements (Parks et al., 2021). The findings indicate that access to real-time soil health data empowers farmers to make informed decisions that significantly improve farming outcomes. After learning about the effectiveness and potential of digital technology, they began to understand and implement what they learned to manage their daily needs based on available data. For instance, farmers now open apps to plan their daily activities in the fields—if water levels are low, they can activate irrigation systems through the app, or add nutrients if the soil needs it.

This capability allows for precise scheduling and resource allocation, reducing unnecessary labor and enabling timely hiring of seasonal workers based on projected yields and workload. Such advancements support enhanced operational efficiency, resource conservation, and ultimately contribute to sustainable

agricultural practices. Before the adoption of digital technology, farmers had to physically go to the fields to monitor and operate irrigation systems manually. Due to the large size of the fields, they needed to hire additional help to conduct these periodic inspections and manage water levels, making it a time-consuming and labor-intensive process.

This shift reflects empowerment theory's focus on self-efficacy and autonomy, where technology reduces dependency on external labor and boosts individuals' capacity to manage resources independently (Nwokolo et al., 2023; Zimmerman, 2000). Moreover, beneficiaries expressed that these tools have empowered them to manage their resources more efficiently, make more strategic decisions, and ultimately have more control over their work environments, enhancing their productivity and confidence in using digital solutions (Gómez-Carmona et al., 2023; Salemink et al., 2017).

Besides, the data suggest that farmers are now able to make more measured decisions related to production practices, particularly through data-driven assessments of soil health and field conditions. With real-time access to this information, farmers can predict and respond proactively to their crops' needs. This development reflects an enhancement in perceived control at an individual level, as the ability to understand and act upon soil conditions in real-time enables farmers to exercise greater control over production outcomes and make more strategic decisions. This shift not only boosts productivity but also grants farmers a stronger sense of agency in managing their yields, underscoring the impact of data-informed decision-making on perceived control in agricultural practices. This shift toward data-informed decision-making highlights empowerment theory's emphasis on perceived control, as farmers gain a greater capacity to make autonomous, strategic choices about their yields (Zimmerman, 2000). Recent research also supports that real-time data access enhances farmers' agency, enabling them to better optimize resource use and improve resilience in response to changing conditions (Ogutu et al., 2014; Zhu et al., 2021).

Besides that, farmers are found to become more effective in managing their time and resources, reducing the need for frequent field visits. By utilizing mobile applications that provide optimal scheduling information for field activities or indicate when additional labor may be required, farmers are able to make strategic decisions regarding resource allocation and timing. This autonomy aligns with the core principle of empowerment theory, which emphasizes increasing individuals' control over their environment and decisions. Recent studies have highlighted how digital tools in agriculture contribute to farmer empowerment by fostering self-reliance and facilitating informed decisions (Kaponda & Chiwaridzo, 2024; Park, 2015; Rai & Maharjan, 2023). This improvement in time and resource management reflects an enhanced sense of control over daily work schedules and operational demands. With planning support from these applications, farmers can rely less on traditional methods and exercise greater autonomy in their farming activities, ultimately bolstering efficiency and self-reliance in their agricultural practices.

Furthermore, the program has enhanced collaboration among farmers, enabling them to share knowledge and strategies more effectively. Both local and regional authorities have observed that this strengthened network facilitates better resource management within their communities. The increased collaboration not only improves individual perceived control but also enhances collective agency among farmers. By working together and exchanging insights, farmers gain greater access to solutions and community support, which allows them to address shared challenges more effectively. This collective empowerment fosters a broader sense of control, as farmers can rely on their networks to share strategies and resources, ultimately leading to improved resilience and sustainability in their agricultural practices.

Conclusion

The West Java Digital Village Program exemplifies how the implementation of digital village initiatives provides beneficiaries with individual opportunities for empowerment through the use of digital technology. The findings indicate that the program has an impact on beneficiaries' self-concept,

digital competencies, and perceived control. As beneficiaries acquire new digital skills, they not only improve their own capacities but also influence others, fostering a culture of digital adoption.

Moreover, the program's emphasis on skill development equips participants with essential tools for managing tasks and making informed decisions, thereby enhancing operational efficiency and productivity. Also, beneficiaries of the West Java Digital Village Programme also have better confidence and autonomy through digital skills, allowing for data-driven agricultural practices and more efficient resource management. However, skill gaps persist and some beneficiaries rely on continuous support from local governments and other stakeholders. Emphasizing ongoing skill development and a supportive ecosystem, particularly from village heads and local communities in villages, will be essential to ensure that beneficiaries of digital village programs can maximize the benefits of digital transformation and contribute to inclusive, resilient rural growth in West Java.

Recommendation

To enhance the implementation of the Digital Village Program in West Java, a focus on Satu Data Desa (One Village Data) is crucial to support measurable and data-driven digital village development. Local governments should establish a centralized data management system at the village level, integrating data on population, agriculture, and village resources. This system will provide a strong foundation for evidence-based policymaking, program monitoring, and targeted interventions to ensure the effectiveness of digital transformation initiatives.

Furthermore, fostering collaboration between village governments and farmer groups is essential for empowering rural communities through the use of digital technology. Village governments can facilitate access to digital tools, such as IoT devices for agriculture, while farmer groups can act as key stakeholders in implementing sustainable and innovative agricultural practices. This partnership will help improve productivity, optimize resource management, and enhance the economic resilience of rural communities.

To ensure the long-term sustainability of the Digital Village Program, it is recommended that villages establish local regulations to form dedicated teams focused on digital technology adoption. These teams, acting as agents of change, will spearhead the transition toward comprehensive digital villages by providing training, technical support, and ongoing community engagement. This approach will strengthen digital literacy and foster inclusive rural development, ensuring that no community is left behind.

Limitations

This study is limited in scope as it focuses exclusively on the West Java Digital Village Programme, without extending to similar programs in other regions. The findings may not fully capture the diverse dynamics and challenges present in other rural contexts across Indonesia or beyond. Additionally, the research is centered on aspects of empowerment, particularly self-concept, skill development, and perceived control, without delving deeper into the interconnections between these aspects and the practical use of technology in daily agricultural practices. A more comprehensive exploration of how each aspect of empowerment directly influences and is influenced by technology usage would provide a deeper understanding of the program’s effectiveness. Expanding the geographical and thematic scope of the study in future research could yield more holistic insights into the impact of digital village programs on rural empowerment and digital technology adoption.

Not forgetting the limitations, several research questions are suggested. They can address some of the challenges in developing a more inclusive implementation framework for digital adoption for small-scale farmers. Some key questions that could be addressed include: Investigating the role of public-private partnerships in promoting digital technology adoption for farmers in rural areas; Understanding how the participation of women in the digital village programme could be improved; Understanding the gaps that exist in the local and regional policies to support the implementation of digital technology adoption for rural communities.

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