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Women's Digital Literacy in Village Information System Use

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Abstract

Digital literacy plays a pivotal role in empowering rural communities, especially in the context of the rapidly evolving digital era. In Indonesia, initiatives like the Village Information System (SID) have been introduced to improve local governance through e-governance platforms. However, the specific challenges and opportunities faced by women in these rural digital initiatives remain understudied. This research focuses on the digital literacy of women in Randegan Village, Banyumas, and their engagement with SID. Despite growing attention to digital literacy, there is limited understanding of the gendered dimensions of participation in village-level digital programs. This study addresses this gap by examining how women in rural settings perceive and interact with digital technologies, particularly in the realm of local governance. The research employed a qualitative approach. Four key dimensions of digital literacy were explored: digital skills, security, ethics, and culture. The findings reveal that while basic digital literacy is emerging, particularly among community leaders. Although awareness of digital ethics and security is increasing, it has not yet translated into consistent practice. Moreover, traditional communication methods are still preferred over digital platforms for civic engagement, and women's participation in SID management remains limited.

Keywords: digital literacy, Indonesia, e-governance, rural development, rural women.

1. Introduction

The spread of information and communication technologies (ICTs) has transformed societies around the world, including rural communities in developing countries, in the rapidly evolving digital landscape of the 21st century. With its vast archipelagic geography and diverse population, Indonesia is at the forefront of this digital revolution, particularly in bridging the rural-urban divide through innovative e-governance initiatives. One such initiative is the Village Information System (Sistem Informasi Desa or SID), a digital platform designed to improve transparency, efficiency, and connectivity at the village level (Pramanik et al., 2017).

The term digital literacy is defined as the ability to access, understand, evaluate, and produce digital content. This plays a pivotal role in enabling individuals to engage effectively in the digital economy and society (Lee, 2014). Given the persisting gender disparities in technology access and usage in rural Indonesia, enhancing women's digital literacy has become a crucial aspect of achieving inclusive digital development. While recent statistics indicate that the number of female internet users in Indonesia has been growing, there still remains a considerable gender gap with regard to meaningful participation in digital governance initiatives (Rahmatunnisa, 2024). It is of the utmost importance to include women in digital initiatives such as Village Information System (Sistem Informasi Desa or SID).

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The concept of digital literacy is multifaceted, encompassing a range of dimensions, including digital skills, digital safety, digital ethics, and digital culture. Each of these aspects is of critical importance in enabling individuals to navigate the digital landscape in an effective and responsible manner. In the context of SID utilization, these dimensions assume even greater significance, as they directly impact the quality and extent of community participation in local governance and development initiatives. The research conducted by Mutiarin et al., (2024) in Central Java indicates that when women have access to and the capacity to utilize SID, they are more inclined to engage in village meetings and submit program proposals (Mutiarin et al., 2024).

The acquisition of digital literacy empowers women to gain access to crucial services via the SID platform. For instance, a study conducted by Putri et al. (Putri et al., 2020) in Yogyakarta illustrates that women who have attained proficiency in digital technologies are more prone to utilize digital platforms for accessing health and educational data at the village level. The Association of Indonesian Internet Service Providers (APJII) has projected that the number of Indonesian internet users in 2024 will reach 221,563,479 individuals, representing a significant increase from the total population of 278,696,200 Indonesians in 2023. As of 2018, Indonesia exhibited an internet penetration rate of 64.8 %. Subsequently, the figure reached 73.7 % in 2020, 77.01 % in 2022, and 78.19 % in 2023. With regard to gender, the majority of internet users in Indonesia are male (50.7 %), while the female population accounts for 49.1 % (APJII, 2024).

Despite growing interest in digital literacy and e-governance in rural areas, several research gaps persist, particularly in the context of women's participation in village-level digital initiatives in Indonesia. Most studies on digital literacy in rural areas have not adequately addressed gender-specific challenges and opportunities. For instance, Akbar and Wijaya (Akbar, Wijaya, 2024) highlighted the general digital literacy challenges in rural Indonesia but did not delve into the specific experiences of women. There is a need for research that specifically examines how women in rural areas interact with and perceive digital technologies, particularly in the context of local governance systems like SID (Akbar, Wijaya, 2024).

Furthermore, while research has been conducted on e-governance initiatives in developing countries, there is limited understanding of how digital literacy levels impact participation in local governance systems. explored e-governance adoption in rural areas but did not specifically address how varying levels of digital literacy among women affect their engagement with such systems (Kumar et al., 2024). This gap calls for research that explicitly links digital literacy skills to participation in initiatives like SID.

Many studies on digital literacy focus primarily on technical skills, overlooking other crucial aspects such as digital safety, ethics, and culture. Comprehensive research has been conducted on digital literacy in rural Asia that touches on aspects such as digital safety, ethics, and culture but does not provide an in-depth analysis of how these aspects interact with each other in the context of community information systems (Tewathia et al., 2020). There is a need for research that adopts a more holistic approach to assessing digital literacy, especially among rural women. The influence of local cultural, social and economic factors on digital literacy and participation in digital governance initiatives among rural women remains under-researched. Other research explores the issue of digital divide in rural communities, but does not adequately address how local contexts shape women's digital engagement (Lythreathis et al., 2022). This gap calls for research that considers the unique contextual factors of Indonesian villages in relation to women's digital literacy and SID participation.

While several studies have identified common barriers to digital adoption in rural areas, there is a lack of research that addresses barriers and enablers to women's participation in digital governance initiatives. Previous research addresses barriers to digital adoption in rural communities, but does not focus on gender-specific challenges. Research is needed to identify and analyze factors that hinder or facilitate women's involvement in systems such as SID (Vassilakopoulou, Hustad, 2023). The lack of long-term research examining the impact of digital literacy interventions on women's participation in local government systems suggests a significant gap (Nedungadi et al., 2018). Further, other studies describe digital literacy programs in rural areas, but do not specifically link to increased participation in e-governance initiatives. This gap calls for research that assesses the long-term effects of improved digital literacy on women's engagement in systems such as SID.

The role of community networks and social capital in influencing the development of digital literacy skills among rural women is another area that requires further investigation. One study has

explored the role of social networks in technology adoption, but did not specifically address how these networks contribute to the development of digital literacy (Suwana, Lily, 2017). There is a need for research that examines how community dynamics in Indonesian villages affect women's digital literacy and their participation in SID.

Additionally, the interaction between digital literacy and other forms of literacy (e.g., functional literacy, media literacy) in the context of rural women's participation in digital governance remains understudied. Roberts et al. (Roberts et al., 2017) explored multiple literacies in rural development, but they did not specifically focus on how these literacies impact engagement with local information systems. Research is needed to understand the interplay between various forms of literacy and their collective impact on women's participation in initiatives like SID. The long-term sustainability of digital literacy skills among rural women, particularly in the context of evolving technologies and governance systems, is another area that requires attention. Chib and Wardoyo (Chib, Wardoyo, 2018) discussed the challenges of maintaining digital skills in rural areas but did not provide insights into strategies for ensuring the ongoing relevance and application of these skills. There is a need for research that explores how to sustain and update digital literacy skills among rural women to ensure continued engagement with systems like SID (Chib, Wardoyo, 2018; Roberts et al., 2017).

The concept of empowerment through digital literacy has been explored in urban contexts, there is limited research on how digital literacy contributes to the empowerment of rural women, particularly in relation to local governance participation. Gwaka et al. examined digital empowerment in developing countries but did not specifically address rural women's empowerment through participation in local digital initiatives. Research is needed to understand how enhanced digital literacy can lead to greater empowerment and agency for rural women in the context of village governance (Gwaka et al., 2018).

In view of the aforementioned research gaps, the present study seeks to examine the digital literacy levels of women in Randegan Village, Banyumas, Indonesia, with a particular focus on their utilisation of the Village Information System (SID). The research will concentrate on four principal aspects of digital literacy: digital skills, digital safety, digital ethics, and digital culture. Adopting a holistic approach to digital literacy assessment and considering the unique contextual factors of rural Indonesian villages, this study aims to provide a comprehensive understanding of the impact of digital literacy on women's participation in local digital governance initiatives.

This research contributes to the academic discourse on digital literacy and e-governance while also providing practical insights for policymakers, development practitioners, and local leaders seeking to enhance the digital participation and empowerment of women in rural areas. By addressing the identified research gaps, this study aims to pave the way for more inclusive, effective, and sustainable digital governance initiatives that can truly harness the potential of technology for rural development and women's empowerment.

2. Materials and methods

Randegan Village, located in Banyumas Regency, Indonesia, presents an intriguing case study for digital literacy research. Despite its remote location far from urban centers, Randegan has implemented a village information system (SID) website, making it an attractive site for investigating rural digital adoption. This study examines women's digital literacy in utilizing the SID, focusing on four pillars: digital skills, digital security, digital ethics, and digital culture.

The Village Information System (SID) is a digital platform designed to improve governance and service delivery in rural Indonesia. SID typically includes features such as village demographic data, financial reports, and various administrative services (Novianti, 2024). In Randegan, the SID offers information about the village, population-related document processing, and access to village financial reports.

This study employed a qualitative approach to explore women's digital literacy in Randegan Village. The research design was informed by established qualitative methodologies (Creswell, Poth, 2018). Data collection methods included focus group discussions (FGDs), in-depth interviews, and observation. Five FGDs were conducted with groups of women aged 25–55 years, totaling 45 participants. This approach allowed for rich, interactive discussions about digital literacy experiences (Krueger, Casey, 2015). Key informants, including SID managers and village officials, were interviewed to gain deeper insights into SID implementation and challenges.

Additionally, researchers observed participants' interactions with the SID platform to assess practical digital skills.

Data analysis followed the thematic analysis approach outlined by Braun and Clarke (Braun, Clark, 2022), involving familiarization with the data, coding, theme development, and refinement. To ensure reliability, triangulation of data sources and methods was employed (Flick, 2018). The study focused on four key dimensions of digital literacy: digital skills, digital security, digital ethics, and digital culture. Digital skills were assessed as the ability to access, understand, evaluate, and produce digital content. Digital security encompassed awareness and practices related to data protection and online safety. Digital ethics examined adherence to values of transparency, honesty, and respect in digital interactions. Finally, digital culture explored the extent to which digital tools are integrated into daily life and community practices. This framework allowed for a comprehensive assessment of women's digital literacy in the context of SID utilization.

3. Discussion

The digital transformation of rural Indonesia presents both opportunities and challenges, particularly in the context of women's digital literacy and participation in village information systems (SID). Focusing on the village of Randegan, this study reveals a complex interplay of factors influencing women's digital engagement across the four pillars of digital literacy as defined by the Indonesian Ministry of Communication and Information Technology (Kominfo): digital skills, digital culture, digital ethics, and digital safety (Kementerian..., 2021). These four pillars form the backbone of Indonesia's National Digital Literacy Program, a comprehensive initiative to improve digital literacy across the country. This highlights the importance of such frameworks in shaping the country's digital landscape (SMERU, 2022).

The Village Information System (SID) is a digital platform used by rural communities in Indonesia to access government services, communicate with local authorities, and participate in local governance. Define digital platforms as digital services that facilitate interactions between different sets of users. SID is a transactional platform that mediates interactions between villagers and local governments, helping to increase transparency and governance efficiency in rural areas (Bonina et al., 2021).

The Village Information System (SID) is a digital platform used by rural communities in Indonesia to access government services, communicate with local authorities, and participate in local governance. Define digital platforms as digital services that facilitate interactions between different sets of users. SID is a transactional platform that mediates interactions between villagers and local governments, helping to increase transparency and governance efficiency in rural areas. However, the successful adoption and use of SID among rural women depend on addressing the digital literacy gap. The development of media competencies is a structured process that requires not only technical skills but also content generation and critical thinking (Kuatbekov et al., 2021).

Digital literacy is essential in shaping how individuals access, evaluate, and interact with information in digital spaces. This insight highlights the importance of equipping women in Randegan with the necessary skills to fully utilize platforms like SID, where navigating and understanding information is crucial. The study found that although many women are aware of digital tools, their ability to critically evaluate information and utilize advanced features of SID remains limited, similar to global trends where digital literacy gaps persist (Guess, Munger, 2020).

The COVID-19 pandemic further emphasized the urgency of addressing digital literacy disparities. A research found that marginalized women, particularly those recently released from prison, faced severe challenges in accessing digital resources during the pandemic. This mirrors the situation in Randegan, where women, despite having access to SID, struggle with digital infrastructure and a lack of consistent digital literacy training (Blomberg et al., 2021).

Empowering women with digital literacy not only enhances their engagement with digital platforms but also enables them to contribute to broader societal and environmental issues. One study emphasized how digital health literacy can empower women to take an active role in climate action and health initiatives. Similarly, in Randegan, improving digital literacy among women can increase their participation in local governance and decision-making processes, which extends beyond SIDs to broader community and environmental action (Abdolkhani et al., 2022) emphasized how digital health literacy can empower women to take an active role in climate action and health initiatives. Similarly, in Randegan, improving digital literacy among women could

enhance their participation in local governance and decision-making processes, extending beyond SID to broader community and environmental actions.

In addition, a participatory approach to digital literacy development proved effective. In Canada, it is evident that digital literacy programs with Indigenous communities are needed to ensure cultural relevance and sustainability. A similar participatory model could be adopted in Randegan, where women are actively involved in designing digital literacy initiatives tailored to their specific needs and context (McMahon et al., 2023).

Digital literacy also plays a crucial role in education, particularly in contexts where access to formal education is limited. Community-driven programs are effective in reaching marginalized populations and improving digital literacy outcomes. In Randegan, similar community-led initiatives could be instrumental in reaching women and other marginalized groups. The importance of community-led initiatives, such as coding clubs in public libraries, to develop digital skills among youth in rural areas. Similarly, local initiatives in Randegan could focus on community-driven digital literacy programs to bridge the digital divide (Detlor et al., 2022; Kelly, McGrath, Hubbard, 2022).

The evolving nature of media studies in a digital era necessitates a rethinking of how media literacy is approached, especially in non-urban settings where traditional forms of media are still prevalent (Parks, 2020). In Randegan, while basic digital skills are emerging, there is a need for more advanced competencies, particularly in the areas of content creation and ethical digital practices. This is in line with research findings highlighting the need for culturally adaptive media education that addresses both the technical and social dimensions of digital literacy (Green, Connolly, 2022).

4. Results

Digital literacy is essential for navigating today's increasingly digital world. In Indonesia, the Ministry of Communication and Informatics (Kominformasi) has developed a comprehensive framework of four key pillars to guide the development of digital literacy: Digital Skills, Digital Ethics, Digital Safety, and Digital Culture. Each pillar represents a critical area in which individuals must develop competencies to become fully digitally literate.

In rural areas like Randegan Village, the need to embrace these four pillars is evident in the challenges faced in using digital platforms for governance and community engagement. While there are promising developments in basic digital literacy, significant gaps remain, particularly in the areas of ethics, security, and fostering a robust digital culture. Integrating all four pillars into educational programs and community initiatives is critical to creating a truly digitally literate society.

a. Digital Skills: Emerging Competencies Amidst Challenges

The findings indicate a nascent but growing digital skill set among women in Randegan Village, particularly among those involved in community roles such as Posyandu (integrated health service post) cadres. The necessity to use smartphones for reporting and documentation has driven a basic level of digital competency. This aligns with global trends where mobile technology serves as a primary gateway to digital literacy in rural areas (Tyers et al., 2021). However, the limited utilization of the SID platform, with a preference for WhatsApp groups for information dissemination, suggests a gap between basic digital skills and more advanced platform-specific competencies.

This disparity echoes findings from other rural contexts, where familiarity with social media platforms often precedes engagement with more complex digital systems (Van Deursen et al., 2017). A study of Indonesia's digital villages shows that successful implementation of digital governance tools requires not only access to technology, but also targeted skills development programs.

b. Digital Ethics: Navigating Social Norms in Digital Spaces

The incident described by Informant A, where a seemingly innocuous social media interaction led to domestic conflict, highlights the complex interplay between digital ethics and local social norms. This scenario underscores the need for digital literacy programs to address not just technical skills, but also the social implications of digital engagement. Digital ethics in the Indonesian context must be understood within the framework of local cultural values and social expectations (Rahmah, 2015).

The decision to restrict comments on social media posts in response to this incident reflects a broader challenge in digital ethics education. It demonstrates a reactive approach to digital conflict

rather than a proactive understanding of ethical online behavior. This suggests a need for more comprehensive digital ethics education that goes beyond basic 'netiquette' to address the nuanced ways in which digital interactions intersect with local social dynamics (Soler-Costa et al., 2021).

c. Digital Safety: Awareness and Action in Cybersecurity

The study reveals a growing awareness of digital safety issues among Randegan's residents, particularly concerning phishing and online fraud. The role of family members, especially younger generations, in educating older relatives about digital threats aligns with findings from other studies on intergenerational digital literacy transfer (Van Deursen et al., 2017). Additionally, the proactive stance of village officials in educating residents about digital threats is a positive sign, indicating a community-level approach to digital safety.

However, the lack of a systematic approach to data backup and protection in the SID system points to a significant gap in institutional digital safety practices. This discrepancy between individual awareness and institutional practices echoes findings from other studies on e-governance in developing contexts, where technical infrastructure often lags behind policy initiatives. Strengthening institutional cybersecurity practices is essential to protect both individual and community-level digital engagements (Zahra, 2023).

d. Digital Culture: The Slow Evolution of Digital Civic Engagement

The underutilization of the SID platform reflects a broader challenge in cultivating a digital culture of civic engagement. The preference for traditional face-to-face meetings and the inclusion of women in village decision-making processes is positive. However, the failure to translate this inclusive approach into digital spaces suggests a disconnect between offline and online civic cultures.

This disconnect is not unique to Randegan and reflects broader challenges in digital transformation of rural governance. The study on the adoption of e-government in rural areas found that the success of digital platforms depends not only on the technological infrastructure, but also on their alignment with existing social and cultural practices (Munyoka, Maharaj, 2017).

The engagement of women, particularly Posyandu cadres, in village meetings presents an opportunity for bridging this digital-physical divide. These women, already trusted within the community and possessing basic digital skills, could potentially serve as digital ambassadors, facilitating broader adoption of the SID platform.

e. Integrating the Four Pillars: Towards Comprehensive Digital Literacy

The interplay between the four pillars of digital literacy in Randegan Village reveals both progress and persistent challenges. While basic digital skills are developing, particularly driven by necessity in community health roles, there's a clear need for more targeted education in digital ethics and safety. The nascent digital culture, while inclusive in offline spaces, has yet to fully manifest in digital civic engagement.

This multifaceted nature of digital literacy aligns with current scholarly understanding of digital inclusion. As Van Dijk argues in his comprehensive work on the digital divide, true digital inclusion requires not just access to technology and basic skills, but also the motivation to engage and the ability to translate digital capabilities into tangible benefits (Van Dijk, 2020). A holistic approach to digital literacy addresses all four pillars simultaneously. such an approach could involve:

a. Targeted skill development programs that focus not just on basic digital operations but on the specific competencies required for effective use of platforms like SID.

b. Community-based digital ethics workshops that address the intersection of online behavior with local social norms and values.

c. Collaborative efforts between local government and community leaders to enhance digital safety practices, both at the individual and institutional levels.

d. Initiatives to foster a digital culture of civic engagement, potentially leveraging existing community networks like Posyandu cadres.

The case of Randegan Village illustrates the complex challenges in fostering digital literacy and engagement in rural Indonesia. While progress is evident, particularly in basic digital skills and awareness of digital safety, significant work remains in cultivating a comprehensive digital culture that encompasses all four pillars of digital literacy (Azanda et al., 2024).

Table 1. Four Pillars of Digital Literacy

Pillar	Description
Digital Skills	Technical abilities to effectively use digital devices and information technology
Digital Ethics	Responsible behavior in the digital world, including respectful interaction and adherence to digital laws
Digital Safety	Ability to protect oneself and personal data from cyber threats
Digital Culture	Understanding of digital norms and active participation in shaping a positive digital environment

Table 2. Degree of Understanding for Each Pillar in Randegan Village

Pillar	Degree of Understanding	Description
Digital Skills	Moderate	Basic smartphone usage skills, particularly among Posyandu cadres. Limited engagement with more complex platforms like SID
Digital Ethics	Low to Moderate	Some awareness of online behavior implications, but reactive rather than proactive approach to ethical challenges
Digital Safety	Moderate	Growing awareness of digital threats like phishing, but lack of systematic approach to data protection
Digital Culture	Low	Limited integration of digital tools in civic engagement, preference for traditional communication methods

f. Implications for Policy and Practice

The findings from Randegan Village underscore several critical implications for advancing rural digital literacy initiatives. The first major takeaway is the need for contextualized digital literacy programs. These initiatives must not only focus on the technical skills necessary for digital engagement but also be attuned to local social norms and cultural practices. In rural areas like Randegan, traditional communication methods, such as face-to-face interactions, are still highly preferred. This means that digital tools must be introduced in ways that align with these existing communication practices, ensuring that technology enhances, rather than disrupts, local customs (Stein et al., 2022). Successful digital literacy programs will need to balance modern technology with the cultural frameworks within which communities operate.

Another important strategy is intergenerational learning, which leverages the digital fluency of younger generations to mentor older members of the community. Younger people, who generally have more exposure to and comfort with digital technologies, can transfer their knowledge to older individuals, thus helping bridge the digital divide. This approach does more than just enhance digital literacy; it strengthens relationships across generations, fostering a sense of communal learning and support (Hernandez et al., 2024). In Randegan Village, where family structures remain strong, intergenerational learning is a particularly effective method for spreading digital literacy across age groups.

A third key factor is the role of community-based digital ambassadors, particularly women who are already engaged in essential community roles such as Posyandu cadres. These women, being trusted figures within their communities, are well-positioned to take on leadership roles in promoting digital literacy. Empowering them to act as digital ambassadors can significantly increase digital adoption, as they can provide peer support and guidance. This grassroots approach is especially beneficial in rural settings where formal digital education infrastructure is limited, making local mentorship crucial to success.

Moreover, institutional capacity building is essential, particularly in terms of data management and digital security. As digital platforms like SID (village information systems) become more prevalent, there is a need to concurrently strengthen the institutions responsible for managing these platforms. This includes developing better data management protocols and implementing robust digital security measures to mitigate cybersecurity threats. Without these institutional safeguards, the long-term sustainability and security of digital initiatives in rural areas are at risk.

Lastly, an integrated approach to e-governance is also crucial. Digital platforms should not be introduced in isolation; they must be supported by comprehensive strategies that engage the community and develop necessary skills. For platforms like SID to be effectively utilized, efforts should focus not only on making the technology available but also on ensuring that the community is both willing and able to use it. This means incorporating training and community outreach into e-governance projects to promote active participation, both online and offline.

5. Conclusion

This study reveals the complex landscape of digital literacy among women in Randegan Village and their engagement with the Village Information System (SID). While basic digital skills are emerging, particularly among community leaders like Posyandu cadres, significant gaps remain in advanced competencies necessary for full SID utilization. Understanding of digital ethics and safety is growing but not yet matched by systematic practices. The digital culture is still evolving, with traditional communication methods often preferred over digital platforms for civic engagement.

Women's participation in SID management is limited, despite their inclusion in traditional village decision-making processes. However, their community roles present an opportunity to serve as digital ambassadors. Moving forward, targeted interventions addressing all aspects of digital literacy are needed, focusing on contextualizing efforts to local needs and cultural practices. By comprehensively addressing these areas, there's potential to enhance women's digital literacy and increase their active participation in digital governance, contributing to more inclusive and effective e-governance at the village level.

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