

Original Article

## How digital governance networks shape community empowerment: A multilevel study of Indonesian villages

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| Article Info                                                                                                                                                                                                                                                                                                                   | Abstract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <p><b>Article history:</b><br/>Received Jun 9<sup>th</sup>, 2026<br/>Revised Jun 21<sup>st</sup>, 2026<br/>Accepted Jun 24<sup>th</sup>, 2026<br/>Published Jun 30<sup>th</sup>, 2026</p> <p><b>Keywords:</b><br/><i>Digital governance;<br/>network governance;<br/>community<br/>empowerment; village<br/>governance</i></p> | <p>This study examines how digital governance networks shape community empowerment in Indonesian villages, focusing on the mediating role of participation quality and citizen facing transparency and accountability. Drawing on network governance and empowerment theory, the study conceptualizes village digitalization as an inter-organizational governance arrangement rather than a standalone administrative intervention. Quantitative data were collected from villages in East Java Province between May and July 2025, involving governance network respondents and 1,200 community members. Governance network characteristics were measured using social network analysis, while citizen perceptions of participation quality, transparency and accountability, and community empowerment were captured through structured surveys. The hypotheses were tested using multilevel structural equation modelling to distinguish village level governance effects from individual level empowerment mechanisms. The results show that higher levels of digital integration and greater network density are positively associated with participation quality and transparency at the village level, while highly centralized governance networks are associated with lower participation quality. At the individual level, participation quality and transparency and accountability are positively related to community empowerment. Mediation analysis confirms that the effects of digital integration and governance network structure on empowerment are indirect and transmitted through governance processes. The study contributes to public administration scholarship by demonstrating that digital governance reforms enhance community empowerment only when embedded within collaborative and transparent governance networks.</p> <p><b>How to Cite (APA Style):</b> Aminullah. A., Wusko, A.U., &amp; Loreño, D.T. (2026). How digital governance networks shape community empowerment: A multilevel study of Indonesian villages. <i>Jurnal Ilmu Sosial</i>, 25(1), 37-58. <a href="https://doi.org/10.14710/jis.25.1.2026.37-58">https://doi.org/10.14710/jis.25.1.2026.37-58</a></p> |

### INTRODUCTION

Indonesia's decentralization framework places village governments at the center of local development and public service delivery, particularly through the management of Village Funds and participatory planning processes. Since the enactment of village autonomy reforms, villages have

assumed greater responsibility for planning, budgeting, and program implementation, while remaining embedded in multilevel accountability arrangements with district and provincial governments (Hariyanto et al., 2025; Z. Wang, 2025). Alongside this institutional shift, the Indonesian government has intensified digital government reforms, encouraging the adoption of electronic systems for planning, financial management, reporting, and oversight at the village level as part of the Electronic Based Government System agenda (Bannister & Connolly, 2014; Meijer & Bolívar, 2016). As a result, village governance increasingly operates through digitally mediated interactions between village governments, district agencies, inspectorates, and other oversight actors.

East Java Province provides a particularly relevant context for examining these dynamics. As one of Indonesia's most populous provinces, East Java administers a large number of villages with substantial variation in administrative capacity, digital infrastructure, and inter organizational coordination. The province has been an early and extensive adopter of digital village financial management and reporting systems, while also exhibiting diverse governance arrangements across districts. Prior studies on local governance in Java indicate that variation in institutional capacity and intergovernmental coordination strongly shapes governance outcomes at the village level, making the province a theoretically informative empirical setting (Asmorowati et al., 2022; Rifaldi, 2024).

Existing scholarship suggests that digitalization can strengthen transparency and accountability in local governance by improving information availability, reporting accuracy, and administrative control (Bannister & Connolly, 2014; Margetts & Dunleavy, 2013). Empirical studies in Indonesia similarly report that digital village financial systems are associated with improved accountability practices and reduced administrative irregularities, particularly in relation to reporting compliance and auditability (Khusna, 2024; Rifaldi, 2024). At the same time, research consistently shows that transparency and participation remain central determinants of accountability and institutional trust, with digital tools functioning primarily as enabling mechanisms rather than independent drivers of governance quality (Asmorowati et al., 2022; Fox, 2015).

Despite these insights, two important limitations persist in the literature. First, digital village governance is often conceptualized as a technical or administrative intervention, rather than as part of an inter organizational governance arrangement. This perspective overlooks the fact that village accountability is produced through continuous coordination among multiple actors, including village governments, district financial offices, inspectorates, facilitators, and, in some cases, civil society organizations. Contemporary public administration research increasingly argues that digital technologies should be analyzed through a network governance lens, as they reshape coordination patterns, information flows, and power relations across organizational boundaries (Das, 2024; Meijer & Bolívar, 2016).

Second, most empirical studies focus on administrative accountability outcomes, while paying limited attention to community empowerment as a substantive governance objective. Empowerment reflects whether citizens experience meaningful participation, collective efficacy, and the ability to influence local decisions, rather than merely observing compliance with reporting requirements (Cornwall, 2008; Zimmerman, 2000). Research on decentralized governance warns that digital systems may strengthen upward accountability while leaving citizen facing transparency and participation unchanged, or even weakened, particularly in multilevel governance settings where information and decision making become increasingly centralized (Fox, 2015; Fung, 2015). This concern is especially salient in East Java, where strong district level oversight may coexist with uneven community engagement at the village level.

These limitations reveal a clear research gap. There remains limited quantitative evidence explaining how digital village governance operates as a governance network and how network characteristics translate into community empowerment through participation and transparency

mechanisms. Moreover, most existing studies rely on single case analyses or single level models, which do not adequately distinguish individual level perceptions from village level governance conditions in large and heterogeneous provincial contexts (Peng et al., 2023; Wilfahrt, 2018).

This study addresses this gap by conceptualizing digital village governance as a networked phenomenon and empirically examining its relationship with community empowerment in East Java using a multilevel structural equation modelling approach. Specifically, the study investigates how digital integration and governance network structure at the village level are associated with participation quality and citizen facing transparency and accountability, and how these governance processes shape empowerment outcomes among community members.

The study contributes to public administration scholarship in three ways. First, it advances digital governance research by situating village digitalization within inter organizational network governance, responding to calls for more relational and institutional analyses of digital government (Meijer & Bolívar, 2016; Wilfahrt, 2018). Second, it extends village governance research by foregrounding community empowerment as a key outcome mediated by participation quality and transparency, rather than treating accountability as an end in itself (Fox, 2015; Sofyani et al., 2021). Third, methodologically, it demonstrates the value of multilevel structural equation modelling for analyzing how governance network conditions shape citizen experiences and outcomes within decentralized governance settings.

## LITERATURE REVIEW

### *Theoretical foundation*

This study is grounded in network governance theory and community empowerment theory, with digital governance conceptualized as an institutional and relational mechanism operating within decentralized public administration systems. In contemporary public administration, governance is increasingly understood not as a hierarchical process confined within a single organization, but as a networked arrangement involving multiple interdependent actors who coordinate through formal and informal rules, shared information, and negotiated authority (Fung, 2015). In decentralized contexts such as Indonesia, village governance is inherently network based, as decision making, accountability, and oversight are produced through interactions among village governments, district agencies, inspectorates, facilitators, and community actors.

Network governance theory emphasizes that network effectiveness depends on both structural characteristics and coordination mechanisms. Structural features such as network density and centralization shape information flows, monitoring capacity, and power distribution within governance networks (Malenko, 2024). Dense networks facilitate frequent interaction, mutual monitoring, and shared understanding, which can strengthen accountability and coordination. Conversely, highly centralized networks may concentrate informational and decision-making authority in a limited number of actors, potentially reducing opportunities for inclusive participation and weakening horizontal accountability. These insights provide a theoretical basis for examining how variation in village governance network structures influences participation quality and transparency outcomes.

Digital governance reforms introduce a critical institutional layer into governance networks. Digital systems for financial management, reporting, and verification are not neutral technical tools, but governance infrastructures that shape how actors interact, share information, and exercise control (Margetts & Dunleavy, 2013; Meijer & Bolívar, 2016). From a network governance perspective, digital integration can increase network connectivity by lowering coordination costs, standardizing information, and enabling real time oversight across organizational boundaries. However, digital integration can also intensify upward accountability if system design prioritizes

reporting to higher level authorities over citizen facing transparency and participation (Bannister & Connolly, 2014). This dual potential makes digital integration a central explanatory variable in understanding contemporary village governance outcomes.

The link between network governance and community empowerment is theorized through participatory governance and accountability mechanisms. Community empowerment refers to the capacity of citizens to influence public decisions, act collectively, and engage meaningfully with governing institutions (Dushkova & Ivlieva, 2024). In decentralized governance systems, empowerment is not solely an individual attribute, but an institutional outcome shaped by opportunities for participation, access to information, and the responsiveness of authorities. Participatory governance theory posits that meaningful participation enhances citizens' sense of agency and collective efficacy, particularly when participation is perceived as inclusive, fair, and consequential (Fung, 2015). Transparency and accountability further reinforce empowerment by enabling citizens to understand government actions and demand justification or correction when necessary (Fox, 2015).

Integrating these perspectives, this study conceptualizes community empowerment as an outcome mediated by participation quality and citizen facing transparency and accountability. Network governance theory explains how digital integration and network structure condition governance processes at the village level, while empowerment theory explains how these processes translate into citizen level outcomes. This framework is particularly suited to a multilevel analytical approach, as it recognizes that individual perceptions of empowerment are shaped by both personal experiences and shared village level governance conditions. By combining network governance theory with empowerment theory, the study advances a relational and institutional understanding of how digital governance reforms shape substantive outcomes in decentralized public administration.

### ***Digital integration and village governance processes***

Digital integration has become a defining feature of contemporary local governance reforms, particularly in decentralized administrative systems where coordination across levels of government is essential. In the context of village governance, digital integration refers to the extent to which village administrative processes are embedded within interconnected electronic systems for planning, financial management, reporting, and oversight. From a public administration perspective, such systems function not merely as technical tools, but as governance infrastructures that shape how information is produced, shared, and used by multiple actors within governance networks (Margetts & Dunleavy, 2013; Meijer & Bolívar, 2016).

Network governance theory provides a useful lens for understanding the implications of digital integration for governance processes. Digital systems can reduce coordination costs and increase the frequency and reliability of information exchange among governance actors, thereby strengthening horizontal and vertical coordination within governance networks (Peng et al., 2023). In village settings, digitally integrated systems facilitate routine interaction between village governments, district agencies, inspectorates, and facilitators through standardized reporting formats, real time verification, and automated feedback mechanisms. These features can enhance transparency by making financial and administrative information more visible and traceable across organizational boundaries.

Empirical research on digital governance suggests that digital integration can improve accountability by increasing information availability, reducing discretionary opacity, and enabling more systematic oversight (Bannister & Connolly, 2014). In the village context, digital reporting systems have been associated with improved timeliness and consistency of financial reporting, as well as clearer audit trails. When effectively implemented, such systems may also strengthen citizen

facing transparency, particularly when information generated through digital systems is translated into accessible formats for community members. However, the extent to which digital integration improves transparency depends on whether information flows are designed to be outward facing, rather than solely upward toward higher level authorities.

Digital integration also has implications for participation quality. Digitally mediated governance processes can support participation by standardizing procedures, documenting decisions, and providing platforms for information dissemination that enable citizens to engage more effectively in deliberative forums. For example, access to timely and reliable information about budgets and programs can enhance citizens' capacity to participate meaningfully in planning and monitoring processes. At the same time, digital integration may unintentionally constrain participation if systems priorities compliance and reporting efficiency over deliberation and inclusion, or if digital capacities are unevenly distributed across actors.

These dynamics suggest that digital integration influences governance processes in conditional ways. Rather than directly producing empowerment outcomes, digital integration shapes the institutional environment within which participation and transparency are enacted. In digitally integrated village governance networks, information visibility and coordination capacity are expected to improve, creating more favorable conditions for transparent and participatory governance. This theoretical reasoning leads to the expectation that villages with higher levels of digital integration will exhibit higher levels of participation quality and perceived transparency and accountability at the collective level.

Accordingly, the following hypotheses are proposed:

**H1.** Higher levels of digital integration in village governance networks are positively associated with perceived transparency and accountability at the village level.

**H2.** Higher levels of digital integration in village governance networks are positively associated with participation quality at the village level.

### ***Governance network structure and participation dynamics***

Beyond digital integration, the structural characteristics of governance networks play a critical role in shaping how participation and transparency are produced in village governance. Network governance theory emphasizes that governance outcomes are influenced not only by the presence of multiple actors, but also by how these actors are connected and how authority and information are distributed within the network (Peng et al., 2023). In village governance, network structure reflects patterns of interaction among village governments, district agencies, inspectorates, facilitators, and other relevant actors involved in planning, implementation, and oversight.

Network density represents the extent to which actors within a governance network are interconnected through frequent and reciprocal interactions. Dense networks are theorized to facilitate trust building, shared understanding, and mutual monitoring, as repeated interactions enable actors to exchange information more effectively and coordinate their actions (Peng et al., 2023). In the context of village governance, higher network density can enhance transparency by reducing information silos and enabling multiple actors to access and verify governance information. Dense networks may also support participation quality by creating institutional environments in which feedback circulates more widely and decisions are subject to broader scrutiny.

Empirical studies of collaborative governance suggest that dense and well connected networks are more likely to support inclusive and responsive governance processes, particularly when governance tasks require coordination across organizational boundaries (Ben Yahia et al., 2021). In village settings, dense governance networks can increase opportunities for community concerns to be conveyed through multiple channels, rather than being filtered through a single authority. As a

result, participation is more likely to be perceived as meaningful when governance networks are characterized by broad connectivity and shared responsibility.

In contrast, network centralization refers to the extent to which coordination and information control are concentrated in a small number of actors. While some degree of centralization may improve efficiency and clarity of decision making, excessive centralization can undermine participation quality by limiting access to information and constraining deliberation (Asimakopoulos et al., 2025). In highly centralized village governance networks, key decisions and information flows may be dominated by village elites or higher-level authorities, reducing opportunities for citizens to engage substantively. Such configurations risk reinforcing upward accountability while weakening horizontal accountability and citizen voice.

From a participation perspective, highly centralized networks may produce formal opportunities for participation without substantive influence, as decisions are effectively predetermined by central actors. This dynamic aligns with broader critiques of participatory governance that warn against tokenistic participation in contexts where power asymmetries remain unaddressed (Ahmad & Islam, 2024; Fung, 2015). Consequently, while centralization may enhance administrative control, it is expected to have a negative association with participation quality in village governance.

Taken together, network governance theory suggests that collaborative network structures characterized by higher density are more conducive to transparency and meaningful participation, whereas highly centralized structures may constrain participatory dynamics. These arguments lead to the following hypotheses at the village level:

**H3.** Village governance networks with higher network density are positively associated with transparency and accountability at the village level.

**H4.** Village governance networks with higher network density are positively associated with participation quality at the village level.

**H5.** Higher network centralization in village governance networks is negatively associated with participation quality at the village level.

### ***Participation quality, transparency, and community empowerment***

Community empowerment is a central normative objective of decentralized governance, reflecting citizens' capacity to exercise voice, influence collective decisions, and engage meaningfully with public institutions. In public administration and development scholarship, empowerment is not understood solely as an individual psychological attribute, but as an outcome shaped by institutional arrangements that enable participation, information access, and accountability (Ahmad & Islam, 2024; Fung, 2015). In village governance contexts, empowerment therefore depends on how governance processes are experienced by citizens in their everyday interactions with local authorities.

Participation quality constitutes a foundational mechanism through which empowerment is generated. Participatory governance theory emphasizes that participation produces empowering effects when it is inclusive, procedurally fair, and perceived as consequential for decision making (Fung, 2015). When citizens are able to express their views, feel listened to, and observe that their inputs are reflected in village priorities, they are more likely to develop a sense of agency and collective efficacy. Empirical studies across decentralized settings show that meaningful participation strengthens trust in local institutions and enhances citizens' perceived capacity to influence governance outcomes (Ahmed et al., 2025; Arkorful et al., 2021). In contrast, participation that is symbolic or dominated by elites may fail to generate empowerment and can even reinforce disengagement.

Transparency and accountability further shape empowerment by mediating the relationship between participation and outcomes. Transparency provides citizens with access to information

regarding decisions, resource allocation, and program implementation, while accountability refers to the obligation of authorities to explain and justify their actions and respond to community concerns (Fox, 2015). From an empowerment perspective, transparency is a necessary but insufficient condition. Information must be accessible, comprehensible, and linked to mechanisms through which citizens can question, contest, or seek redress. When transparency is coupled with responsiveness, citizens are better positioned to engage in informed participation and to perceive governance as legitimate and answerable.

The relationship between participation quality and transparency is therefore mutually reinforcing. Participatory processes often serve as channels through which information is shared, clarified, and debated, while transparent governance environments enhance the meaningfulness of participation by reducing information asymmetries (Molina Rodríguez-Navas et al., 2021). Empirical research suggests that communities experiencing higher quality participation are more likely to perceive governance as transparent and accountable, as participation facilitates dialogue, scrutiny, and feedback between citizens and authorities (Fox, 2015; Fung, 2015).

Taken together, these arguments suggest a sequential logic at the individual level. Participation quality directly enhances community empowerment by fostering agency and collective efficacy. Transparency and accountability also directly contribute to empowerment by enabling citizens to understand and influence governance processes. At the same time, participation quality strengthens perceptions of transparency and accountability, which in turn reinforce empowerment outcomes. This reasoning underpins the individual level hypotheses tested in this study.

Accordingly, the following hypotheses are proposed:

**H6.** Perceived participation quality positively influences community empowerment at the individual level.

**H7.** Perceived citizen facing transparency and accountability positively influence community empowerment at the individual level.

**H8.** Perceived participation quality positively influences perceived citizen facing transparency and accountability at the individual level.

### ***Governance processes as mediating mechanisms***

Network governance theory suggests that structural and technological characteristics of governance systems do not generate substantive social outcomes in a direct or automatic manner. Instead, their effects are realized through governance processes that shape how citizens interact with public institutions and perceive their capacity to influence collective decisions (Peng et al., 2023; van Popering-Verkerk et al., 2022). In the context of village governance, digital integration and governance network structure therefore operate as enabling conditions whose consequences for community empowerment depend on the quality of participation and the extent of citizen facing transparency and accountability.

Digital integration can enhance information availability, coordination, and oversight within village governance networks, but empowerment arises only when these capacities are translated into transparent and responsive governance practices that are accessible to citizens. Digital systems may improve reporting accuracy and administrative control, yet their empowering potential remains limited if information flows are primarily upward toward higher level authorities rather than outward toward communities. From an empowerment perspective, transparency and accountability function as critical mechanisms that convert digital integration into meaningful citizen engagement by enabling communities to understand decisions, monitor implementation, and demand justification or correction when necessary (Fox, 2015).

Similarly, governance network structure shapes empowerment indirectly through participation dynamics. Collaborative network configurations characterized by higher density can support inclusive

deliberation and shared oversight, while highly centralized structures may constrain opportunities for meaningful participation by concentrating informational and decision-making authority. These structural conditions influence whether participation processes are perceived as fair, inclusive, and consequential, which in turn determines their empowering effects (Fox, 2015; Fung, 2015). Participation quality thus serves as a key mechanism through which network structure affects empowerment outcomes.

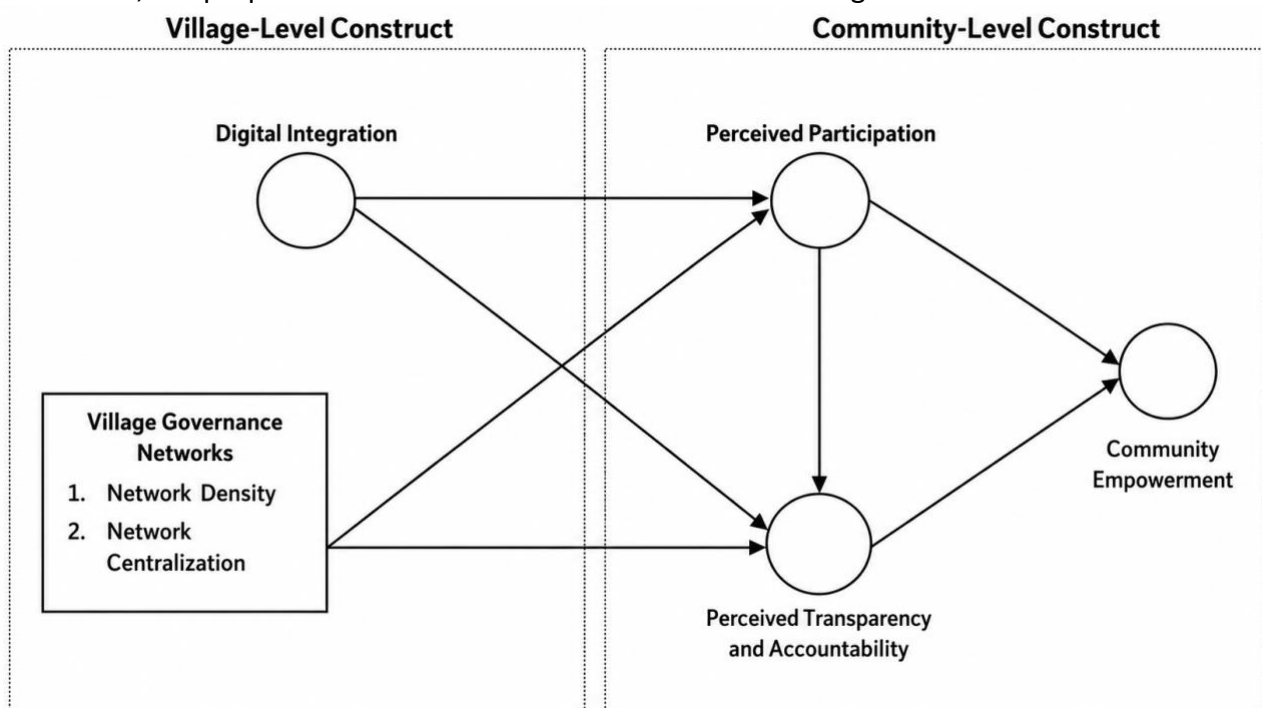
Taken together, these arguments indicate that both digital integration and governance network structure influence community empowerment through governance processes rather than through direct effects. Transparency and accountability, together with participation quality, mediate the relationship between digital network governance and empowerment, translating institutional capacities into citizen level outcomes. This mediating perspective aligns with calls in public administration research for mechanism-based explanations of governance reform effects.

Accordingly, the following hypotheses are proposed:

**H9.** The relationship between digital integration and community empowerment is mediated by transparency and accountability at the village level.

**H10.** The relationship between village governance network structure, indicated by network density and centralization, and community empowerment is mediated by participation quality and transparency at the village level.

Overall, the proposed research framework is summarized in Figure 1



**Figure 1.** Research Framework

Source: Authors own work

## METHODS

This study employed a quantitative cross sectional research design to examine how digital governance networks shape community empowerment in Indonesian villages. The analytical framework was grounded in network governance and empowerment theory and operationalized using multilevel structural equation modelling, which allows the simultaneous estimation of village level governance effects and individual level empowerment mechanisms. This approach is



appropriate given the nested structure of the data, where individual citizens are embedded within villages that differ in digital integration and governance network characteristics.

The empirical setting of the study was East Java Province, Indonesia, which was selected for three main reasons. First, East Java has a large and diverse number of villages with varying levels of digital governance adoption, particularly in the use of digital village financial management and reporting systems. Second, the province exhibits substantial variation in inter organizational governance arrangements involving village governments, district agencies, inspectorates, and facilitators, making it suitable for network governance analysis. Third, East Java operates under a relatively consistent provincial regulatory framework, allowing meaningful comparison across villages while controlling for macro institutional conditions.

Villages were selected from multiple districts within East Java using purposive sampling. Selection criteria included variation in the level of digital integration, the presence of identifiable governance networks linking village governments with district level actors, and continuous implementation of Village Fund programs for at least three fiscal years. This strategy ensured that governance processes were sufficiently institutionalized and comparable across cases. The sampled villages varied in administrative capacity and digital infrastructure maturity, providing sufficient heterogeneity across districts to support meaningful village-level comparisons within the multilevel model.

Data were collected between May and July 2025 through face-to-face surveys administered by trained enumerators. Two distinct respondent groups were involved, corresponding to the two analytical levels of the study. The first group consisted of village governance network actors who were directly involved in governance coordination, implementation, and oversight. These respondents included village heads, village secretaries, village treasurers, representatives of Village Consultative Bodies, village facilitators, subdistrict or district officials responsible for village administration or finance, and representatives of district inspectorates where applicable. These respondents provided data used to construct village level variables, including digital integration intensity and governance network structure. Within each sampled village, multiple governance network respondents were recruited to ensure that the relational data used to construct social network measures reflected the perspectives of several actors rather than a single informant.

The second group consisted of community respondents drawn from village residents using stratified random sampling based on neighborhood units and gender to ensure broad representation. Only adult residents who had lived in the village for a minimum of two years were included to ensure adequate exposure to village governance processes. Community respondents provided data on participation quality, citizen facing transparency and accountability, and community empowerment.

Digital integration at the village level was measured as a composite index capturing the extent to which village governance processes were embedded within interconnected digital systems. Indicators included the use of digital financial management systems, frequency of digital reporting to district authorities, interoperability with district level systems, frequency of digital feedback or verification, and exposure to technical training related to digital governance. All indicators were standardized and aggregated to form a village level digital integration score.

Governance network structure was measured using social network analysis based on relational data collected from governance network respondents. Respondents were asked to identify organizations with whom they regularly exchanged governance related information, coordination, or oversight. These responses were used to construct adjacency matrices for each village governance network. From these matrices, network density and network centralization were calculated and used as observed village level predictors in the multilevel structural equation model.

Individual level constructs were measured using multi-item Likert type scales ranging from strongly disagree to strongly agree. Participation quality captured citizens' perceptions of inclusiveness, procedural fairness, and perceived influence in village governance processes. Measurement items were adapted from participatory governance literature that emphasizes voice, deliberative inclusion, and perceived consequentiality of participation (Fung, 2015; Haesevoets et al., 2024). Citizen facing transparency and accountability measured perceptions of access to governance information, clarity and comprehensibility of information, responsiveness of village officials, and perceived answerability to community concerns. These items were informed by accountability and social accountability frameworks that conceptualize transparency as access to usable information and accountability as answerability and responsiveness to citizens (Fox, 2015; Vian, 2020). Community empowerment was operationalized as a latent construct reflecting perceived agency, collective efficacy, trust in village institutions, and perceived capacity to influence village priorities. Measurement items were adapted from empowerment and community governance literature that conceptualizes empowerment as both individual and collective capacity shaped by institutional contexts (Dushkova & Ivlieva, 2024). All items were refined through pilot testing to ensure clarity, cultural relevance, and contextual appropriateness within the Indonesian village governance setting.

Data analysis proceeded in several stages. First, social network analysis was conducted to compute village level network metrics. Second, confirmatory factor analysis was used to assess the reliability and validity of individual level measurement models. Third, multilevel structural equation modelling was employed to test the proposed hypotheses. The model estimated village level effects of digital integration and governance network structure on participation quality and transparency, individual level effects of participation quality and transparency on community empowerment, and mediation effects linking digital network governance to empowerment outcomes. Indirect effects were assessed using standard mediation procedures within the multilevel SEM framework. Model fit was evaluated using established SEM fit indices and variance explained at both the village and individual levels.

Ethical considerations were addressed throughout the research process. Participation was voluntary, informed consent was obtained from all respondents, and data were anonymised prior to analysis. No personally identifiable information was retained.

## RESULTS AND DISCUSSION

Prior to testing the structural relationships, the measurement model for the individual level latent constructs was assessed using confirmatory factor analysis. The analysis focused on participation quality, citizen facing transparency and accountability, and community empowerment. The assessment followed established criteria for evaluating construct reliability, convergent validity, and discriminant validity in structural equation modelling.

**Table 1.** Confirmatory Factor Analysis Results and Reliability

| Construct                       | Number of items | Standardised loading range | Composite reliability | Average variance extracted |
|---------------------------------|-----------------|----------------------------|-----------------------|----------------------------|
| Participation Quality           | 4               | 0.72–0.84                  | 0.86                  | 0.61                       |
| Transparency and Accountability | 4               | 0.70–0.87                  | 0.88                  | 0.65                       |
| Community Empowerment           | 4               | 0.73–0.85                  | 0.87                  | 0.63                       |

Source: Authors own work

**Table 2.** Discriminant Validity Assessment Using Fornell–Larcker Criterion

| Construct                       | Participation Quality | Transparency and Accountability | Community Empowerment |
|---------------------------------|-----------------------|---------------------------------|-----------------------|
| Participation Quality           | 0.78                  |                                 |                       |
| Transparency and Accountability | 0.54                  | 0.81                            |                       |
| Community Empowerment           | 0.57                  | 0.60                            | 0.79                  |

**Note:** Diagonal elements represent the square root of the average variance extracted for each construct.  
Source: Authors own work

**Table 3.** Intraclass Correlation Coefficients for Key Constructs

| Construct                       | Intraclass correlation coefficient |
|---------------------------------|------------------------------------|
| Participation Quality           | 0.18                               |
| Transparency and Accountability | 0.21                               |
| Community Empowerment           | 0.24                               |

**Note:** Intraclass correlation coefficients represent the proportion of variance attributable to between village differences.  
Source: Authors own work

**Table 4.** Village-Level Structural Model Results

| Hypothesis | Structural path                                       | Standardised coefficient | p-value | Result    |
|------------|-------------------------------------------------------|--------------------------|---------|-----------|
| H1         | Digital Integration → Transparency and Accountability | 0.34                     | < 0.01  | Supported |
| H2         | Digital Integration → Participation Quality           | 0.29                     | < 0.05  | Supported |
| H3         | Network Density → Transparency and Accountability     | 0.31                     | < 0.01  | Supported |
| H4         | Network Density → Participation Quality               | 0.27                     | < 0.05  | Supported |
| H5         | Network Centralisation → Participation Quality        | −0.26                    | < 0.05  | Supported |

**Note:** Coefficients are standardised between-village estimates derived from multilevel structural equation modelling.  
Source: Authors own work

As shown in Table 1, factor loadings for all measurement items were statistically significant and exceeded commonly accepted thresholds. Most standardized loadings were above 0.70, indicating that the observed indicators shared substantial variance with their respective latent constructs. Items with slightly lower loadings were retained because they remained theoretically meaningful and contributed to adequate construct reliability.

Composite reliability values for all constructs exceeded the recommended minimum of 0.70, demonstrating satisfactory internal consistency. Convergent validity was evaluated using average variance extracted. The average variance extracted values for all constructs were above 0.50, indicating that each latent construct explained more than half of the variance in its indicators. These results confirm adequate convergent validity.

As presented in Table 2, discriminant validity was assessed using the Fornell–Larcker criterion. For each construct, the square root of the average variance extracted was greater than the correlations with other constructs, indicating that the constructs were empirically distinct. This result

suggests that participation quality, transparency and accountability, and community empowerment capture related but conceptually separate dimensions of citizen governance experience.

Overall, the measurement model demonstrates satisfactory reliability and validity. The results indicate that the latent constructs are measured consistently and distinctly, providing a robust foundation for subsequent multilevel structural equation modelling and hypothesis testing.

### ***Multilevel model justification***

Given the nested structure of the data, with individual respondents clustered within villages, it was necessary to assess whether multilevel modelling was empirically justified. Multilevel structural equation modelling was adopted to account for potential dependence among observations within the same village and to distinguish individual level relationships from village level governance effects.

To evaluate the extent of between village variance, null models were estimated for participation quality, transparency and accountability, and community empowerment. Intraclass correlation coefficients were calculated for each construct. The intraclass correlation coefficient represents the proportion of total variance attributable to differences between villages rather than differences among individuals within villages.

Based on Table 3, the results indicate that a nontrivial share of variance in all key constructs is explained at the village level. Participation quality exhibited meaningful between village variance, suggesting that shared governance conditions shape how citizens experience participation. Transparency and accountability showed a comparable level of clustering, indicating that perceptions of information access and responsiveness are partly structured by village level governance arrangements. Community empowerment also demonstrated substantial between village variance, reflecting the influence of village level institutional and network conditions on empowerment outcomes.

These findings provide strong empirical justification for the use of multilevel structural equation modelling. Ignoring the hierarchical structure of the data would risk biased standard errors and conflation of individual level perceptions with village level governance effects. By explicitly modelling both within village and between village variance components, the multilevel approach enables a more accurate estimation of how digital integration and governance network structure shape governance processes and empowerment outcomes.

### ***Structural model results at the village level***

This section reports the results of the between-village structural model, examining how digital integration and governance network structure are associated with participation quality and citizen-facing transparency and accountability at the village level. These results correspond to hypotheses H1 through H5.

As can be seen in Table 4, the positive association between digital integration and transparency and accountability (standardized coefficient = 0.34,  $p < 0.01$ ) indicates that a one standard deviation increase in the level of digital integration is associated with a 0.34 standard deviation increase in shared perceptions of transparency and accountability at the village level. This effect size is moderate in magnitude, suggesting that digital integration constitutes an important, though not exclusive, determinant of transparent and accountable governance practices. The high level of statistical significance indicates that this relationship is unlikely to be due to random variation, lending strong empirical support to the role of digital governance systems in enhancing information visibility and responsiveness when aggregated at the village level.

Similarly, digital integration shows a positive and statistically significant relationship with participation quality (standardized coefficient = 0.29,  $p < 0.05$ ). This coefficient implies that villages with higher levels of digital integration tend to exhibit higher shared perceptions of participation

quality among residents. Although slightly smaller than the effect on transparency and accountability, the magnitude remains substantively meaningful. This result suggests that digital integration may contribute to improved participation by providing structured information, clearer procedures, and more predictable governance routines, which facilitate citizen engagement in deliberative processes.

With respect to governance network structure, network density exhibits a positive association with transparency and accountability (standardized coefficient = 0.31,  $p < 0.01$ ). This finding indicates that villages with more interconnected governance networks tend to demonstrate higher collective perceptions of information access and answerability. A 0.31 standard deviation increase in transparency and accountability associated with a one standard deviation increase in network density reflects a moderate effect size, highlighting the importance of collaborative governance arrangements in enabling information circulation and mutual monitoring across organizational boundaries.

Network density is also positively associated with participation quality (standardized coefficient = 0.27,  $p < 0.05$ ). This coefficient suggests that denser governance networks are linked to more inclusive and meaningful participation processes. Substantively, this implies that when governance actors maintain frequent and reciprocal interactions, opportunities for citizen input are more likely to be facilitated and recognized. The statistical significance of this relationship indicates that collaborative network structures play a nontrivial role in shaping participatory governance outcomes.

In contrast, network centralization displays a negative association with participation quality (standardized coefficient =  $-0.26$ ,  $p < 0.05$ ). This result implies that a one standard deviation increase in the concentration of governance interactions around a small number of central actors is associated with a 0.26 standard deviation decrease in shared perceptions of participation quality. The negative direction and moderate magnitude of this coefficient provide empirical evidence that highly centralized governance arrangements constrain participatory dynamics. From a governance perspective, this suggests that when decision making and information control are concentrated, citizens may perceive participation as less influential or more symbolic, even in the presence of formal participatory mechanisms.

Taken together, the statistical results demonstrate that both technological and relational dimensions of governance matter. Digital integration exerts positive effects on governance processes, but these effects are conditioned by the structure of governance networks. Collaborative network structures amplify the positive association between digital integration and governance quality, while centralized configurations undermine participation. The consistency of coefficient signs with theoretical expectations and their statistical significance reinforces the robustness of the village-level model and provide a strong empirical foundation for subsequent analyses of individual-level empowerment mechanisms and mediation effects.

### ***Structural model results at the individual level***

This section reports the results of the within-village structural model, examining how individual perceptions of participation quality and citizen-facing transparency and accountability shape community empowerment outcomes. These results correspond to hypotheses H6, H7, and H8, as shown in Table 5.

The individual-level structural estimates indicate that both participation quality and transparency and accountability are positively and significantly associated with community empowerment. In addition, participation quality is positively associated with transparency and accountability, supporting the proposed sequential relationship among governance process variables at the individual level.

**Table 5.** Individual-Level Structural Model Results

| Hypothesis | Structural path                                         | Std. Coef. | p-value | Result    |
|------------|---------------------------------------------------------|------------|---------|-----------|
| H6         | Participation Quality → Community Empowerment           | 0.38       | < 0.001 | Supported |
| H7         | Transparency and Accountability → Community Empowerment | 0.33       | < 0.001 | Supported |
| H8         | Participation Quality → Transparency and Accountability | 0.46       | < 0.001 | Supported |

**Note:** Coefficients are standardised within-village estimates derived from multilevel structural equation modelling.  
Source: Authors own work

**Table 6.** Mediation Effects

| Hypothesis | Indirect path                                                                 | Indirect effect | p-value | Result    |
|------------|-------------------------------------------------------------------------------|-----------------|---------|-----------|
| H9         | Digital Integration → Transparency and Accountability → Community Empowerment | 0.11            | < 0.01  | Supported |
| H10a       | Network Density → Participation Quality → Community Empowerment               | 0.10            | < 0.05  | Supported |
| H10b       | Network Density → Transparency and Accountability → Community Empowerment     | 0.08            | < 0.05  | Supported |
| H10c       | Network Centralization → Participation Quality → Community Empowerment        | -0.09           | < 0.05  | Supported |

**Note:** Indirect effects are standardised village-level estimates derived from multilevel structural equation modelling.  
Source: Authors own work

The positive and statistically significant relationship between participation quality and community empowerment (standardized coefficient = 0.38,  $p < 0.001$ ) indicates that individuals who perceive higher quality participation in village governance also report higher levels of empowerment. Substantively, a one standard deviation increase in perceived participation quality is associated with a 0.38 standard deviation increase in community empowerment. This represents a moderately strong effect size, suggesting that participation quality is a key mechanism through which citizens develop a sense of agency, collective efficacy, and confidence in their ability to influence village governance. The high level of statistical significance indicates that this relationship is robust and unlikely to be driven by random variation, providing strong support for H6.

Similarly, citizen-facing transparency and accountability show a positive and statistically significant association with community empowerment (standardized coefficient = 0.33,  $p < 0.001$ ), supporting H7. This coefficient implies that individuals who perceive greater access to governance information, clearer explanations of decisions, and more responsive village authorities tend to report higher empowerment. The magnitude of this effect is comparable to that of participation quality, underscoring the importance of accountability mechanisms in shaping empowerment outcomes. From a governance perspective, this finding suggests that empowerment is strengthened not only by opportunities to participate, but also by the availability of understandable information and the perceived answerability of local authorities.

The relationship between participation quality and transparency and accountability is both positive and strong (standardized coefficient = 0.46,  $p < 0.001$ ), providing robust support for H8. This coefficient indicates that a one standard deviation increase in perceived participation quality is associated with a 0.46 standard deviation increase in perceived transparency and accountability. This

relatively large effect size suggests that participatory processes play a central role in shaping how citizens perceive transparency and accountability. When participation is inclusive, fair, and influential, citizens are more likely to view governance processes as open and responsive. Conversely, low-quality participation may weaken perceptions of transparency, even when formal information disclosure mechanisms are present.

Taken together, the individual-level results demonstrate a coherent pattern of relationships among governance process variables and empowerment outcomes. Participation quality emerges as a foundational factor that directly enhances empowerment and indirectly strengthens empowerment by improving perceptions of transparency and accountability. These findings reinforce the theoretical argument that empowerment is produced through lived governance experiences rather than through institutional arrangements alone. The strength and consistency of the estimated coefficients provide a solid empirical basis for the subsequent mediation analysis examining how village-level governance conditions translate into individual-level empowerment outcomes.

### ***Mediation analysis***

This section reports the results of the mediation analysis examining whether governance processes transmit the effects of digital integration and governance network structure to community empowerment. Consistent with hypotheses H9 and H10, mediation effects were tested within the multilevel structural equation modelling framework using indirect effect estimation at the village level. Indirect effects were evaluated based on standardized coefficients and statistical significance.

As can be seen in Table 6, the mediation analysis provides strong empirical support for the proposed process-based explanation of how digital network governance shapes community empowerment. The results indicate that the effects of digital integration and governance network structure on empowerment are indirect and transmitted through governance processes, rather than operating as direct relationships.

For H9, the indirect effect of digital integration on community empowerment through transparency and accountability is positive and statistically significant (standardized indirect effect = 0.11,  $p < 0.01$ ). This coefficient indicates that a one standard deviation increase in digital integration is associated with a 0.11 standard deviation increase in community empowerment via improvements in village-level transparency and accountability. Although smaller in magnitude than the direct governance process effects observed at the individual level, this indirect effect is substantively meaningful, particularly given that it represents an aggregated village-level mechanism. The result confirms that digital integration enhances empowerment primarily by improving how information is disclosed and how authorities are perceived to respond to citizen concerns, rather than by directly altering empowerment outcomes.

For H10, governance network structure exhibits multiple significant indirect pathways to community empowerment. First, network density shows a positive indirect effect on empowerment through participation quality (standardized indirect effect = 0.10,  $p < 0.05$ ). This finding suggests that villages with more interconnected governance networks foster higher-quality participation, which in turn strengthens collective empowerment outcomes. Second, network density also demonstrates a positive indirect effect through transparency and accountability (standardized indirect effect = 0.08,  $p < 0.05$ ), indicating that collaborative network structures enhance empowerment by improving information circulation and answerability.

In contrast, network centralization exhibits a negative indirect effect on community empowerment through participation quality (standardized indirect effect = -0.09,  $p < 0.05$ ). This result implies that highly centralized governance networks reduce empowerment by constraining participation quality. Substantively, when coordination and information control are concentrated in

a small number of actors, opportunities for meaningful citizen engagement diminish, leading to weaker empowerment outcomes. The negative sign and statistical significance of this indirect effect provide strong empirical support for concerns raised in participatory governance theory regarding the disempowering potential of centralized governance arrangements.

Taken together, the mediation results demonstrate that governance processes function as critical transmission mechanisms linking digital integration and network structure to community empowerment. Digital technologies and network configurations shape empowerment outcomes only insofar as they alter participation quality and transparency and accountability. This finding reinforces the central theoretical claim of the study that empowerment is a process-dependent outcome rooted in everyday governance experiences, rather than a direct product of technological adoption or institutional structure alone.

### **Discussions**

This study examined how digital governance networks shape community empowerment in Indonesian villages by integrating digital integration and governance network structure into a multilevel structural equation model. The results demonstrate that digital integration and collaborative governance networks positively influence participation quality and transparency, which in turn enhance individual-level empowerment. These findings extend both digital governance and network governance literatures while advancing understanding of decentralized governance in the Global South.

The positive relationship between digital integration and governance processes confirms that digital systems can strengthen transparency and accountability when embedded within broader governance networks. This aligns with recent evidence suggesting that digital tools contribute to information visibility, procedural regularity, and oversight capacity, particularly when integrated across organizational boundaries (Onifade et al., 2024; Rodríguez-Abitia et al., 2020). In the context of East Java, villages with higher digital integration exhibited stronger shared perceptions of transparency and accountability, consistent with studies showing that digital reporting platforms enhance citizens' access to governance information and reduce opportunities for administrative opacity (Gupta et al., 2022; Schuppan, 2020). These results underscore that digital integration facilitates accountability not only through improved administrative compliance, but also by making governance information more accessible and actionable for citizens.

Similarly, the positive associations between digital integration and participation quality support the argument that digital infrastructures can enable more informed and meaningful participation when complemented by supportive governance arrangements. Prior research has emphasized that information availability alone does not guarantee participation; rather, digital systems must be embedded within institutional processes that allow citizens to engage substantively with decision making (Asimakopoulos et al., 2025; Dean, 2023). The present findings suggest that digitally integrated villages in East Java provide conditions in which residents perceive participation as fairer, more inclusive, and more consequential. This highlights the importance of designing digital governance systems that go beyond administrative reporting to facilitate citizens' engagement in deliberation and oversight.

The results concerning governance network structure provide strong support for network governance theory. Villages with higher network density exhibited higher levels of shared transparency and participation quality. This finding resonates with scholarship on collaborative governance, which posits that dense inter organizational networks enhance shared problem solving, trust, and information exchange (Ben Yahia et al., 2021; H. Wang & Ran, 2023). In village settings, dense networks create multiple channels for information flow and mutual monitoring, reducing the bottlenecks associated with hierarchical coordination and enabling broader involvement in



governance processes. These results contribute to an emergent literature emphasizing the relational dimension of local governance in Indonesia, where network connectivity has been linked to improved service delivery and community engagement (Sari & Nugroho, 2024; Shaleh & Nuraini, 2021).

In contrast, network centralization was negatively associated with participation quality, consistent with critiques of hierarchical governance structures that concentrate informational power and decision rights in a few dominant actors. Centralized networks may streamline administrative control, but they can also marginalize peripheral actors and limit opportunities for deliberative engagement (Gupta et al., 2022; Peng et al., 2023). The negative indirect effect of centralization on empowerment via participation quality reinforces concerns raised in participatory governance research that formal mechanisms of engagement may be rendered symbolic if decision making authority remains concentrated (Chamusca, 2025; Panday & Al-Maruf, 2025).

At the individual level, both participation quality and transparency and accountability were positively associated with community empowerment. This aligns with prior studies linking meaningful participation and accountable governance to enhanced citizen agency and collective efficacy (Chamusca, 2025; Panday & Al-Maruf, 2025). The strong relationship between participation quality and transparency suggests that these governance processes are mutually reinforcing, supporting arguments that participatory environments enable citizens not only to contribute, but also to interpret and act upon governance information (Fox, 2015; Fung, 2015). These findings contribute to a growing body of evidence demonstrating that empowerment is not solely an individual psychological attribute, but a relational outcome shaped by institutional experiences and networks of interaction (Goh et al., 2022; Llorente-Alonso et al., 2024).

The mediation analysis confirms that digital integration and governance network structure influence empowerment indirectly through governance processes. Digital governance reforms and broader network conditions do not produce empowerment outcomes directly, but do so by shaping the quality of participation and transparency experienced by citizens. This mechanism-based evidence responds to recent calls in public administration scholarship for studies that move beyond input–output models to explain how and why governance reforms produce social outcomes (Meijer & Bolívar, 2016; Panday & Al-Maruf, 2025). The finding that digitally integrated and densely connected networks foster empowerment via improved governance processes has implications for designing digital and collaborative governance interventions that are attuned to citizen-facing outcomes.

Collectively, these results emphasize the need to consider both technological and relational dimensions in analyzing governance reforms. Digital tools matter, but their impact is contingent on the quality of governance interactions and the structure of inter organizational networks. This insight contributes to literature on digital era governance by integrating digital infrastructure with network governance theory, thus providing a more holistic understanding of how decentralized governance unfolds in contexts like East Java (Margetts & Dunleavy, 2013).

Overall, the study's findings advance scholarly understanding of digital governance networks and community empowerment in decentralized settings. They provide empirical evidence from a large sample of Indonesian villages, thereby addressing a gap in the literature where quantitative evidence on governance networks and empowerment remains limited (Harinurdin et al., 2025; Harsanto & Wahyuningrat, 2024). Furthermore, by employing multilevel structural equation modelling, this research demonstrates the analytical value of modelling both within- and between-village processes to capture the complex multilevel dynamics of governance reforms.

Taken together, these findings carry direct relevance for ongoing national digitalization initiatives such as the Digital Village Program and the Smart Village Program. The results suggest that the empowerment payoff of these programs is unlikely to be realized through technology

deployment alone, but depends on whether digital systems are deliberately designed to widen, rather than concentrate, network connectivity among village governments, district agencies, and community actors. This implies a shift in program evaluation criteria, from measures of digital adoption and reporting compliance toward indicators of network density, citizen-facing transparency, and participation quality. In doing so, the study delivers on the three contributions outlined at the outset: it repositions village digitalization as a network governance phenomenon, establishes community empowerment as a process-dependent outcome rather than an automatic by-product of technology, and illustrates how multilevel structural equation modelling can disentangle village-level governance conditions from individual-level citizen experience.

## CONCLUSION

This study examined how digital governance networks shape community empowerment in Indonesian villages by integrating digital integration and governance network structure within a multilevel analytical framework. Using data from villages in East Java and applying multilevel structural equation modelling, the study demonstrated that digital integration and collaborative governance networks influence empowerment outcomes indirectly through participation quality and citizen facing transparency and accountability.

The findings show that villages with higher levels of digital integration tend to exhibit stronger shared perceptions of transparency, accountability, and participation quality. These results suggest that digital governance reforms can enhance governance processes when they are embedded within village governance networks and translated into citizen facing practices. However, the study also finds that governance network structure matters. Densely connected governance networks are associated with higher participation quality and transparency, while highly centralized networks are linked to weaker participatory dynamics. This highlights that digital tools alone are insufficient to improve governance outcomes if relational and institutional conditions remain restrictive.

At the individual level, participation quality and transparency and accountability were found to be strong predictors of community empowerment. Citizens who perceived governance processes as inclusive, fair, and responsive reported higher levels of agency, collective efficacy, and trust in village institutions. Importantly, the mediation analysis confirms that digital integration and network structure do not directly produce empowerment outcomes. Instead, their effects operate through governance processes, reinforcing the argument that empowerment is a process dependent outcome rooted in everyday governance experiences rather than a direct product of technological adoption.

This study contributes to public administration scholarship in three ways. First, it advances digital governance research by conceptualizing village digitalization as part of inter organizational governance networks, rather than as a standalone administrative intervention. Second, it extends village governance and decentralization research by foregrounding community empowerment as a substantive outcome mediated by participation and transparency. Third, methodologically, it demonstrates the value of multilevel structural equation modelling for disentangling individual level perceptions from village level governance conditions in decentralized governance settings.

The findings also carry important policy implications. Digital governance reforms aimed at strengthening village administration should be accompanied by efforts to foster collaborative governance networks and to prevent excessive centralization of decision making. Policymakers should prioritize governance designs that promote information sharing, horizontal coordination, and meaningful citizen participation, ensuring that digital systems serve not only upward accountability requirements but also community empowerment objectives.

Several limitations should be acknowledged. The cross-sectional design limits causal inference, and future research could employ longitudinal data to examine how changes in digital integration and network structure affect empowerment over time. In addition, while the study focuses on East Java, governance dynamics may differ across provinces with varying administrative capacity and political contexts. Future studies could extend this framework to other regions or explore sector specific governance networks to further refine understanding of digital governance and empowerment.

Overall, this study provides robust empirical evidence that digital governance networks matter for community empowerment, but only when embedded within participatory and transparent governance processes. By integrating network governance theory, empowerment theory, and multilevel quantitative analysis, the study offers a comprehensive framework for understanding how decentralized digital governance reforms can support substantive democratic and developmental outcomes.

#### Author Contribution

Conceptualization, A.A. and A.U.W.; methodology, A.A. and A.U.W.; software, A.A.; validation, A.A., A.U.W. and D.T.L.; formal analysis, A.A. and A.U.W.; investigation, A.A. and A.U.W.; resources, A.A.; data curation, A.A. and A.U.W.; writing—original draft preparation, A.A. and A.U.W.; writing—review and editing, A.A., A.U.W. and D.T.L.; visualization, A.A.; supervision, A.U.W.; project administration, A.A.; funding acquisition, A.A., A.U.W. and D.T.L.

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#### Conflict of Interests

The authors declare that there are no conflicts of interest in this article, which is based on actual events in the field.

#### Data Availability Statement

The data is available by request to the author

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