



Digital Governance in Ethnic Minority Regions: A Supportive Community Pathway from Structural Support to Governance Effectiveness

Baiyu Hu 

Aba Teachers College, Wenchuan 637000, China

hubaiyu96@qq.com

Abstract. Digital governance in rural ethnic minority regions often runs into what practitioners call "technological suspension"-a disconnect between externally introduced technologies and the social structures they are meant to serve. Drawing on years of targeted assistance experience in Aba Prefecture, this study introduces the concept of a "supportive community" and builds an analytical framework that traces a trajectory from structural support, through adaptive embedding, to governance effectiveness. The findings show how external assistance and recipient communities interact to create the social conditions that allow digital governance to take root. Structural support works through resource investment, institutional grafting, and emotional bonding. Adaptive embedding follows, weaving technology into local life through technological translation, institutional buffering, and cultural adaptation. The result is governance effectiveness that shows up in better public services, stronger local industries, and more cohesive communities. By shifting the focus from technology deployment to social integration, this study extends governance community theory and offers a grounded perspective on the social foundations of digital governance-with implications for digital economy development and management practice in complex socio-cultural settings.

Keywords: Supportive Community, Digital Governance, Ethnic Minority Regions, Embeddedness Theory, Counterpart Assistance.

1 Introduction

1.1 Research Background and Problem Statement

China's Digital China strategy and rural revitalization initiatives have converged in recent years, placing digital governance at the center of efforts to modernize rural administration. In the context of a rapidly growing digital economy, digital technologies are reshaping how production and transactions work, and they also open up new possibilities for governance innovation in various regions. However, certain ethnic minority areas face unique challenges. Factors such as complex geographical conditions, diverse ethnic traditions, and distinctive social capital structures often lead to situations where

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externally introduced digital governance tools encounter difficulties in fully integrating with local practices, sometimes resulting in a state of "technological adaptation challenges" rather than immediate widespread adoption. The implementation of "counterpart assistance" programs has played a crucial role in channeling external resources, institutional expertise, and personnel into these areas, providing a valuable context for observing how external structural forces can facilitate governance transformation in developing ethnic minority regions, and how "supportive communities" begin to form. In such regions, digital platforms often present standardized rules, while local communities frequently rely on flexible arrangements rooted in personal relationships, face-saving, and traditional authority for self-governance. This dynamic interplay raises a central question for this study: how can digital governance move beyond a rigid form of embedding and find its way toward a more collaborative symbiosis within the socio-cultural landscape of ethnic minority regions?

1.2 Research Background and Problem Statement

Getting past this dilemma means understanding how external support interacts with local social structures. In a specific ethnic minority prefecture, assistance went beyond project-based resource transfers. Over years of sustained engagement with local governments, community organizations, and villagers, a "supportive community" took shape and continued to evolve. That brings us to the central question: how does this supportive community—through the way it forms and operates—help digital technology move past its initial incompatibility, shift from a "suspended tool" to an "adapted medium," and finally deliver real governance outcomes?

Looking at the existing literature, three gaps stand out. Research on counterpart assistance rarely theorizes the relationship between helpers and recipients in any depth. Studies of digital rural governance often overlook the social conditions that allow technology to take hold. And work on governance in ethnic minority regions has yet to offer a systematic account of how external forces interact with local societies. This study tries to fill those gaps by introducing the concept of a "supportive community" and building an analytical framework that traces a path from structural support, through adaptive embedding, to governance effectiveness. The framework shows how external actors lay the groundwork for digital governance, get technology integrated into local life, and then see governance outcomes follow. Seen through the lens of digital economy research, the study also brings to light how digital technology and social structures interact and shape each other—offering a fresh way to think about regional governance in an era of digital transformation.

On the practical side, the study makes a case for what might be called the "social foundation" of digital governance: whether technology works depends on whether it can embed itself in local institutions, culture, and daily life. That argument has direct implications for digital rural development in ethnic minority regions—especially when it comes to building sustainable digital economy initiatives and adapting management practices to fit local contexts.

1.3 Research Significance

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2 Literature Review and Theoretical Framework

2.1 Literature Review

Counterpart Assistance Research: From Policy Process to Relationship Network. counterpart assistance concentrates on policy processes, resource investment, and whether projects deliver results ^{[1],[2]}. Researchers tend to treat counterpart assistance as a flow of resources or a matter of policy implementation. What gets lost in that framing is a deeper understanding of the relationship between helpers and recipients—specifically, the long-term interactions, emotional ties, and trust networks that develop between them over time.

Migdal^[3] argued in *Strong Societies and Weak States* that state-society relations are better understood as a complex interplay over social control, not a simple dichotomy. The "supportive community" we see in counterpart assistance practices is a concrete example of just such an interplay—it forms and evolves in ways that deserve closer theoretical attention. A few recent studies have started looking at how inter-regional assistance promotes economic development and industrial up-grading in less developed areas, especially in the context of digital transformation^{[4],[5]}. But we still know relatively little about how these assistance efforts build social capital or help integrate local economies into the digital economy.

Digital Rural Governance Research: From Technology Application to Social Foundation. Scholars writing about digital rural governance have taken up several

lines of inquiry. Some have focused on defining digital governance communities and laying out their theoretical foundations^[6]; Others have looked at how to build digital rural governance systems in practice^[7]; A third group has examined practical difficulties—low farmer participation, for instance, or the trouble with activating local governance resources^[8]; And a fourth strand of research has explored what makes digital rural governance more effective^[9].

That said, much of this work leans heavily toward technology applications and governance outcomes. It rarely digs into the social conditions that allow technology to actually take hold. As Yang et al.^[10] pointed out that using smart technologies to empower rural governance comes with multiple challenges—technological adaptation challenges, institutional barriers, and socio-cultural lags, to name a few. A fundamental tension runs through this: standardized technological logic often clashes with the personal relationships, customs, and informal norms that shape rural social order. Some researchers have started looking at how digital technologies affect rural economic development, digital inclusive finance, and smart agriculture^{[11],[12]}. But we are still far from a full picture of how these technologies mesh with local socio-cultural structures in ethnic minority regions to produce governance outcomes.

Ethnic Minority Region Governance Research: From Cultural Particularity to Interaction Mechanisms. Work on governance in ethnic minority regions tends to emphasize cultural particularities, religious factors, and ethnic relations. Researchers often take an "internal perspective," highlighting what makes these societies distinctive^[13]. The rise of the digital economy brings both new challenges and new opportunities for ethnic minority regions. Digital technologies can help with cultural preservation, tourism development, and the digital transformation of local industries. But managing these digital processes effectively—without widening digital divides or creating cultural conflicts—is no small task. Management science has yet to fully come to terms with this challenge. The rise of the digital economy brings both new challenges and new opportunities for ethnic minority regions. Digital technologies can help with cultural preservation, tourism development, and the digital transformation of local industries. But managing these digital processes effectively—without widening digital divides or creating cultural conflicts—is no small task. Management science has yet to fully come to terms with this challenge^[14].

2.2 Theoretical Framework

To analyze how supportive communities form and how they lead to better governance outcomes, this study builds a framework organized around three linked stages: structural support, adaptive embedding, and effectiveness generation.

Structural support means the basic guarantees that external actors—governments, enterprises, social organizations—provide for digital rural governance. They do this through institutional arrangements, resource investment, and technical assistance. That support does more than just lay a foundation. It also gives ethnic minority regions the material and institutional backing they need to integrate into the digital economy and

develop digital industries. Theoretically, structural support ties directly to what Migdal^[4] called "state capacity"—the ability to penetrate society, regulate social relations, extract resources, and allocate resources. In ethnic minority regions, those capacities are often developing, for reasons ranging from geographical barriers to cultural differences to historical underinvestment. The counterpart assistance mechanism, by investing resources and deploying personnel in a sustained way, essentially strengthens state capacity in recipient areas. That, in turn, creates the conditions for introducing modern governance approaches like digital governance.

Adaptive embedding looks at how digital technology becomes part of local socio-cultural contexts and governance practices. This matters for two reasons. First, technology needs social and cultural acceptance to work. Second, how well it embeds affects its efficiency and management effectiveness in local economic activities—and that makes it a key link in realizing the value of the digital economy. The concept draws directly on Polanyi's^[15] and Granovetter's^[16] theories of embeddedness. Polanyi argued that economic behavior is always embedded in social relations and cultural structures. Granovetter went further, distinguishing between structural embeddedness and relational embeddedness. In digital governance, adaptive embedding shows up as both—where technology sits in social network structures, and whether users trust each other and act reciprocally. When digital technology achieves this dual embeddedness, it can genuinely integrate into local society and avoid the "adaptation challenges" problem.

Effectiveness generation is about the real improvements in governance that come from structural support and adaptive embedding. From a digital economy standpoint, effectiveness generation means more than just more efficient public services. It also includes digital technology empowering local industries, expanding market connections, and stimulating regional economic vitality—all of which add up to more inclusive digital economy growth. Theoretically, this links to what Putnam^[17] called the positive effects of social capital. His study of communities in northern Italy showed that social capital—social networks, norms, and trust—encourages reciprocal cooperation and helps produce and sustain collective well-being. Supportive communities build social capital across regions and groups, and they cultivate shared norms and trust. That social capital then turns into observable governance outcomes.

To put the framework more concretely: structural support works to integrate resources systematically. It uses resource investment to overcome basic barriers, institutional grafting to align rules, and emotional bonding to build consensus across different actors. Adaptive embedding is the deeper process through which digital technology and local realities come together. Technology does not just land hard on local communities. Instead, it works through supportive networks—localizing itself to meet grassroots needs, adjusting institutions to fit local governance logic, and integrating culturally to gain social acceptance. Effectiveness generation is what happens when the first two stages work together. The benefits of digital governance then become visible over time. This three-stage analytical framework is depicted in Fig. 1.

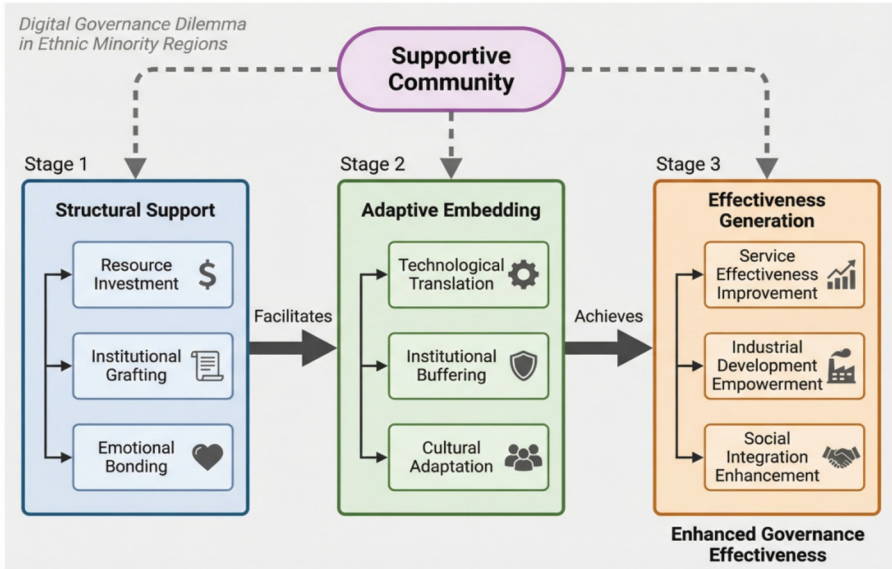


Fig. 1. Analytical Framework of Supportive Community in Digital Governance for Ethnic Minority Regions.

3 Research Methods and Case Selection

3.1 Research Methods

This study takes a qualitative approach, relying mainly on case study and in-depth interview methods. We treat Aبا Prefecture as the main analytical unit, but we zoom in on digital governance practices in selected villages of Z County for thick description and process tracing. Case studies work well for "how" and "why" questions-they allow researchers to dig into the causal mechanisms behind complex social phenomena. Process tracing, which focuses on key events, decision points, and causal chains, helps uncover the full trajectory from initial causes to final outcomes.

Data collected during two months of fieldwork in Z County, Aبا Prefecture, from July to August 2025. This study used three methods together: semi-structured interviews, participant observation, and document analysis. Semi-structured interviews let us adjust questions as we went, following up on what respondents said, which helped us get at key information in depth. Participant observation gave us firsthand experience of daily digital governance practices and allowed us to document them. For document analysis, we collected and examined secondary materials-policy documents, project reports, statistical data-to complement the interview data and cross-check findings across sources. A total of 92 individuals were interviewed. That included 32 grassroots cadres which from township and village level, 15 assistance personnel (from Province C, City S), and 45 local residents-ordinary villagers, local elites, and industry leaders. We asked about the history of assistance, digital governance practices, what it felt like to use the

technology, and how social relationships had shifted. For participant observation, we concentrated on digital governance activities in five administrative villages, documenting how people used digital platforms, how villages made decisions, and how public services were delivered.

For data analysis, we used process tracing. That meant going carefully through key events, decision nodes, and causal mechanisms to reconstruct the full chain from structural support to adaptive embedding to effectiveness generation. We also made a point of triangulating our findings—checking them across different data sources and methods to make sure they held up.

3.2 Case Selection

Aba Prefecture in Sichuan Province was once classified as a deeply impoverished area. It has made real progress in poverty alleviation, but development gaps remain. Several provinces and cities have provided targeted assistance to Aba, creating a complex support network that makes the prefecture a good place to study how supportive communities form and operate. Z County, which is fairly representative of Aba, has received assistance from multiple sources: the economically developed eastern Province C, and also cities within Sichuan Province itself—City S in the east. That gives Z County what we might call a multi-level, multi-entity assistance model.

Why focus on Z County? Three reasons stand out. First, counterpart assistance there has continued for a long time—more than sixteen years, starting in 2008. That gives us a chance to watch how the supportive community relationship evolves from its early stages to maturity. Second, Z County has multiple assistance partners. That diversity lets us compare how different assistance models work. Third, Z County has been actively exploring digital governance, with both successes and instructive challenges. That provides rich empirical material for analyzing when technology faces adaptation issues and when it actually gets implemented.

4 Structural Support: The Foundational Construction of Supportive Communities

Structural support is where the supportive community pathway begins. It gives digital governance in ethnic minority regions the basic backing it needs to get off the ground. Three mechanisms work together here: resource investment, institutional grafting, and emotional bonding.

4.1 Resource Investment: The Material and Human Capital Foundation of Digital Governance

Resource investment is the main mechanism within structural support. It works on three fronts: capital investment, technology introduction, and talent input. The core idea here is not just to provide what people call "blood transfusion" but to create the conditions for "blood generation"—so that development can sustain itself over time.

The counterpart assistance mechanism has kept funding steady for digital infrastructure in a specific ethnic minority prefecture. Take Z County. Over thirteen consecutive years, eastern Sichuan City S put a substantial amount of financial assistance into the area, supporting numerous projects and helping resolve practical problems. Eastern Province C set aside its own funds for digital infrastructure. That money has upgraded Z County's digital infrastructure considerably and given it a solid material base for moving forward with digital governance. And those infrastructure improvements do more than just provide hardware for digital governance. They also create favorable conditions for new digital economy sectors to grow locally—digital agriculture, digital tourism, and the like.

Assistance providers also brought in digital platforms and smart devices. Province C set up a "digital village" platform (e.g., the "Digital Village One Map"), which integrates services such as rural governance, social security inquiries, and agricultural product traceability. They also rolled out smart monitoring systems for food safety (e.g., the "Sunny Kitchen" platform covering over 5000 catering entities) and geological disaster early warnings in some areas, and donated digital equipment to village information centers and schools. One example: the "Mao nong fu" smart agriculture platform from a city of Province C, deployed in Aba, uses IoT technology to monitor crops in real time, making local agriculture more intelligent and pushing its digital transformation forward. That said, bringing in technology did not always go smoothly. One Aba cadre put it bluntly: "Some equipment is hard to maintain locally, and when it breaks down there's no timely support, so even after training people stop using it and it just sits there as decoration" (G-15). This illustrates technology introduction has to match local service capacity, maintenance systems, and actual user workflows.

Talent input is arguably the most critical piece of resource investment. Province C and Z County set up a long-term cadre exchange program, regularly sending technical personnel from education, healthcare, and agriculture to provide training and guidance. When it came to digital governance, these experts helped Aba cadres learn how to use the platforms and trained villagers in basic digital skills. That mentorship model raised local digital literacy considerably and gave digital governance the human resources it needed to keep evolving. Look at it through a social capital lens, and talent input does more than just transfer human capital.

4.2 Institutional Grafting: The Normative Foundation of Digital Governance

Institutional grafting refers to the process in which aid providers introduce their own governance experience and institutional models into the assisted region, and then adjust them according to local conditions in order to achieve the purpose of institutional assistance^[18].

Assistance providers have developed fairly mature institutional models through years of governance practice. Those models come into recipient areas through supportive communities, where they offer useful reference points for institutional innovation. Take eastern Sichuan City S's support. City S established a whole-territory pairing mechanism connecting all townships and over 154 local units, led by six special task forces under deputy county-level officials. It also promoted "school-to-school" and

"medical consortium" reforms, sharing proven models of group-based schooling and integrated medical services. This helped Wenchuan consolidate its dispersed educational and medical resources, significantly improving public service effectiveness. Moreover, through long-term cadre exchange programs and "mentoring" initiatives, City S helped cultivate a local talent force capable of sustaining institutional improvements.

Pushing the institutional innovation forward means adapting external models to local conditions. In Z County, the supportive community introduced a "one-household, one-account" precision employment assistance mechanism originally developed in City S. This mechanism required standardized data collection and regular follow-ups, which initially clashed with the more flexible local administrative practices. Through a process of "rule docking," they aligned the standardized reporting requirements with local governance workflows, creating an "online-offline integration" model for employment services. Important cases are handled offline with village-level coordination, while routine updates are processed through digital platforms for efficiency. This approach keeps the normative structure of the external model intact while preserving the flexibility that local governance requires. Policy transfer theory would call this "learning-based policy transfer ^[18]". Whether such transfers succeed depends largely on how transferable the core concepts are, and on whether specific implementation methods can adapt to local conditions.

4.3 Emotional Bonding: The Social Foundation of Digital Governance

Emotional bonding builds emotional connections and social trust that go beyond administrative orders and contracts. The tools here include long-term cadre deployments, unit pairing, and kinship assistance. What makes this mechanism work is its ability to inject trust—a vital form of social capital—into assistance relationships.

Counterpart assistance is a long-term endeavor. In Z County, aid cadres are usually sent on a rotational basis for a three-year term. For example, in June 2024, 162 new batches of cadres from Province C assigned to Sichuan arrived, marking the first centralized rotation of counterpart assistance in three years. Long-term residence allows cadres enough time to truly understand the local situation and build stable working relationships with the community. As one aid cadre from Province C in Z County said, "After going around, I have gained a deeper understanding of this land. I have transformed from a 'cadre from C' into a 'local person.'" Cadres do not sit in offices making decisions; instead, they go into villages—conducting field surveys, visiting households, understanding what villagers really need, and addressing practical problems.

Consider the 'kinship support' initiative between a district in City S and Z County. According to official records, under the framework of pairing across the whole region, the district promoted 'street-to-street kinship support,' organizing 53 district-level departments, 18 schools, and 4 hospitals to establish paired relationships with corresponding units in Z County. Under the principle of 'one-on-one mentoring,' officials went deep into the frontline to form kinship support relationships with impoverished households. Currently, under this framework, at least 24 households and 48 individuals have been paired. Paired officials regularly visit their 'relatives' to understand their living

conditions and provide practical assistance. Over time, the purely supportive relationships have gradually taken on emotional and moral significance. In some cases, support officials have even been awarded the honorary title of village resident by local villages, which fully demonstrates the deep-rooted emotional bonds.

What does an emotional connection produce? Trust gradually accumulates, and it is an important form of social capital. It can reduce transaction costs, promote cooperation, and make collective action more effective. In a supportive community, trust gradually develops from institutional trust to interpersonal trust, and ultimately forms group trust. This accumulated trust provides the essential social conditions for cooperation and collective development. Fig. 2. The Accumulation of Trust in "Supportive Communities" and Pathways for the Transformation of Trust Through Digital Technology, illustrates how trust accumulates within supportive communities and how digital technology can further transform trust.

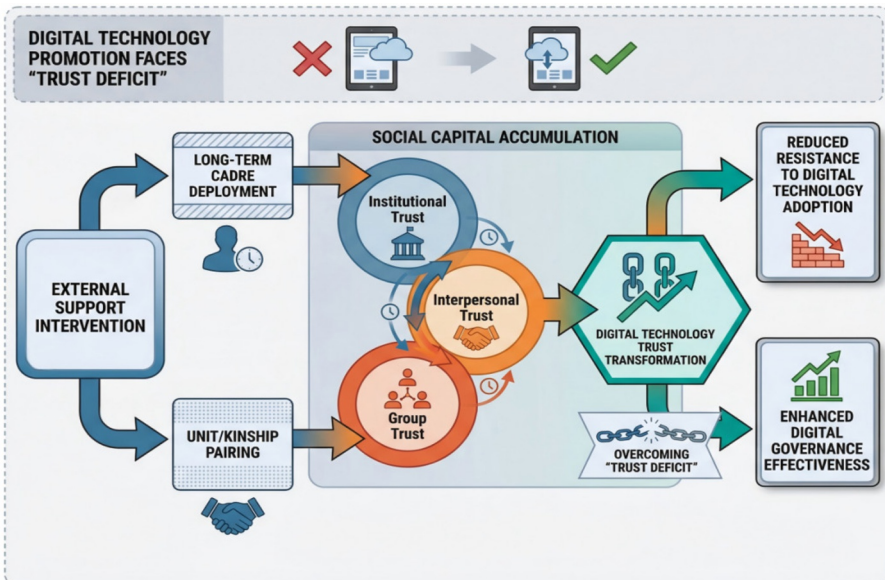


Fig. 2. The Accumulation of Trust in "Supportive Communities" and Pathways for the Transformation of Trust Through Digital Technology.

5 Adaptive Embedding: The Integration Mechanism of Digital Technology and Indigenous Society

Adaptive embedding is the stage where digital technology weaves itself into the local socio-cultural fabric and governance realities of ethnic minority regions. Three mechanisms make this happen: technological translation, institutional buffering, and cultural adaptation.

5.1 Technological Translation: From Standardized Design to Local Adaptation

Technological translation means taking standardized digital technologies and re-shaping them to fit local needs, usage habits, and ways of thinking. Callon and Latour's [19],[20] work on "translation" theory is useful here. They remind us that technology is not a static, given thing. It is dynamic and malleable—it can adapt to different social contexts through reinterpretation, redesign, and reconfiguration.

Digital platforms often come with complex interfaces, and that creates real barriers for villagers who do not have much digital literacy. In Z County, the supportive community made a concerted effort to translate the interface on multiple levels. Take the government affairs APP. Its interface incorporated traditional local patterns, which made it feel more culturally familiar. Buttons used both icons and text, and the icons were designed around everyday objects villagers would recognize. The menu structure got flattened so people could reach common functions in two or three clicks. Those interface changes lowered the entry barrier for villagers considerably.

Standardized functions do not always fit local needs. In pastoral areas of Z County, for instance, villagers' primary concerns often center on social security inquiries, medical appointments, and government subsidy applications—needs that are not always well captured by off-the-shelf digital platforms. In response, local initiatives have explored ways to make digital services more accessible and relevant. For example, Z County developed the "Wen Yi ban" convenience mini-program, which integrates utility payments, education, healthcare, employment, social security, and civil affairs inquiries into a single mobile interface, helping villagers avoid repetitive trips.

A multi-ethnic populace presents a linguistically diverse environment for digital governance. In Aba Prefecture, apps such as "Rang tang Jia yuan" provide policy categories in both Chinese and Tibetan, including agriculture, social security, forest fire prevention, and environmental protection. "Meili Aba," the prefecture's integrated information and service platform, offers one-click Chinese-Tibetan language switching. Such linguistic translation is not merely a technical convenience. It also carries a cultural and political message: respect for local ethnic cultures, and an invitation for villagers to identify with digital governance and feel it belongs to them. One local Tibetan user put it this way: "Being able to operate it in my native language makes me feel this system is 'ours.'" (V-18).

5.2 Institutional Buffering: Bridging Rigid Rules and Flexible Governance

Digital platforms come with standardized rule systems built in. Those rules can create tension when they meet the flexible governance logic that rural societies tend to rely on. Institutional buffering is the mechanism that makes digital platforms more adaptable to local contexts without sacrificing their normative integrity.

Digital platform rules tend to be one-size-fits-all. But real governance situations vary widely and need some room for discretion. In Z County, the supportive community pushed for several institutional flexibility reforms. Take the review process for mini-

num living security applications. Z County developed a "digital+manual" mixed review model, which local officials call the "big data + iron feet" approach. The digital platform does an initial screening to flag applications that are clearly ineligible. For borderline cases, local cadres and stationed personnel go out to conduct field investigations, looking at applicants' actual living conditions, what neighbors say, and other factors that are hard to quantify. Then they make the final call.

The same issue shows up with complex operational processes in rural settings. So the supportive community in Z County redesigned several digital governance processes. Take village affairs publicity. They adopted an "online+offline" dual-track model. Important village affairs go out both digitally and on physical bulletin boards, so information reaches everyone. Villagers can give feedback through either channel, and village cadres regularly collect and sort through what comes in. For example, in Z County's a Village, village council discussions are prepared online in advance, matters are made public during meetings, and villagers participate in discussions remotely through digital platforms. A key lesson from the region was learning to embed digital tools into these existing governance practices and finding ways for the two to coexist and integrate. One cadre summed it up: "After learning from advanced experiences elsewhere and combining them with our villagers' preference for face-to-face discussions, we finally adopted an 'online release + offline discussion' model, which both improves efficiency and preserves tradition" (G-19).

5.3 Cultural Adaptation: Aligning Technological Rationality with Cultural Identity

Digital technology does more than just perform a function. It also carries particular values and ways of thinking. Cultural adaptation is how digital technology gains cultural legitimacy and acceptance—through a set of deliberate mechanisms.

Symbols carry cultural identity. In Z County, the supportive community has explored ways to embed local cultural symbols into digital platforms. One notable example is the "Rang tang Jia yuan" client, whose Tibetan and Chinese bilingual interface integrates 13 policy categories closely related to local residents' lives, including services such as agricultural support, labor and employment, social security, forest fire prevention, and ecological environment protection. Such design modifications help weave digital technology into the local meaning system, shifting it from something perceived as foreign to something that feels local.

Digital governance tends to emphasize values like efficiency, transparency, and standardization. Rural society, by contrast, often puts more weight on face-saving, personal relationships, and flexibility. The supportive community has explored different ways to align these values. For instance, the implementation of "sunshine village affairs" across Z County has integrated both online and offline mechanisms. Village affairs boards and QR codes serve as offline channels, while digital platforms enable online participation. Many villages have also adopted the "Chuan shan zhi" governance platform, which provides integrated services for villagers to offer suggestions, express concerns, participate in village management, and track the progress of village affairs, effectively improving governance efficiency while ensuring the accessibility

and transparency of rural public affairs. The challenge for cultural adaptation is to create institutional "buffering" mechanisms that translate the values of digital systems into locally legitimate forms without undermining their operational norms.

6 Effectiveness Generation: The Governance Outcomes of Supportive Communities

Effectiveness generation is about the real improvements in governance that come from the supportive community pathway. We saw these improvements in three areas: better public services, stronger local industries, and more cohesive communities.

6.1 Enhanced Service Effectiveness

As digital governance advanced in Aba, government services became more accessible, more convenient, and more precise.

Take remote medical consultation. Aba is remote and medical resources are scarce. Digital platforms now allow villagers to consult specialists without traveling long distances. In Z County, for example, the "grassroots scanning + cloud diagnosis" model enables local hospitals to transmit images to experts in Zhejiang, who issue diagnostic reports remotely. One patient remarked: "In the past, seeing a specialist meant traveling to a big city. Now, with telemedicine, experts come to us." (V-25). The same improvement has shown up in social security certification and subsidy applications. Most residents now complete pension certification through facial recognition on their phones, eliminating unnecessary travel.

Digital governance also makes services more precise. With big data analytics, governments can identify needs more accurately. The platform, for instance, automatically flags elderly people over eighty who live alone, so village cadres know to visit them regularly. It also picks out flexibly employed people who have missed several months of social security payments and pushes them payment reminders and policy explanations. These kinds of targeted interventions—like the "Worry-Free Canteen" project in Z County—give grassroots populations a real sense that things are improving for them.

6.2 Empowered Industrial Development

Digital technology breathed new life into Aba's signature industries. We saw this in three ways: broader market connections, stronger brands, and more integrated supply chains.

Take Z Village, a well-known cherry-growing area in Z County. For years, farmers there relied on merchants who bought in bulk at low prices. With support from eastern Sichuan City S, the village organized live-streaming training and built a team of "village broadcasters." During the 2024 cherry season, just forty days of live-streaming sales helped villagers sell 23,000 jin of sweet cherries and bring in over 700,000 yuan. E-commerce platforms did more than open up new sales channels. They also made it possible to ship directly from the farm, cutting out middlemen and letting farmers keep

more of the profit. That is a clear example of how the digital economy can optimize supply chains and raise the value of agricultural products. It offers a model other ethnic minority regions could follow as they transform and upgrade their own signature industries.

Digital technology does not just help farmers sell their products. It helps them sell well. With backing from supportive communities, Z County registered several geographical indication trademarks for its agricultural products. Those brands spread widely through WeChat public accounts, short video platforms, and live-streaming sales. Assistance cadres and local officials got personally involved in promotion, telling the stories behind the products and giving them emotional weight and cultural meaning. One assistance cadre put it this way: "We are not just selling products but stories and culture. Consumers are not just buying cherries but the sunshine of the plateau and the enthusiasm of the Tibetan people" (C-07).

6.3 Strengthened Social Connectivity

As digitalization progressed, grassroots social governance in Aba Prefecture became more connected and participatory, enabling broader participation, stronger community identification, and tighter cohesion.

Digital platforms became new public spaces. For example, Z County promoted the use of the "Chuan shan zhi" digital rural governance platform, which integrates functions such as "villager participation," "three types of openness" (village affairs, finances, and services), and "point-based systems" into a single interface. Villagers can check village affairs, voice their concerns, and participate in decision-making directly through the platform. One village cadre noted: "In the past, notifying matters required going door-to-door; now it can be quickly conveyed through WeChat groups. More importantly, young people working outside can also stay connected to their villages." (G-09). The platform has made "digital homecoming" a reality, allowing remote villagers to engage in village governance. This kind of participation mechanism cuts across geographical distances, strengthens villagers' sense of belonging, and encourages different groups to govern together.

Supportive communities do more than strengthen cohesion inside villages. They also encourage interaction and integration across regions and groups. In October 2025, Province C and Z County co-organized the "Connect Hearts across the Clouds, Travel Together over Seas and Mountains" exchange and learning event, bringing together over 30 internet influencers and media representatives for field visits centered on digital innovation, ecological transformation, and red culture. With total online dissemination exceeding 180 million views, the event effectively promoted cross-regional social connectivity. By leveraging the connectivity of digital technology, this kind of cross-regional interaction opens up new pathways for deepening ethnic unity and strengthening social cohesion.

7 Theoretical Contributions and Discussion

7.1 Core Theoretical Contributions

Proposing the Concept of Supportive Community and Expanding Governance Community Theory. This study introduces the concept of a “supportive community.” It extends and complements existing governance community theory. While prior research largely concentrates on intra-village governance communities, the work broadens this perspective to “cross-regional” governance communities. Focus on illuminating how assistance providers and recipients, representing external forces and indigenous societies, respectively, forge community relationships that transcend geographical boundaries through sustained interaction. This concept engages in a profound dialogue with Tönnies's^[21] theory of *Gemeinschaft* and *Gesellschaft*. Tönnies posited a societal trend from community towards society. However, the practice of supportive communities demonstrates that, under specific conditions, society can indeed transform into community. Initial relationships, often established through policy arrangements, evolve into community-like characteristics through long-term interaction, emotional accumulation, and trust-building.

Constructing a Dynamic Framework: Structural Support-Adaptive Embedding-Effectiveness Generation. Existing research often treats external intervention as a linear input-output process. In contrast, this study constructs a dynamic process framework that reveals the complete chain through which external forces establish foundations via structural support, achieve integration through adaptive embedding, and ultimately generate governance effectiveness. This framework draws critically on the core insights of embeddedness theory^[16]. We apply this theory to digital governance, positing that the effectiveness of digital technology hinges on achieving triple embedding: structural, relational, and cultural. Structural support primarily facilitates structural embedding; adaptive embedding predominantly achieves relational and cultural embedding; and effectiveness generation is the synergistic outcome of these combined embeddings.

Articulating the "Social Foundation" Proposition of Digital Governance. A central argument of this study is that digital technology works only when it embeds itself in local institutions, culture, and daily life. That argument runs counter to technological determinism—the view that technology is a neutral tool that operates independently and automatically produces results. We argue instead that technological outcomes depend fundamentally on specific social conditions and mechanisms. This puts us in conversation with the Science and Technology Studies (STS) tradition^[19,20]. Applying an STS lens to digital governance highlights the social embeddedness of digital technology. It is not a universal given. It has to integrate with society through a series of adaptive mechanisms. That point is especially important in the digital economy era, where understanding social embeddedness is key to realizing the inclusive and sustainable potential of digital technologies.

7.2 Key Theoretical Dialogues

Dialogue with Counterpart Assistance Research: From Policy Process to Relationship Network. Traditional research on counterpart assistance has focused mainly on policy processes, resource investment, and whether projects work-treating assistance as a flow of resources or a policy implementation problem. We shift the focus to relationship networks: the long-term interactions, emotional ties, and trust that build up between helpers and recipients. That shift draws on social capital theory^[17]. In the counterpart assistance context, resource investment is the hardware. Relationship networks are the software. Project effectiveness is short-term output. Social capital accumulation is a long-term asset. Building supportive communities is essentially about cultivating social capital across regions and groups. In the digital economy era, that kind of cross-regional, cross-group social capital matters not just for moving information, technology, and resources around. It also provides a foundation for building digital trust, encouraging digital collaboration, and promoting integrated development of regional digital economies^[14].

Dialogue with Governance Community Theory: From Intra-Village to Cross-Regional Collaboration. Existing work on governance communities has looked mainly at how different actors collaborate within villages. We expand that view to look at cross-regional collaboration-how assistance providers and recipients build community relationships that cross geographical lines. That expansion has real theoretical implications. In an era of globalization, urbanization, and digitalization, "place" is no longer a closed, self-contained unit. It is an open, interconnected node in a network. Our findings suggest we need to think of governance communities as dynamic, multi-scalar networks that make digital transformation possible.

Dialogue with Science and Technology Studies: Emphasizing the Social Embeddedness of Technology. Technological determinism says technology is the main driver of social change. But our empirical work reveals that technology's effects are conditional. They depend on whether technology embeds itself in particular social structures, cultural contexts, and relationship networks. That view aligns with the "social construction of technology" tradition in Science and Technology Studies^{[19],[20]}. We go further. In today's rapidly evolving digital economy, digital technologies are not neutral tools. Their design, how they get used, and whether they work are all shaped by social, cultural, and political factors. That means understanding the social embeddedness of digital technology is essential for managing digital transformation effectively.

7.3 Practical Implications

What does this mean for practice? Three things stand out. First, digital rural development needs to focus not just on installing technology but on integrating it fully. Technological suspension happens when technology and society come apart. So we need a

path that lets technology, institutions, and culture evolve together. That has clear implications for digital economy strategies in less developed regions. Don't just chase hard investment in technology. Balance it with soft integration-making sure technology fits with local economic and social development. Second, counterpart assistance should move toward a "relationship-based" model of collaboration. That means focusing on long-term interaction, emotional bonding, and building trust-so that supportive communities can genuinely sustain themselves. That kind of relationship-based collaboration matters especially in the digital economy era. It helps create resilient digital ecosystems, encourages sharing of digital resources, and supports the synergistic development of digital industries. Third, building a sense of community between external actors and local society is a key path to modern governance. It requires three mechanisms to work together: resource investment, institutional grafting, and emotional bonding. That offers a fresh way to think about promoting multi-stakeholder collaboration and achieving sustainable regional development-through management strategies that work in the digital economy context.

7.4 Research Limitations and Future Directions

This study has several limitations. First, it is a single-case study focused on Z County in Aba. How well the findings generalize is something future research will need to test. The mechanisms and effectiveness of supportive communities may look different in other ethnic minority regions, under other assistance models, or with other technologies. Second, we relied primarily on qualitative methods. Without quantitative data, it is hard to measure precisely how the "intensity" of a supportive community relates to the "magnitude" of governance effectiveness. Third, we did not dig deeply into power relations or interest conflicts inside these communities. In reality, supportive communities experience internal tensions too-differences in interests between helpers and recipients, power imbalances between cadres and villagers, cultural conflicts across ethnic groups.

Future research could take several directions. First, cross-case comparative studies. Researchers could select cases from different regions, different assistance models, and different technological conditions to test how widely the structural-support-adaptive-embedding-effectiveness-generation framework applies, and where its limits are. Comparisons across ethnic minority regions with different levels of digital economy development and different governance models could reveal how supportive communities work differently to promote digital economy growth. Second, integrating quantitative methods. We need measurement tools to quantify the intensity of supportive communities (network density, trust levels, reciprocity) and the magnitude of governance effectiveness (service satisfaction, industrial growth rates, social cohesion indices). Then statistical analysis could test how these variables relate. For example, measuring how deeply digital technologies have penetrated local economic activities, how fast digital industries are growing, and how much digital governance has improved the business environment would give us a more precise picture of governance effectiveness in the digital economy context. Third, long-term tracking studies. Following supportive communities through different stages-formation, maturity, exit-would let us analyze their

long-term effects and potential risks, especially governance resilience after external support ends. Such studies should pay particular attention to what drives digital economy development from within, and whether digital governance can sustain itself once external support is gone-and how management innovations might help address the challenges that come up.

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