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Rural Social Transformation Through Local Culture and Technology: A Systematic Review of Village Development

Nur Afdalia[1], Jamaluddin Hos[2]

[1,2] Universitas Halu Oleo Kendari
e-mail: nurafdaliawahyiddin@gmail.com ; jamaluddin_hos@uho.ac.id

Abstract

Rural technological change unfolds within cultural practices and institutions that influence who adopts new tools, how they are used, and who benefits. This review examines the reciprocal relationship between local culture and technology in village development across diverse rural settings. The source reports searches across seven interdisciplinary and computing sources and selection of 147 study entries. Narrative thematic synthesis addresses governance and participation, cultural heritage and identity, technology adoption and livelihoods, and digital inclusion. Across these domains, local knowledge, trust, social norms, and institutional arrangements shape adoption and appropriation. Technologies can support cultural transmission and market access while also contributing to commodification, exclusion, and unequal benefits. Connectivity alone does not ensure meaningful use, and adoption does not guarantee sustained livelihood improvement. We propose a framework connecting knowledge brokering, capability building, collective learning, and negotiated adaptation of practices under differing conditions of authority and resource access. It distinguishes community-directed integration, externally steered incorporation, and uneven or exclusionary transformation as interpretive pathways rather than empirically validated categories. The findings support attention to community voice, continued institutional support, and the distribution of outcomes. Search dates, year restrictions, source-specific queries, appraisal records, and unresolved citations require verification before the reported review can be considered fully reproducible.

Keywords: Rural Transformation; Local Culture; Digital Inclusion; Technology Adoption; Village Development

INTRODUCTION

Rural transformation involves changes in livelihoods, authority, social relationships, and the meanings attached to place. Agrarian restructuring provides a historical context for these changes (Akram-Lodhi & Kay, 2012). Digital infrastructures introduce further opportunities and pressures, including new links between communities, services, and markets (Gómez-Carmona et al., 2023). Their implications cannot be understood through adoption rates alone. A technology may become widely available while leaving existing inequalities intact, or acquire uses that differ from those intended by its designers.

Research on ICT for development and digital villages increasingly connects technological provision with development objectives (Andersson & Hatakka, 2023; Ikbal et al., 2025). Pandemic-era evidence also demonstrates differences between access and online activity across rural and urban settings (Olson et al., 2025). Earlier adoption research identifies household and resource conditions that affect agricultural uptake (Akudugu et al., 2012). These contributions explain part of the process, but the interpretation and use of technology also depend on relationships, cultural expectations, and organizational support.

Local culture includes knowledge, identity, customary practice, and shared expectations about legitimate action. Rural landscapes and heritage can sustain belonging,

while community-based resource management connects values with practical decisions (Dragan et al., 2024; Fabricius, 2013). Creative tourism can make these resources economically visible, but also changes how they are represented and exchanged (Rodrigues et al., 2024). Questions of ownership and appropriation of indigenous knowledge are therefore relevant to contemporary digital initiatives as well as older technical interventions (Roht-Arriaza, 1996).

Culture and technology can influence one another. Norms and trust shape adoption, while new communication and production practices may alter relationships and cultural transmission (Fadhila et al., 2026; Nnanna et al., 2025). Evidence needs to be interpreted at the level actually studied. Research on hybrid rural primary care, for example, describes a service configuration and should not be treated as direct evidence of every form of cultural hybridity (Rekenyi et al., 2026). Related education research highlights socioeconomic barriers, but its rural relevance must be demonstrated rather than assumed (Ojong, 2025).

The literature remains divided among adoption, heritage, digital inclusion, and governance studies. Participatory work on village information systems offers a way to connect these concerns by examining use and local decision-making together (Saadah et al., 2026). The central questions are how culture shapes technological appropriation, how technological practices reshape community life, and under which conditions these relationships support inclusive development. Addressing them requires distinguishing access from capability, participation from influence, and economic gains from equitable outcomes.

The novelty of this review lies in integrating cultural interpretation, technological appropriation, and institutional mediation within a single account of village transformation. Its objectives are to synthesize the reported relationships across four thematic domains; identify mechanisms of knowledge brokering, capability building, collective learning, and negotiated practice; examine contextual and distributional conditions; and propose transformation pathways and a research agenda. The contribution is an interpretive framework for explaining variation across settings, rather than an assumption that technology adoption necessarily produces development.

METHODS

This review uses narrative thematic synthesis, with reporting organized by PRISMA 2020 (Page et al., 2021). The source describes an advance protocol and a SPICE-based question covering rural settings, stakeholder perspectives, technology–culture relationships, comparisons where available, and development outcomes. No dated protocol or registration is provided. The question requires a substantive connection between the review domains rather than their incidental co-occurrence.

Seven search sources are reported: Scopus, Web of Science, ScienceDirect, SpringerLink, IEEE Xplore, ACM Digital Library, and Google Scholar. They cover development, rural studies, computing, and technology appropriation, but overlap in indexed publications. The manuscript describes searching mainly from 2016 onward while also admitting older conceptual and historical material. Exact search dates, updates, source-level yields, and the reference-management software are absent. The review therefore retains the source's mixed-period scope without presenting it as a strictly verified 2016–2026 corpus.

The reported search joins four blocks using AND: rural transformation ("rural social transformation," "rural transformation," "rural change," "rural development"); culture ("local culture," "local knowledge," "cultural practices," tradition, "indigenous knowledge"); technology (technology, "digital technology," ICT, innovation, "technological change"); and development setting ("village development," "rural community," "rural livelihoods," "community development"). Terms within each block use OR. Computing-source examples emphasize abstracts, while the Google Scholar example uses four phrases

Eligible studies addressed rural transformation through an explicit connection between local culture, technology, and development. The source permitted empirical, conceptual,

review, conference, preprint, and methodologically detailed institutional-report material. English texts or full translations were eligible. Urban comparisons and single-village cases were admitted where directly relevant, although the source's exceptions require clarification. Older sources were allowed for historical or conceptual grounding, so publication date and data period must be recorded separately.

The source reports 565 identified records, 112 duplicates, and 12 other removals, leaving 441 records screened. Exclusion of 215 left 226 reports sought; 47 were not retrieved. Eligibility assessment of 179 reports excluded 32, yielding 147 study entries. These totals reconcile arithmetically. Figure 1 preserves the supplied selection diagram. The manuscript describes independent screening by two reviewers, discussion, and third-reviewer consultation; supporting logs are not supplied.

Exclusion criteria covered superficial relevance, inaccessible texts, overlapping reports, severe methodological deficiencies, and ineligible contexts. Appraisal considered design clarity, sampling, collection and analysis procedures, ethics, and support for conclusions; conceptual work was assessed for coherence and scope

Extraction recorded study identity, design, setting, population, technology, cultural dimensions, development outcomes, governance, and findings. Table 1 retains all 147 supplied study identities as a compact geographical register. Four overlapping domains guide interpretation: governance and participation; heritage and identity; adoption and livelihoods; and digital inclusion. Tables 2–5 summarize mechanisms and qualifications rather than reproduce the complete extraction sheets. Reviews, conceptual proposals, and primary studies are distinguished to reduce double counting of evidence.

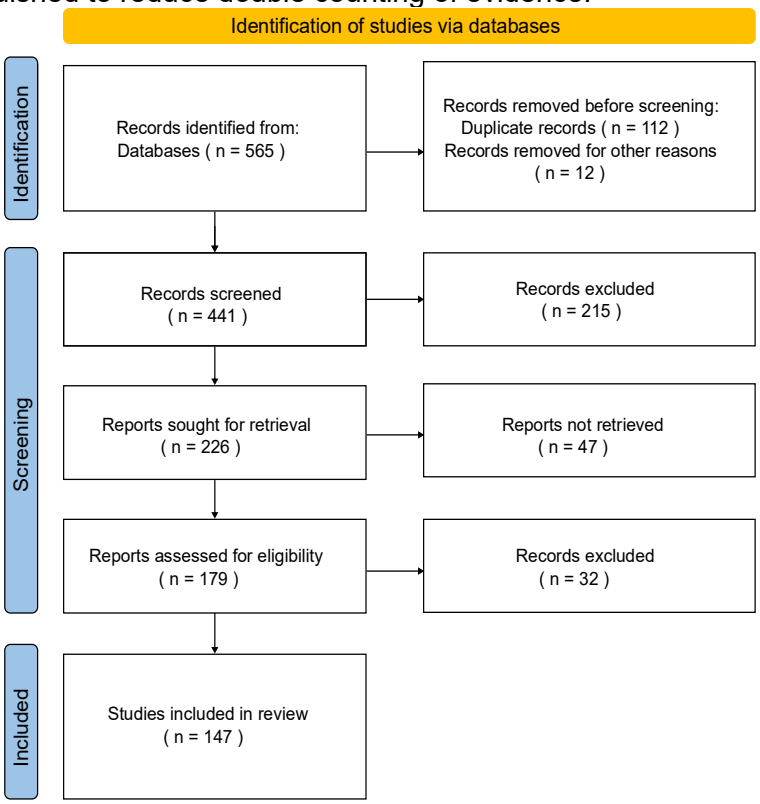


Figure 1. PRISMA flowchart of the study selection process.

Narrative comparison examines reported associations, contrasting cases, conditions of implementation, and distributional effects. No pooled effect estimate was calculated because designs and outcomes differed. Mediation models are treated as study-specific statistical relationships, not proof of temporal causation. The proposed pathway typology is an

interpretation across studies, not a counted classification applied independently by reviewers. Reproducible weighting by quality is not possible without the missing appraisal records.

RESULTS AND DISCUSSION

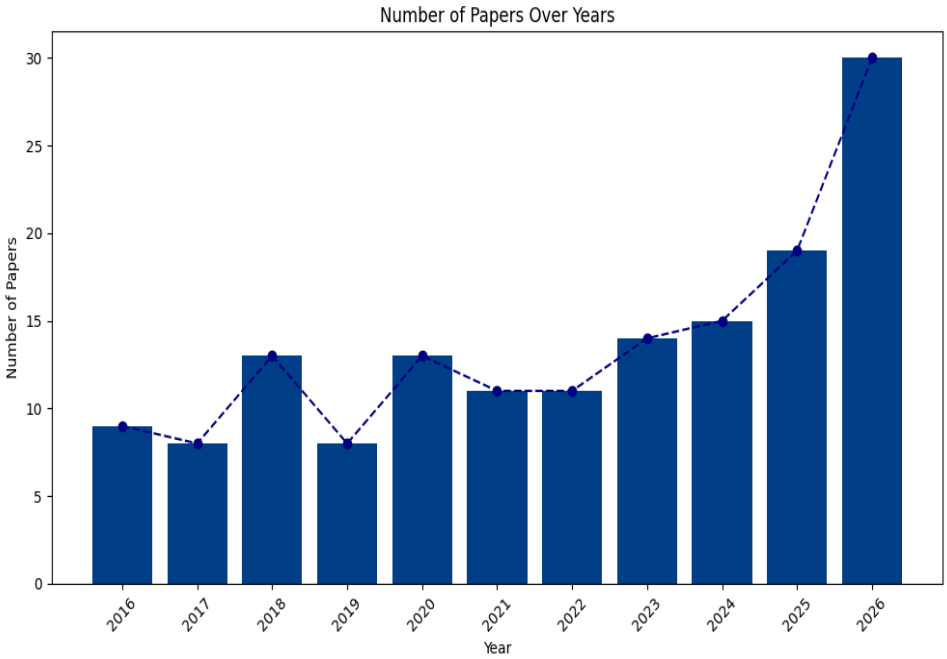


Figure 2. Research trends in the domain of Rural Social Transformation: The Interplay between Local Culture, Technology, and Village Development

The study register contains 147 entries, consistent with the selection total. Figure 2 is retained unchanged. Its source narrative reports 15 publications in 2024, 19 in 2025, and 30 in 2026, a combined 64, but a complete year-by-year distribution and final search date are needed to verify interpretation. Year-to-date 2026 coverage should not be compared with completed years as a growth rate without qualification.

The register combines household surveys, qualitative cases, reviews, conceptual contributions, and historical work. It therefore supports comparison of proposed mechanisms and reported experiences more readily than estimates of average impact. Publications predating the main search window, possible duplicate versions, and studies that cover only part of the technology–culture relationship require explicit eligibility decisions.

Table 1 preserves the 147 supplied study identifiers. The evidence spans agriculture, culture, tourism, governance, education, finance, and connectivity. Adoption, sustained use, participation, and livelihood outcomes remain analytically distinct.

Table 1. Register of the 147 supplied study entries

Study	Study	Study	Study
(Agwu, 2020)	(Akimowicz & Salmon, 2021)	(Amboro & Wahyuningsih, 2025)	(Amir et al., 2019)
(Awotide et al., 2022)	(BRAŃKA, 2025)	(Basaki et al., 2016)	(Bathena & Rao, 2021)
(Baumgartner et al., 2019)	(Bebbington, 2017)	(Bhalla et al., 2018)	(Bonenberg, 2019)

Study	Study	Study	Study
(Bosworth et al., 2016)	(Brugger & Zanetti, 2020)	(Buthelezi et al., 2021)	(COSMA & GOGA, 2025)
(Campo-Villares & González, 2026)	(Cardey et al., 2024)	(Ceretta et al., 2016)	(Chinh, 2024)
(Chong et al., 2019)	(Correa & Pavez, 2016)	(Datoon et al., 2023)	(Debbarma & Debbarma, 2026)
(Doloi, 2025)	(Elsen & Fazzi, 2021)	(Epure et al., 2024)	(Eşitti, 2023)
(Fafurida et al., 2023)	(Fahmi & Savira, 2025)	(Fathurrochman et al., 2025)	(Futemma et al., 2020)
(Gao, 2016a)	(Gao, 2016b)	(Gebremichael et al., 2026)	(Gerli & Whalley, 2021)
(Ghouse et al., 2026)	(Giamporcaro et al., 2025)	(Greser et al., 2021)	(Gu, 2023)
(Hayuni et al., 2025)	(Hendrian, 2025)	(Hlalele, 2022)	(Hoque, 2020)
(Husen et al., 2017)	(Husna et al., 2026)	(Johnson & Vlachokyriakos, 2024)	(KIMOTE & MUTUNGA, 2024)
(KUSUMAWATI et al., 2022)	(Kagungan & Atika, 2026)	(Kelly & Wrathall, 2025)	(Khairani & Silaban, 2026)
(Khanum, 2024)	(Kim & Jamal, 2015)	(Knapik & Król, 2023)	(Knapp & Hoffman, 2018)
(Kološta & Flaška, 2016)	(Krishnaswamy et al., 2026)	(Kudiwa, 2024)	(R. Kumar & Kumar, 2026)
(Dr. P. Kumar & Tiwari, 2025)	(Kurniawan et al., 2023)	(Kusio et al., 2022)	(Lasino et al., 2023)
(Li et al., 2022)	(Lin et al., 2023)	(Lindberg et al., 2024)	(Lowe et al., 2018)
(K. Lu et al., 2017)	(X. Lu, 2026)	(Luo et al., 2025)	(MAYANGSARI et al., 2025)
(Mahon & Hyyryläinen, 2019)	(Maimori et al., 2023)	(Maksum et al., 2020)	(Mapande & Zuva, 2026)
(Mazlan et al., 2026)	(Mingming, 2026)	(Molla & Tilahun, 2026)	(Monda et al., 2023)
(Muhtar et al., 2023)	(Mulyana et al., 2024)	(Mustanir et al., 2017)	(Mwanza et al., 2018)
(Nain et al., 2025)	(Ncube et al., 2025)	(Novikova, 2021)	(Onitsuka et al., 2018)
(Os et al., 2026)	(Palmer & Chuamuangphan, 2018)	(Pamungkas, 2019)	(Pandey & Kushwaha, 2026)
(Pant & Odame, 2017)	(S. Park et al., 2019)	(Pasya et al., 2024)	(Permatasari et al., 2021)
(Piekut & Rybaltowicz, 2024)	(Pohl-Valero, 2026)	(Polas et al., 2026)	(Puppala et al., 2023)
(Purwanto et al., 2025)	(Qayyum, 2024)	(Qin et al., 2022)	(Rodríguez-Cohard et al., 2018)
(6472fff4?)	(Salieva et al., 2026)	(Samaloisa et al., 2026)	(Saputra et al., 2023)

Study	Study	Study	Study
(Satama & Iglesias, 2020)	(Schneider et al., 2016)	(Scott et al., 2016)	(Sharma, 2026)
(Shita et al., 2020)	(Sindakis & Showkat, 2024)	(Sirolli et al., 2025)	(Smith & Csurgó, 2019)
(Snyder, 2018)	(Sopla et al., 2026)	(Stanovčić et al., 2018)	(Stotten & Froning, 2023)
(Sudiah et al., 2026)	(Sunaryo et al., 2022)	(Supandi et al., 2025)	(Supardal et al., 2022)
(S. Supardal et al., 2022)	(Surwade, 2025)	(Suryani & Soedarso, 2021)	(Sá et al., 2018)
(A. Tambunan et al., 2021)	(R. Tambunan et al., 2026)	(Teye & Quarshie, 2022)	(Tim et al., 2017)
(Tshikala et al., 2018)	(Vitasurya et al., 2018)	(Wang et al., 2017)	(Wang et al., 2025)
(W. Wang et al., 2026)	(Xiong et al., 2024)	(Xu et al., 2026)	(L.-S. Ye & Yang, 2020)
(C. Ye et al., 2020)	(Zhang & Zhang, 2020)	(Zhang et al., 2024)	(T. Zhang et al., 2026)
(Ziemiańczyk et al., 2017)	(Zuo et al., 2022)	(shinde, 2026)	

Governance influences who can define development priorities and act on them. Yogyakarta's cultural-village cases report tensions between autonomy and administrative control, while smart-village research in China describes centrally coordinated development (Supardal et al., 2022; S. Supardal et al., 2022; Zhang & Zhang, 2020). Governmentality analysis similarly questions accounts that reduce inequality to a lack of technical skills (Samaloisa et al., 2026). These studies identify risks of top-down intervention without establishing that centralized coordination always reduces local agency.

Intermediary institutions connect policy with practice. Customary bodies can support dispute resolution and cultural rights, but their formal establishment does not demonstrate effective coverage (Purwanto et al., 2025). Village websites likewise may provide information without strengthening residents' informational capability (Pamungkas, 2019). Actor networks and organizational roles can change across development stages, making institutional performance more informative than organizational presence alone (Wang et al., 2017; Lin et al., 2023).

Participation is stratified by land access, social standing, and links to decision makers. Thai ecotourism and Indonesian planning cases illustrate constraints on meaningful involvement (Palmer & Chuamuangphan, 2018; Mustanir et al., 2017). Brazilian comparisons distinguish the flexibility of farmer-led agroforestry from asymmetrical company relationships (Futemma et al., 2020). Historical development accounts provide further context for local discretion and the circulation of participatory approaches (Maksum et al., 2020; Qayyum, 2024; Pohl-Valero, 2026).

Recognition of knowledge also matters. Vernacular expertise connects place-based understanding with external learning, while Ecuadorian conservation research shows how programme categories may undervalue farmers' contributions (Lowe et al., 2018; Satama & Iglesias, 2020). Brokerage, dialogue, and knowledge-sharing routines offer possible responses (Novikova, 2021; Supandi et al., 2025; Ziemiańczyk et al., 2017). Table 2 summarizes the institutional mechanisms and their limitations.

Table 2. Governance and institutional mechanisms

Governance mechanism	Interpretation	evidence
Administrative steering	Coordination may coexist with limited local discretion.	Supardal et al. (2022); Zhang & Zhang (2020).
Institutional intermediation	Organizations connect policy, knowledge, and community action; presence alone is insufficient.	Purwanto et al. (2025); Pamungkas (2019).
Meaningful participation	Land, standing, and decision-making access condition involvement.	Palmer & Chuamuangphan (2018); Mustanir et al. (2017).
Knowledge brokerage	Recognition and dialogue help connect local and external expertise.	Lowe et al. (2018); Satama & Iglesias (2020); Novikova (2021).

Heritage supports livelihoods and belonging, but its economic visibility can alter its social meaning. Cultural groups in Wonosari, local agricultural knowledge, and food-heritage initiatives illustrate potential assets for development (Amboro & Wahyuningsih, 2025; Surwade, 2025; Giamporcaro et al., 2025). Tourism and cultural-policy studies also emphasize constraints in infrastructure, entrepreneurship, and public support (Eşitti, 2023; Stanovčić et al., 2018; Scott et al., 2016).

Table 3. Heritage and community development

Cultural process	Development opportunity	Qualification and evidence
Heritage mobilization	Local production and identity support community initiatives.	Resources and institutional support remain necessary; Amboro & Wahyuningsih (2025); Giamporcaro et al. (2025).
Commercialization	Tourism can create income and reshape practices.	Participation, ownership, and livelihood effects differ; Zuo et al. (2022); KUSUMAWATI et al. (2022).
Ritual adaptation	Practices may be retained, shortened, or reinterpreted.	Continuity and changing meaning coexist; Husna et al. (2026); Nain et al. (2025).
Learning and documentation	Schools and digital records can support transmission.	Community authority and representation require attention; Fathurrochman et al. (2025); Knapik & Król (2023).

Economic success and community participation need not coincide. The Boyle and Salmela festival comparison describes different balances between engagement and commercial viability (Mahon & Hyyryläinen, 2019). Administrative intervention, spatial restructuring, and changing occupations can also disrupt the settings in which culture is practiced (C. Ye et al., 2020; Zhang et al., 2024). Ritual studies describe selective retention

and reinterpretation rather than a simple disappearance of tradition (Husna et al., 2026; Lasino et al., 2023; Nain et al., 2025).

Tourism cases reveal similarly mixed outcomes. Residents in Hongcun adapt built space and livelihoods; batik tourism changes employment relations; and Canggu's development creates pressures on land and identity (Zuo et al., 2022; kusumawati et al., 2022; mayangsari et al., 2025). Yunnan studies show differences between expert classifications and residents' understandings (Gao, 2016a, 2016b). Such accounts support attention to authority over representation and benefit sharing rather than treating cultural commercialization as inherently protective or destructive.

Schools, community organizations, and intergenerational learning provide other routes to continuity (Khanum, 2024; Fathurrochman et al., 2025). Craft decline and digital documentation raise questions about what is preserved, by whom, and in which form (Knapik & Król, 2023). Table 3 distinguishes these mechanisms. The review does not establish that community control alone is sufficient for viable cultural livelihoods; material resources and wider policy conditions remain relevant.

Adoption varies with perceptions, relationships, and structural position. Tajik and Peruvian studies identify perceived usefulness, risk, trust, and ease of use as relevant, but their estimates remain specific to their samples and models (Salieva et al., 2026; Sopla et al., 2026). Financial resources, technical services, and entrepreneurial readiness also differ across technologies (Amir et al., 2019; Mazlan et al., 2026). Agricultural uptake cannot therefore be explained by awareness or device ownership alone.

Table 4. Adoption mechanisms and livelihood qualifications

Adoption pathway	Relevant conditions	Evidence and limits
Perceptions	Usefulness, ease, risk, and trust shape decisions.	Context-specific models; Salieva et al. (2026); Sopla et al. (2026).
Relational support	Groups, credit, extension, and continued assistance influence uptake.	Association types can have contrasting effects; Husen et al. (2017); Datoon et al. (2023).
Capabilities	Design, training, and operational support enable use.	Short-term improvements do not establish durability; Os et al. (2026); Ghouse et al. (2026).
Distribution	Income changes need separate assessment from inequality.	Benefits may be uneven; Shita et al. (2020); Brugger & Zanetti (2020).

Associations may enable some practices while constraining others. Husen et al. (2017) report differing relationships for funeral and conflict-resolution groups and different technology types. Landcare evidence describes declining uptake after external support withdrew, emphasizing the importance of sustained relationships (Datoon et al., 2023). Credit, extension, and cooperative membership also appear in studies of agricultural adoption and welfare (Awotide et al., 2022; Teye & Quarshie, 2022). These findings do not demonstrate that social capital is uniformly beneficial.

Adoption may improve income while redistributing benefits unevenly. Ethiopian evidence reports income gains alongside worsening inequality, and mining-related diversification in Burkina Faso differentiates livelihood trajectories (Shita et al., 2020; Brugger & Zanetti, 2020). Technology intention, actual use, productivity, and long-term wellbeing require separate measurement. Artificial-intelligence adoption intentions, for example, should not be presented as realized sustainability outcomes (Polas et al., 2026).

Participatory design and capability building offer promising implementation approaches. Os et al. (2026) report knowledge and operational improvements over a short monitoring period; Ghouse et al. (2026) associate support and training needs with entrepreneurial resilience. Digital finance studies identify further relationships among literacy, inclusion, adoption, and performance (Khairani & Silaban, 2026; Agwu, 2020). These designs suggest pathways but do not establish the universal superiority of a particular intervention package.

Hybrid practice can combine indigenous and external techniques. Farmer-led arrangements and collective learning illustrate adaptation of technologies to community purposes (Bebbington, 2017; Futemma et al., 2020; Suryani & Soedarso, 2021). Table 4 summarizes adoption mechanisms and livelihood qualifications. The unidentified source marker in the original productivity discussion is excluded from substantive support until its bibliographic identity is resolved.

Digital inclusion involves motivational, material, skills, and usage thresholds, not connectivity alone (Onitsuka et al., 2018). Comparative and Australian research further show how infrastructural disadvantages interact with existing social exclusion (Hendrian, 2025; S. Park et al., 2019). Devices and coverage are important inputs, but usable services, affordability, confidence, and institutional responsiveness influence whether residents benefit.

Table 5. Digital inclusion thresholds

Inclusion threshold	Intervention focus	Evidence and qualification
Motivational	Relevance, trust, confidence, and perceived usefulness.	Not reducible to device ownership; Onitsuka et al. (2018); Kudiwa (2024).
Material	Affordable and reliable connectivity and equipment.	Geography and demand constrain provision; Gerli & Whalley (2021); Ncube et al. (2025).
Skills	Literacy, training, service support, and cultural recognition.	Equipment alone insufficient; COSMA & GOGA (2025); Mwanza et al. (2018).
Use and benefit	Accessible services and observed practice change.	Outcomes vary within communities; Hoque (2020); Buthelezi et al. (2021); Qin et al. (2022).

Infrastructure models face different constraints. UK community networks reached some locations left underserved by public–private provision, although scalability remained uncertain (Gerli & Whalley, 2021). South African deployment faces terrain, density, and income barriers, while Assam residents weigh connectivity against other material priorities (Ncube et al., 2025; Doloi, 2025). These cases support contextual design rather than claims that one model consistently outperforms another.

Within-village differences also matter. South African research describes distinct uses across occupations, genders, and generations, including deliberate limits on use (Buthelezi et al., 2021). Romanian education and Chinese platform cases distinguish equipment provision from effective capability (COSMA & GOGA, 2025; L.-S. Ye & Yang, 2020). Gendered adoption findings vary by context and do not justify assuming a universal male–female gap (Kudiwa, 2024; Sindakis & Showkat, 2024).

Policy and user capability interact. Bangladesh's Union Digital Centres and Swedish rural services illustrate implementation limits despite formal objectives (Hoque, 2020; Lindberg

et al., 2024). Evaluation should examine actual practices and benefit distribution, alongside service availability (Qin et al., 2022). Indonesian and South African knowledge studies further connect cultural recognition with willingness and capacity to use digital tools (Fahmi & Savira, 2025; Mwanza et al., 2018). Table 5 summarizes the inclusion thresholds.

The synthesis proposes four interacting mechanisms: knowledge brokering connects external and local expertise; capability building enables meaningful use; collective learning spreads and modifies practice; and negotiated appropriation aligns technologies with local priorities. Authority, resources, and social position condition each mechanism. These relationships form an interpretive model, not an empirically verified causal system.

Three transformation pathways organize this interpretation. Community-directed integration combines technological use with meaningful local decision-making. Externally steered incorporation may improve coordination or market access while limiting discretion. Uneven or exclusionary transformation concentrates gains and shifts cultural or social costs toward less powerful groups. These pathways can coexist within a village and change over time; they are not mutually exclusive categories with reported prevalence estimates.

Culture is neither a fixed obstacle nor an automatic asset. Its role depends on the practices and institutions examined, and technological influence can be negotiated rather than simply accepted or resisted. Evidence from cultural tourism and agricultural organizations supports this conditional reading, but does not establish a single recursive mechanism across all sectors (Gao, 2016b; Husen et al., 2017). Specific feedback processes require longitudinal observation.

The framework complements adoption models by specifying organizational and cultural conditions rather than claiming to replace them. Institutions are recurring mediators in the narrative, but the review cannot rank their influence above all technical or material constraints. Likewise, observed inclusion problems do not imply that perceptual barriers always dominate affordability, connectivity, or land access.

For policy, relevant actions include meaningful local authority, support for community knowledge, accessible training and services, and monitoring of within-village outcomes. Co-design should be linked to continued maintenance and operational support. Heritage documentation should follow community priorities and consider ownership and benefit sharing. These implications require evaluation; the present evidence does not prove that participatory approaches always outperform alternatives.

Limitations include language restrictions, 47 unretrieved reports, heterogeneous designs, and possible overlap between primary studies and reviews. Search chronology, mixed-period eligibility, appraisal documentation, source-specific syntax, and unresolved identifiers further limit reproducibility. Duplicate or related Supardal records require checking. These issues preclude confident pooled estimates, precise claims about evidence quality, and unqualified interpretation of the publication trend.

Future research should follow the same communities over time, compare similar interventions across settings, and disaggregate outcomes by gender, generation, landholding, and institutional access. Mixed-method and quasi-experimental designs could test the proposed mechanisms while retaining contextual detail. Emerging AI applications require assessment of actual use, knowledge assumptions, and consequences rather than intention alone (Mapande & Zuva, 2026; Polas et al., 2026). Completing the search and appraisal record is the immediate requirement before submission.

CONCLUSION

Rural transformation depends on how cultural practices, technologies, and institutions interact. Adoption creates opportunities but does not ensure meaningful participation, cultural continuity, or equitable benefits. The review proposes knowledge brokering, capability building, collective learning, and negotiated appropriation as explanatory mechanisms. Village authorities and programme designers should support local decision-making, sustained

operational assistance, and monitoring of within-village inequalities. Longitudinal comparisons are needed to test these relationships. Search dates, eligibility decisions, appraisal records, and unresolved citations must be reconciled before the reported synthesis is fully reproducible.

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