



Collaborative Proxy and Hybrid Institutional Design: Governing the Digital Transformation of Population Administration Services in Remote Areas of Berau Regency, Indonesia

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ABSTRACT

Digital transformation of population administration services is frequently treated as a technical matter, yet in geographically fragmented regions its success depends on how actors share infrastructure, authority, and trust. This study analyzes collaborative governance in the digital transformation of population administration services in Berau Regency, Indonesia, focusing on the Si Penyu Beramal mobile application. A qualitative analytic approach within a post-positivist paradigm was employed. Data were gathered through in-depth interviews, observation, and documentation involving officials of the Population and Civil Registration Agency (Disdukcapil), the Communication and Informatics Agency (Diskominfo), sub-district and village heads, a mining company, non-governmental organizations, academics, media, and citizens. The data were coded in NVivo using the four dimensions of Ansell and Gash (2008) and complemented by inductive themes. The findings show that severe resource imbalances, including blank spot areas and low digital literacy, were converted into interdependence through proactive facilitative leadership, open institutional rules, and sustained face-to-face and virtual dialogue. Village officials, legitimized through appointment decrees and stamped integrity pledges, acted as collaborative proxies for citizens without devices or signal.

INTRODUCTION

The digitalization of public services has moved from an administrative option to an institutional necessity. Public organizations are expected to deliver services that are fast, transparent, and efficient, and digital transformation is the main route through which this expectation is pursued (Mergel et al., 2019). Population administration sits at the center of this agenda because civil documents such as the family card, birth certificate, and electronic identity card are gateways to almost every other public and private service. However, the experience of developing countries shows that technology alone rarely delivers the promised change. Heeks (2002) argued that failures in public information systems arise from the gap between the rationality embedded in technology design and the institutional reality of local capacity, culture, and infrastructure. Technology does not operate in a vacuum; its effects depend on how organizational structures and inter-actor relations adapt around it (Fountain, 2001).

This tension is clearly visible in Berau Regency, East Kalimantan. The regency covers 34,127.47 km², consisting of 21,951.71 km² of land and 11,962.42 km² of sea, and is administratively divided into 13 sub-districts, 10 urban villages, and 100 villages. By the end of 2025 it had a population of 308,020 people (163,632 males and 144,388 females) organized into 107,982 family cards (Disdukcapil Kabupaten Berau, 2025). Settlement is highly uneven: Tanjung Redeb, the capital sub-district, hosts 79,332 residents, whereas Kelay in the upstream interior has only 8,580 residents spread across 14 villages and the outer island of Maratua only 4,063. Residents of interior villages reported that reaching the regency office by road took about four hours, and field findings recorded journeys of four to six hours from the farthest areas. Under such conditions, service delivery cannot be centralized in a single office.

The regional government has responded with a series of innovations, most notably Si Penyu Beramal, an Android-based population service application launched in November 2019 as the continuation of electronic signatures for civil documents. Through the application, citizens submit requests for family cards, birth certificates, identity cards, and residence transfers online and track their status in real time. The outcome is visible in aggregate indicators. In 2022, electronic identity card coverage reached 97.91% (185,597 of 189,564 mandatory holders) and birth certificate coverage reached 99.24% (Disdukcapil Kabupaten Berau, 2022). The Community Satisfaction Index (IKM) also rose steadily and remained in the "Good" category, as summarized in Table 1.

Table 1. Community Satisfaction Index and selected service elements of Disdukcapil Berau

Indicator	Score	Remark
IKM 2022	84.55	Category B (Good)
IKM 2023	85.84	Category B (Good)
IKM 2024	86.23	Category B (Good)
U3 Service speed/time	3.27	Lowest of nine service elements

Indicator	Score	Remark
U9 Complaint handling	3.32	Low
U7 Staff courtesy and friendliness	3.34	Fair
U4 Certainty of service fees	3.87	Highest (services are free)

Source: Compiled from LAKIP and IKM documents of Disdukcapil Kabupaten Berau (2025).

Yet the aggregate picture conceals a structural problem. Service speed obtained the lowest score among the nine service elements (3.27), and it fell to 3.14 in the 2024 satisfaction survey, which means that an application designed to accelerate bureaucracy is still perceived as slow at the point of use. The cause is not merely software failure. Disdukcapil owns the application and the population data, but the authority over telecommunication towers and bandwidth lies with the Communication and Informatics Agency and private internet providers. Blank spot areas interrupt real-time transmission from citizens to the server, while low digital literacy leaves many villagers unable to operate the application independently. The result is a risk of a new service gap in which urban residents register from home while poor and indigenous residents in the upstream villages travel far and queue. When one agency cannot resolve a problem that spans organizational boundaries, collaborative network management becomes a strategic requirement rather than a managerial supplement (Agranoff & McGuire, 2003).

Collaborative governance is the most relevant lens for this problem. It refers to an arrangement in which public agencies directly engage non-state stakeholders in formal, consensus-oriented, and deliberative collective decision-making (Ansell & Gash, 2008). Nevertheless, a research gap remains. First, studies that link digital government and collaboration tend to treat technology as a tool and rarely examine remote archipelagic and interior regions with scarce resources. Second, a theoretical gap exists: the dominant models assume that collaborating actors possess comparable capacity and operate in a non-digital ecosystem, whereas in digital transformation the technology itself behaves as a non-human actor and boundary object that dictates the speed and direction of collaboration (Gil-Garcia et al., 2018). Existing theory does not yet explain how collaboration should be designed when infrastructure asymmetry, such as internet access, is a precondition of success.

The urgency of this research follows from three concerns: digital policies must not discriminate against citizens because of limited access, the civil rights of residents in 3T (frontier, outermost, and disadvantaged) areas must be met, and a workable model is needed to keep digital population administration from stagnating. This article therefore aims to (1) analyze collaborative governance in the digital transformation of population administration services in Berau Regency, (2) identify its supporting and inhibiting factors, and (3) formulate a collaborative governance model suited to geographically extreme settings.

LITERATURE REVIEW

Collaborative Governance

Ansell and Gash (2008) built their model from a systematic review of 137 cases and identified four broad variables: starting conditions, institutional design, facilitative leadership, and the collaborative process. Starting conditions cover power and resource imbalances, incentives to participate, and the prehistory of cooperation or conflict. Institutional design refers to the basic protocols and ground rules that determine legitimacy, including participatory inclusiveness and procedural transparency. Facilitative leadership provides mediation and mobilization, while the collaborative process is a cycle consisting of face-to-face dialogue, trust building, commitment to the process, shared understanding, and intermediate outcomes. Emerson et al. (2012) later widened the framework by placing collaborative dynamics, namely principled engagement, shared motivation, and capacity for joint action, within a broader system context.

Subsequent scholarship underlines that collaboration is fragile. Bryson et al. (2015) emphasize that cross-sector collaboration is needed but challenging, and that its success relies on leadership, formal and informal governing mechanisms, and accountability. Vangen and Huxham (2003) show that trust is built incrementally through a virtuous cycle of small wins, while Purdy (2012) warns that power is unevenly distributed among participants and must be managed so that collaboration does not merely reproduce existing hierarchies. In the Berau context, these arguments justify treating the four Ansell and Gash dimensions as an analytical lens while remaining open to inductive themes that the original model does not anticipate.

E-Government and Digital Transformation

E-government evolves through stages. Layne and Lee (2001) describe four stages, from cataloguing and transaction to vertical and horizontal integration, and the shift from counter-based service to smartphone-based submission in Berau corresponds to the transaction stage in which citizen and government interaction is mediated by information technology. Digital transformation, however, is broader than digitization. Mergel et al. (2019) define it as a holistic change in organizational processes, cultures, and relationships with stakeholders, driven by digital technologies. Cordella and Iannacci (2010) similarly argue through the e-government enactment framework that technology reshapes and is reshaped by institutional arrangements, so its outcomes cannot be predicted from technical features alone.

The literature also warns about failure. Heeks (2002) classifies most e-government initiatives in developing countries as total or partial failures because of design-reality gaps in information, technology, processes, objectives, staffing, and infrastructure. Gil-Garcia et al. (2018) add that digital government research must integrate public management concerns such as inter-organizational collaboration and governance. Klievink and Janssen (2009) show that joined-up government requires dynamic capabilities to integrate across organizational boundaries. These works imply that a digital service can only be

as strong as the collaboration that sustains its infrastructure, data integration, and legitimacy.

METHODOLOGY

This study adopted a post-positivist paradigm and a qualitative analytic approach. The paradigm recognizes that the reality of governance and digital service is complex and can only be approximated through multiple perspectives, so triangulation across actors was required. The approach was inductive and analytic rather than merely descriptive: Ansell and Gash (2008) served as an initial lens, but the aim was to explain why collaboration succeeds or fails and to construct a new model (Miles et al., 2014). The research was located in Berau Regency, with observation at the district service office in Tanjung Redeb and in villages in interior and island sub-districts, particularly Segah, Kelay, and Kepulauan Derawan.

Informants were selected purposively as information-rich cases (Patton, 2002) to represent the boundary-spanning network of the innovation. They comprised the head of Disdukcapil and its operators, the head of Diskominfo, sub-district heads, village heads and village registration officers known as Aktif Prestasi, citizens who use the application, a non-governmental organization, an academic, a local media outlet, and a representative of a mining company (PT Berau Coal). Primary data were obtained through semi-structured in-depth interviews conducted in 2025 and 2026, passive participatory observation, and field notes. Secondary data consisted of population aggregates, performance accountability reports (LAKIP), community satisfaction survey reports, the Regent's regulation on electronic-based government, and related academic publications (Sugiyono, 2018).

Data analysis followed the interactive model of Miles et al. (2014), namely data condensation, data display, and conclusion drawing or verification, operationalized in NVivo. Transcripts and documents were imported and coded deductively into the four Ansell and Gash dimensions and inductively into emerging themes such as collaborative proxy and blank spot. Project maps and hierarchy charts were used for data display, and query functions were used to test propositions. Trustworthiness was maintained through source and technique triangulation, member checking with key informants, and an audit trail of analytical memos in NVivo (Lincoln & Guba, 1985). Interview excerpts presented below were translated from Indonesian into English by the authors.

RESEARCH RESULT

Starting Conditions: Resource Imbalance as the Source of Interdependence

NVivo coding of the starting conditions dimension produced five main nodes: geographic conditions, distance to Disdukcapil, initial experience using the application, blank spots and internet networks, and community digital literacy (Figure 1). Together these nodes show that collaboration began from a position of asymmetry rather than equality. The spatial distribution of the population illustrates the imbalance (Table 2). Tanjung Redeb hosts almost ten times as many residents as Kelay and nearly twenty times as many as Maratua,

yet the latter two are spread over more scattered settlements with fewer service points.

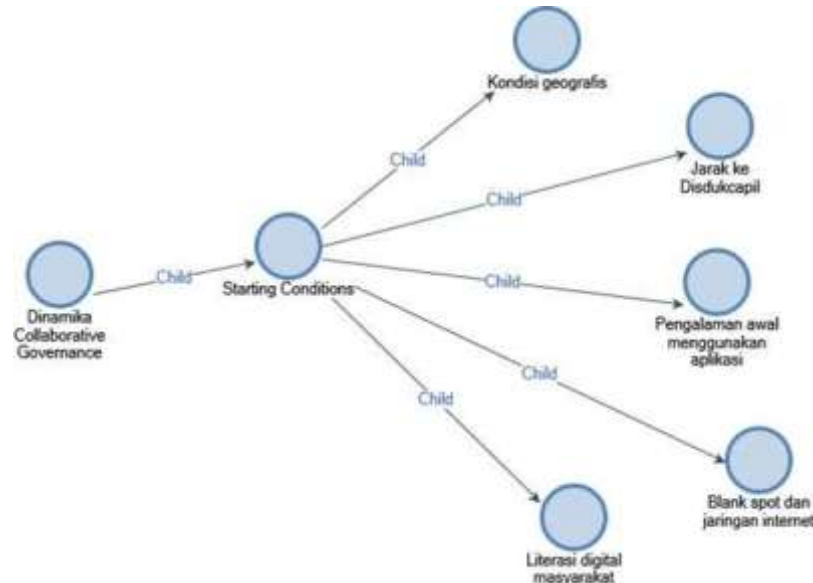


Figure 1. NVivo project map of starting conditions in collaborative governance

Table 2. Population concentration in urban and peripheral sub-districts of Berau Regency

Sub-district	Population	Villages/urban villages	Geographic character
Tanjung Redeb	79,332	6	Urban, government center
Kelay	8,580	14	Interior, upstream
Maratua	4,063	4	Outermost island

Source: Population Aggregate Data of Berau Regency, Semester II 2025.

Informants confirmed that the imbalance was felt in time, cost, and connectivity. A resident of Dumaring village noted that online processing was "easier and takes a short time, compared with the past when we had to go to the regency, which was quite far and took around four hours" (interview, May 20, 2026). Conversely, an NGO representative warned that in Tanjung Redeb "service is fast because the signal is good, but in the upstream villages of Kelay, Segah, and Sambaliung many poor or indigenous residents do not have smartphones, data quota, or signal," creating "a new gap" (interview, May 25, 2026). The mining company representative stated that digital infrastructure is usually built through multi-party collaboration but that its current programs focus on community economic development (interview, May 28, 2026), which indicates that private-sector participation was still optional at the outset.

Two factors moderated the imbalance. The first was strong incentives to participate, since residents wanted to avoid expensive and lengthy journeys and village officials wanted to spare their residents from such travel. The second was a prehistory of trust between villagers and village apparatus. The head of Dumaring village said that residents "fully trust us" because the process

takes place in the village office, and that no suspicion had ever arisen (interview, June 2, 2026). Weak infrastructure and low literacy thus produced interdependence among actors, while high social capital created the basis for a proxy arrangement.

Administrative data reinforce this picture. Of 213,319 residents who are required to hold an electronic identity card, 211,713 had completed biometric recording, leaving only 1,606 unrecorded (Disdukcapil Kabupaten Berau, 2025). Such coverage above 99% shows that the state had already reached almost every resident, so the remaining challenge was no longer registration coverage but the speed, quality, and equity of digital services after registration. The presence of 18,197 female-headed households among 107,982 family cards, roughly 17%, also signals a group that may bear a heavier burden of travel and paperwork, which makes assisted services more important for them.

The performance of the application at the time of heavy use added another layer of imbalance. A local media informant observed that government applications in the regency tend to become slow or unstable when many users access them at once, and that residents in blank spot areas cannot access the application at all (interview, May 22, 2026). This testimony matches the low score for service time in the satisfaction survey and confirms that the network and server capacity, rather than the willingness of citizens, formed the first bottleneck of the collaboration.

Facilitative Leadership and the Constellation of Actors

Facilitative leadership was distributed across three levels. At the regency level, the head of Disdukcapil acted proactively. Confronted with slow services, brokers, and about three large bags of files to sign each day, the head initiated electronic signatures and then launched Si Penyu Beramal in November 2019, and personally visited the Communication and Informatics Agency to secure technical support (interview with the head of Disdukcapil). Diskominfo provided the technical leadership by managing servers, data-security networks, and a cyber incident response team, and by obliging any agency that builds a new application to coordinate with it under the regulation on electronic-based government. At the middle level, sub-district heads functioned as facilitators, coordinators, mediators, and supervisors, turning district offices into semi-autonomous digital service posts when villages faced signal problems. At the frontline, village heads educated hesitant residents and formed volunteers or registration officers for residents who were not technologically literate.

Figure 2 maps nine actor-role nodes. Disdukcapil is the leading sector and Diskominfo the provider of infrastructure, network, server, and data security; the sub-district acts as a bridging element; village government is the initial service provider and companion of residents; and non-state actors complement the state network. Academics serve as think tanks and evaluators, media as information channels and social control, corporate social responsibility (CSR) funds as potential support for social and digital infrastructure, NGOs as companions and independent supervisors, and citizens as users and feedback providers. This configuration explains how a single agency without authority

over towers and bandwidth could still deliver services in areas with limited resources.

Leaders at each level described their roles in terms of dialogue rather than command. The head of Diskominfo referred to the Regent's regulation that obliges regional agencies to coordinate with the agency before creating a new application, and explained that two-way communication was maintained through messaging groups and cross-sector technical teams (interview, April 14, 2025). The sub-district head of Kepulauan Derawan described a strategy of participatory collaboration with village heads through capacity building, continuous assistance, appreciation, and adaptive solutions to limited facilities. This style corresponds to the mediating and empowering function of facilitative leadership, and it explains why resistance in the villages was absorbed rather than escalated.

Non-state actors gave the network an evaluative and corrective edge. An academic from a local university expressed readiness to act as an academic partner of the regional government by providing data-based studies and policy recommendations, the NGO representative voiced the equity concerns quoted earlier, and local media publicized complaints about application speed, to which the government responded openly. The mining company remained the least bound actor: it recognized the value of village officers as service agents but had no obligation to channel CSR funds to digital infrastructure. Leadership therefore succeeded in mobilizing consent from most actors but had not yet converted private-sector goodwill into binding commitment.

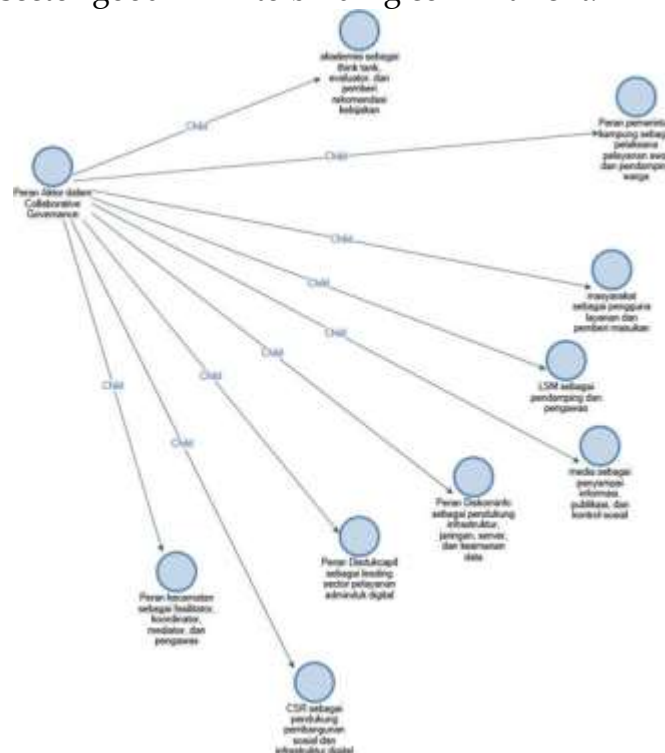


Figure 2. NVivo map of actor roles in collaborative governance

Institutional Design: Pragmatic Rules and the Legalization of Proxies

The institutional design combined formal instruments with flexible practice (Figure 3, Table 3). No specific memorandum of understanding existed

between Disdukcapil and Diskominfo regarding the application; the relationship was governed by the Regent's regulation on electronic-based government and the general task divisions of regional agencies. This produced flexibility in daily technical problem solving but also ambiguity in the event of a large-scale cyber incident because no service level agreement specified responsibilities. Legal validity of documents was secured through electronic signatures certified by the national cyber and encryption agency, allowing remote authorization by the agency head and printing of documents on plain A4 paper carrying a QR code.

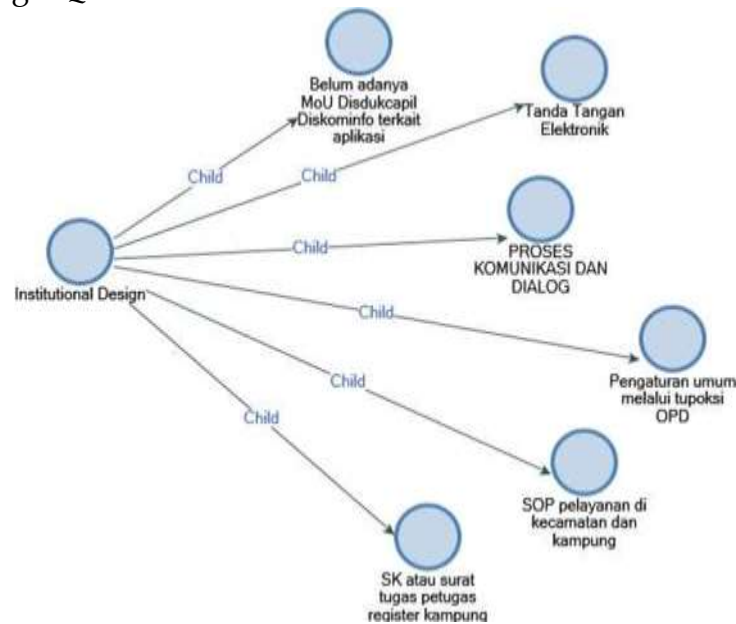


Figure 3. NVivo map of institutional design

Table 3. Elements of institutional design in the digital transformation of population administration

Element	Instrument	Implication for collaboration
Absence of specific MoU	Regent's regulation on electronic-based government; agency duties	Flexible technical problem solving, but ambiguity of responsibility during major cyber incidents
Electronic signature	Certification by the national cyber and encryption agency	Remote authorization, shorter bureaucracy, and public trust in digital documents
Service SOP at sub-district and village	Internal SOP	Uniform procedures at the grassroots and continuity of service
Village registration officers	Appointment decree and stamped integrity pledge	Legal legitimacy of the collaborative proxy and prevention of data misuse and brokerage

Element	Instrument	Implication for collaboration
Communication and dialogue	Focus group discussions, integrated evaluation, WhatsApp groups	Rapid resolution of rejected files and alignment with regulatory updates

Source: Authors' analysis based on NVivo coding and interviews (2026).

The most significant design element was the delegation of registration tasks to village apparatus under the Aktif Prestasi innovation. Two designated officers per village signed a stamped statement covering service readiness, data security, and a commitment against illegal fees and brokers, endorsed by the village head. The head of Disdukcapil described these three commitments as the basis of registration. The sub-district head of Segah confirmed that village officers are legally part of the official collaboration with Disdukcapil. This arrangement gave legal standing to what would otherwise have been an informal favor and reduced the risk of privacy violations.

Trust in the institutional design operated on two layers. The first concerned confidence among agencies: Disdukcapil had to rely on the security of servers managed by Diskominfo, which was answered by the establishment of a cyber incident response team and data encryption protocols. The second, and more critical, concerned the legitimacy of digital documents in the eyes of indigenous communities, vulnerable groups, and residents of blank spot areas, because authentic holographic documents were replaced by ordinary paper printed with a QR code. The village apparatus served as social guarantors of this transition. The head of Bukit Makmur village reported that almost no resident suspected misuse of the files entrusted to the village office and that residents believed in the arrangement and were greatly helped by it (interview with the village head). The design thus capitalized on traditional social capital to implement a modern digital policy.

Collaborative Process and Intermediate Outcomes

The collaborative process followed the cycle described by Ansell and Gash (2008). Face-to-face dialogue took the form of cross-agency coordination meetings, direct socialization in sub-districts and villages, and technical guidance for operators, while virtual dialogue ran through a technical WhatsApp group of village registration officers where rejected files and network disturbances were answered quickly (Figure 4). Trust operated on two layers: agency-to-agency confidence in the security of servers managed by Diskominfo, and citizen confidence that a document printed on ordinary paper is legitimate. A citizen stated that although family cards and certificates now come as PDF files printed by oneself, "I still feel the document is valid," and that it is easier to use for banks and schools (interview, February 14, 2025). Commitment was strongest in the Aktif Prestasi pledge and in Diskominfo's provision of free internet, while shared understanding was reflected in the fact

that all levels, including the mining company, discussed village officers as the most rational agents for service in remote areas.

Commitment was tested on a daily basis. The head of Diskominfo stated that the regional government had prepared free internet for all villages, urban villages, and sub-districts, with priority to village administration, education, and health before public areas (interview, April 14, 2025). Village officers, in turn, committed time beyond their regular duties to photocopy, scan, and upload documents one by one. Yet commitment from the private sector stalled at a legal threshold. The mining company was reluctant to release CSR funds without a clear legal basis and a firm delineation of authority, which confirms the proposition of Ansell and Gash (2008) that collaboration cannot rest on informal understanding alone. The absence of a memorandum of understanding with the agency responsible for networks therefore emerged as the main point at which commitment and institutional design were disconnected.

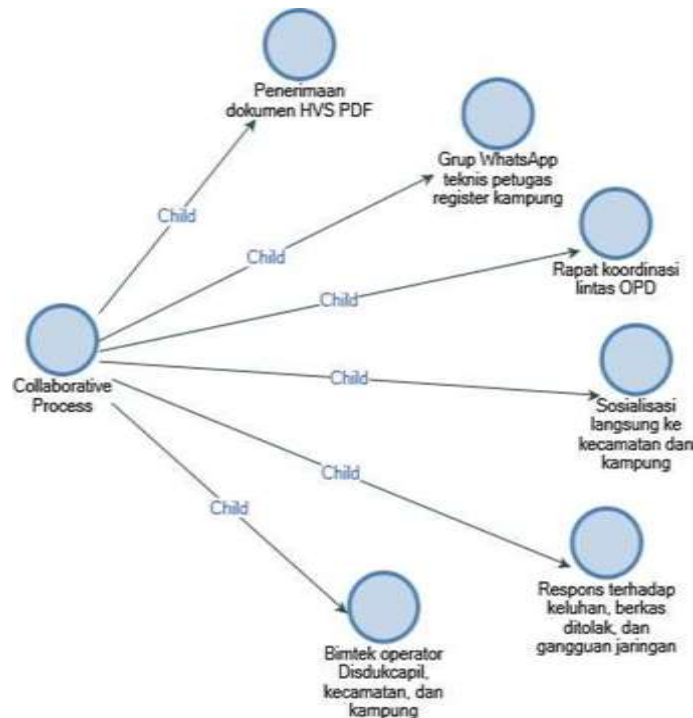


Figure 4. NVivo map of the collaborative process

These interactions generated tangible intermediate outcomes (Table 4). Free internet reached 1,502 connection points across 100 villages, 10 urban villages, and 13 sub-districts by the end of 2025; the neighborhood-head reference letter was abolished, service counters were merged, and electronic signatures were fully implemented; and Aktif Prestasi operated in all 100 villages. Interview evidence also indicated a marked decrease in the transportation costs of interior residents and a narrowing of room for brokers.

Table 4. Intermediate outcomes (small wins) of the collaborative process

Aspect	Empirical indicator	Impact on the collaboration ecosystem
Bureaucratic simplification	Neighborhood-head letter abolished; counters merged; full electronic signature	Saves citizens' time and reduces the pile of documents awaiting approval
Connectivity expansion	1,502 free internet points in 100 villages, 10 urban villages, and 13 sub-districts	Basic infrastructure for village officers to operate as proxies
Service inclusion	Aktif Prestasi in 100 villages; documents in PDF format	Vulnerable and technologically illiterate residents are served without owning a device
Economic efficiency	Marked reduction of travel costs to the regency center	Higher trust in state innovation and less room for brokers

Source: Authors' analysis (2026).

Supporting and Inhibiting Factors

Supporting factors were the courage of Disdukcapil leadership to begin reform in 2019, Diskominfo's provision of network, servers, and cybersecurity, the readiness of village apparatus with internal procedures and designated operators, participatory guidance from sub-district heads, and the independent oversight of NGOs, media, and academics. The inhibiting factors, mapped in Figure 5, were fourfold. First, blank spots continued to hamper services in remote areas, and perspectives diverged: an official from the communication agency claimed that the share of blank spots within regional government authority was 0%, while civil society representatives still reported an absence of signal in upstream villages. Second, the application was not automatically integrated with the central SLAK system, so any central server downtime halted local production of documents, aggravated by regional IT equipment procured around 2014 to 2015. Third, incomplete or unreadable citizen files increased verification workload. Fourth, entrusting original documents to third parties raised data security and misuse concerns. Additionally, a sub-district head noted that implementation instructions were still delivered orally without written procedures.

Statements from officials illustrate how these obstacles were experienced. The head of Disdukcapil explained that much of the information technology equipment was procured around 2014 and 2015 and was sometimes incompatible with current systems, and that because SLAK is centralized, problems at the center affect all regions (interview with the head of Disdukcapil). The sub-district head of Kepulauan Derawan observed that implementation of the application was limited to oral instructions and information and lacked formal procedures. Together with the high volume of

returned applications caused by blurred or incomplete uploads, these facts show that the barriers were not solely technical: they combined outdated equipment, vertical dependence, procedural gaps, and citizen readiness. Table 5 therefore separates supporting and inhibiting factors by the actor that can act on them.

Table 5. Matrix of supporting and inhibiting factors

Actor	Supporting factors	Inhibiting factors
Disdukcapil	Early adoption of electronic signature (2019); proactive coordination; technical guidance for operators	Aging IT equipment; dependence on central SIAK; returned files from incomplete uploads
Diskominfo	Free internet at 1,502 points; server management; cyber incident response team	Blank spots remain; no MoU or SLA with Disdukcapil
Sub-district and village	Participatory mediation; internal SOP; designated operators; strong social trust	Oral instructions without written procedures; data-misuse concerns
Private sector and civil society	Willingness to support; independent oversight by NGOs, media, and academics	CSR not bound to digital infrastructure; uneven public understanding of digital services

Source: Authors' analysis (2026).

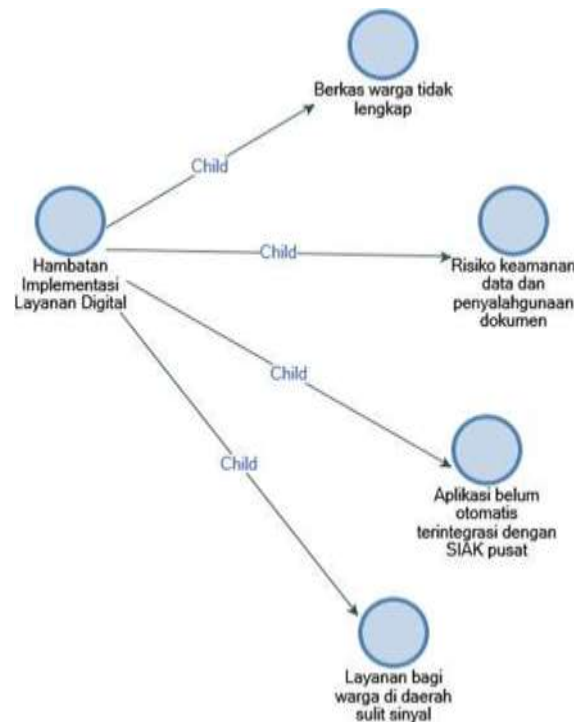


Figure 5. NVivo map of barriers to digital service implementation

The Proposed Model: Collaborative Proxy and Hybrid Institutional Design

From these findings the study derives a model with two pillars (Table 6). The first is the Collaborative Proxy at the micro-operational level: village officers legitimized by decree and integrity pledge act as human intermediaries who receive physical files from vulnerable residents, digitize them, and track their status, so the village hall becomes a hybrid digital service point. The second is the Hybrid Institutional Design at the macro-structural level: the regional government and Diskominfo act as orchestrators rather than sole builders of infrastructure, and CSR funds of extractive companies are directed by regional regulation toward rural digital infrastructure such as very small aperture terminal (VSAT) installations, with private firms positioned as deliberative partners in a sustainability roadmap.

Table 6. Synthesis of the proposed collaborative governance model

Pillar	Actors	Mechanism	Expected outcome
Collaborative Proxy (micro)	Village officers, Disdukcapil, sub-districts	Appointment decree, stamped integrity pledge, SOP, technical guidance	Inclusive service for vulnerable residents and anti-brokerage
Hybrid Institutional Design (macro)	Regional government, Diskominfo, private sector (CSR)	Regional regulation binding CSR to the e-government roadmap; MoU and SLA	Infrastructure beyond the regional budget and network continuity
Oversight and learning	NGOs, media, academics	Independent evaluation, public feedback	Transparency and adaptive improvement

Source: Authors' analysis (2026).

In operation, the model works as a sequence. A resident without a device or signal hands physical files to a designated village officer, who verifies completeness, digitizes the documents, and uploads them through the free village connection. Disdukcapil operators verify the submission online and issue the document with an electronic signature, and the resident prints the PDF at home, at the village hall, or through the self-service kiosk. Behind this sequence, Diskominfo maintains servers and networks, sub-district heads mediate and supervise, and the private sector funds connectivity in areas that the regional budget cannot reach. The village officer thus functions as the human interface of the digital system, while the hybrid design supplies the infrastructure on which that interface depends.

DISCUSSION***Resource Imbalance as a Trigger, Not Only a Barrier***

The findings confirm that the four Ansell and Gash (2008) dimensions are analytically productive in a digital setting, but they also show that the relations

among the dimensions differ from the original model. In the original framework, low resource symmetry is treated as a risk to be compensated by empowerment. In Berau, the imbalance in infrastructure and literacy was not only a risk; it was the trigger of collaboration, because each actor recognized that it could not deliver the service alone. This resonates with the claim that cross-sector collaboration is undertaken when problems exceed the capacity of a single organization (Bryson et al., 2015). It also supports the argument that technology acts as a boundary object that shapes the pace and form of collaboration (Gil-Garcia et al., 2018): the quality of signal and server determined which actors became indispensable.

The Berau evidence also qualifies a common expectation in digital government research. The high administrative coverage of electronic identity cards, above 99% of mandatory holders, coexists with the lowest satisfaction score on service time. Coverage and experience are different outcomes: a government can reach nearly every resident yet still deliver slow services when the network, server, and authority over them are fragmented. This is consistent with the warning that design-reality gaps, especially in infrastructure and institutional capacity, explain many e-government shortcomings (Heeks, 2002), and it suggests that collaborative arrangements should be evaluated against service experience at the periphery and not only against aggregate indicators.

The Collaborative Proxy and Street-Level Discretion

The collaborative proxy extends the theory in two ways. Conceptually, it shows that the collaborative process, which Ansell and Gash describe as an interaction cycle among institutional leaders, can be embodied in frontline officials who execute commitments, build trust with citizens, and produce intermediate outcomes on behalf of the network. This is consistent with Lipsky's (2010) view that street-level discretion shapes actual policy, and with the New Public Service emphasis on serving and empowering citizens (Denhardt & Denhardt, 2015). Practically, the proxy answers the facilitating-conditions problem in technology acceptance (Venkatesh et al., 2003): rather than waiting for every resident to acquire a device and skills, the state relocates part of the digital interface to a trusted local actor. The stamped pledge and appointment decree matter because, as Vangen and Huxham (2003) suggest, trust requires both goodwill and structures that manage vulnerability; without them, the arrangement could turn into a channel for data misuse or informal payments.

A further implication concerns accountability. Delegating authority to village apparatus gives them discretion that is useful precisely because it is flexible, yet flexibility can be abused. The integrity pledge, the appointment decree, and the anti-brokerage commitment in Berau are institutional means of bounding this discretion, and their effectiveness will depend on monitoring by sub-district heads, NGOs, and media. Without periodic audit and sanctions, the same proximity that generates trust could make oversight harder, which is a trade-off that the model should acknowledge explicitly.

Hybrid Institutional Design and the Binding of Private Capital

The Hybrid Institutional Design addresses a different weakness. The current design relies on the regional budget and on voluntary private contributions, and the absence of a specific memorandum of understanding leaves private actors unwilling to release CSR funds without a clear legal basis. Institutional design in the Ansell and Gash model emphasizes ground rules and transparency, which the Berau case supports: informal understanding suffices for daily coordination but not for allocating resources across public and private boundaries. Binding CSR into the electronic-government roadmap responds to the need for dynamic capabilities to integrate across organizational boundaries (Klievink & Janssen, 2009) and to the observation that sustained collaborative innovation depends on arenas that link actors and resources (Sørensen & Torfing, 2011). Power asymmetries also remain: a firm that controls capital could steer infrastructure toward its own operating areas, so transparency and deliberation must accompany the mandate (Purdy, 2012).

CONCLUSIONS AND RECOMMENDATIONS

Digital transformation of population administration in Berau Regency is not a mere transfer of paper documents to electronic form but a governance shift built on collaboration. Starting conditions marked by blank spots, low digital literacy, and long distances were converted into interdependence through facilitative leadership from Disdukcapil, Diskominfo, sub-district heads, and village heads, pragmatic institutional rules such as electronic signatures and legally bound village officers, and a continuous cycle of dialogue, trust, and commitment that produced tangible small wins, including 1,502 free internet points and Aktif Prestasi in 100 villages. The proposed model, consisting of a Collaborative Proxy and a Hybrid Institutional Design, demonstrates that geographic isolation and limited regional budgets need not block reform when social engineering at the grassroots is combined with structural integration of private capital.

Based on these conclusions, we recommend that the regency government enact a regional regulation that binds extractive-sector CSR funds to the electronic-government roadmap, especially for VSAT provision in blank spot areas; prepare a memorandum of understanding and service level agreement between Disdukcapil and Diskominfo covering technical authority, cyber incident responsibility, and recovery time; implement continuing digital literacy programs so that dependence on proxies decreases gradually; and expand personal data protection education and strengthen incident response capacity down to village service providers.

ADVANCED RESEARCH

Future research could test the proposed model in other archipelagic and interior regencies through comparative or multiple-case designs, examine the sustainability of CSR-funded digital infrastructure after changes in political leadership or corporate management, and use mixed methods to measure how the collaborative proxy affects service time, citizen satisfaction, and data-protection outcomes over time.

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