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Local Wisdom-Based Risk Governance In Infrastructure Business Operations: An Abductive Multiple-Case Study With Grounded Theory-Informed Coding

Joni Kutu' Kampilong[1], David Paul Elia Saerang SE, M. Com (Hons)[2], Djurwati Soepeno[3], Rudy Steven Wenas [4]

[1]Program Doctor Management Science, Sam Ratulangi University, Indonesia
[2,3,4]Faculty of Economics and Business, Sam Ratulangi University, Indonesia

Corresponding Author: Joni Kutu' Kampilong (jonikutu@ukit.ac.id)

Abstract

This article discusses the role of local wisdom-based risk governance in sustainable infrastructure business operations. While some understanding of the importance of formal risk controls has emerged from existing studies on business sustainability, project governance, stakeholder engagement, and infrastructure delivery, there remains a lack of understanding of how informal local authority governs operational disruptions when business operations are subject to community claims at the project level. The design of this study is an abductive multiple-case study with grounded theory-informed coding across 20 infrastructure cases in North Sulawesi. The results reveal five mechanisms: community monitoring, local labor absorption, customary mediation, religious authority, and elite capture. The most frequently mentioned mechanism is community monitoring, which suggests that local actors can do more than engage in symbolic participation; they can also discipline the operation of infrastructure. However, the same informal power can turn into coercion when project-related rents, opaque compensation, and monopolized brokerage result in elite capture of local legitimacy. The article contributes to the fields of economics, business, and innovation by conceptualizing local wisdom as a situated risk-governance innovation that can support business continuity when coupled with transparency, plural representation, and accountability safeguards.

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Keywords: local wisdom; risk governance; sustainable business operations; infrastructure projects; abductive case study; grounded theory-informed coding; community monitoring; elite capture

INTRODUCTION

Infrastructure business operations are no longer just about technical aspects such as cost, schedule and quality control. Infrastructure delivery is now a governance issue, and is part of project-based business research, which links risk management, stakeholder influence, procurement, environmental control, public legitimacy and operational continuity. Flyvbjerg (2014) illustrates how big projects are likely to fail when decision makers underestimate uncertainty and overestimate managerial control. Aaltonen and Kujala (2010) also state that the impact of the stakeholders can change the results of the project throughout the project life cycle. Indonesia is not an exception in facing this challenge, as mentioned by OECD (2024) that links sustainable infrastructure with responsible business conduct, environmental and social due diligence, and governance quality. The study of the implementation of Triple Bottom Line in North Sulawesi also shows that the sustainability of infrastructure is closely related to the management of economic viability, environmental responsibility, and social legitimacy (Mandagi & Kampilong, 2025).

While formal controls are still required, they are not the only aspects of operational risk governance. While meaningful stakeholder engagement is a condition, documentary discipline (environmental assessments, HSE procedures, contract administration, and grievance channels) does not always prevent conflict and project delay in the context of infrastructure projects in Southeast Asia (OECD 2025). If community engagement is viewed as a tick box exercise, it becomes ineffective, as Babaei et al. (2023) cautions. Lehtinen and Aaltonen (2024) also show that formal communication may not reflect the day-to-day negotiations and contestations of communities over infrastructure provision.

This problem is particularly apparent in North Sulawesi. Infrastructure business operations in the province frequently confront local authority structures such as Hukum Tua, Tona'as, Kabela, rukun tetangga, fishermen groups, youth groups and market associations. These actors are informal institutions in North's (1990) sense as they influence behavior beyond the formal contractual and bureaucratic rules. Helmke and Levitsky (2004) offer some answers to the question of why such institutions can complement formal governance, serve as a substitute for missing controls, or compete

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with official procedures. The business problem arises when the continuity of the business depends more on these informal channels than acknowledged in the project documents.

There are three related gaps in the literature. Stakeholder research explains participation and influence, but it still underspecifies the informal mechanisms that enable operations to continue when disruption becomes immediate on-site (Mok et al., 2015). Second, social-license research can consider trust and acceptance, but it rarely examines how legitimacy translates into actual changes in a project's design, scheduling, supply, and monitoring by the community (Moffat & Zhang, 2014). Third, infrastructure studies sometimes acknowledge the power imbalance, but require more nuanced explanations of how informal infrastructure governance can safeguard communities in one instance and coerce them in another (Larkin, 2013).

This article aims to fill these gaps by using an abductive multiple-case study of 20 infrastructure business operations in North Sulawesi. It is not described as pure Glaserian induction. To go back and forth between empirical surprises and previous theory to develop a plausible explanation of the observed mechanisms, abductive analysis can be used (Timmermans & Tavory, 2012). That movement is aided by coding the evidence at the incident level into categories, as was done in grounded theory, but not by using it as a template for coding the literature (Charmaz, 2014). The study's question is: What role does local wisdom in risk governance play in supporting or hindering the sustainable operation of infrastructure businesses?

LITERATURE REVIEW

Sustainable infrastructure business operations and site-level social risk

Delivering sustainable infrastructure is more than just completing assets. It requires infrastructure business managers to manage risk, stakeholder claims, environmental controls, procurement, labor agreements, and life cycle impacts. Indonesia is part of this governance challenge, as identified by the OECD (2024), through linkages among infrastructure, responsible business conduct, environmental and social risks, and project accountability. Song et al. (2025) introduce a business-operations connection by demonstrating how risk management practices that engage stakeholders affect sustainable project performance. Previous studies on the integration of sustainable construction also indicate that technical, operational, and organizational levels cannot deliver sustainability without links to implementation realities (Kampilong, Rattu, & Mandagi, 2025). These studies continue to view engagement and risk management as a formalized project process, rather than as practices that are challenged on the site.

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The problem is that formal risk registers and actual disruptions are not always aligned in operations. Formal risk matrices can include land acquisition, environmental effects, and community opposition, but they seldom include the impact of a village path, a fishing channel, a market stall, a shallow well, or a sacred site on construction. These disruptions are not peripheral social issues for infrastructure project and business managers. They impact sequencing, logistics, productivity, HSE compliance, vendor control and claims exposure. This operational reading also builds on recent arguments that infrastructure projects can only generate circular value if the operational capacity can be leveraged to coordinate at the site level, control resources and establish routines for stakeholders (Kampilong, 2026).

Stakeholder engagement, social license, and formal participation limits

The most obvious entry point to this problem is the scholarship on stakeholder engagement. Reed (2008) proposes that participation is effective in improving environmental management when it starts early, is representative of affected groups, and influences decisions. Fung (2006) also points out that the level of participation will vary depending on the participants, the way they communicate, and the authority they hold. While these insights remain relevant, infrastructure projects tend to reduce engagement in hearings, documentation, and grievance processes. Babaei et al. (2023) show that local community engagement in transport megaprojects can be socially weak if it is seen as compliance and not practice. Lehtinen (2024) continues the discussion, examining online engagement in infrastructure projects, but when residents face dust, noise, displacement, lost livelihoods, or potential technical risks, the trusted local translator cannot be replaced by online communication.

Social license to operate is closer to the issue because it treats legitimacy as something granted, withheld, or withdrawn by communities. Dare et al. (2014) connect community engagement with social license, and Moffat and Zhang (2014) see trust as a route to acceptance. Social license is applicable not only in the mining context but also in port contexts, as shown by Moeremans and Dooms (2021). However, social license studies are usually conducted after the engagement and request perceptions of acceptance. It is not as much about the operational practices that make legitimacy possible: redesigning an apron, restricting night logistics, replacing an illegal material supplier, opening a public crossing within a solar farm, or allowing neighborhood youth to stop trucks if dust-control practices are not working.

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Informal institutions, informal local authority, and authority differentiation

Informal institutions are the institutions that organize behavior outside the formal rules. North (1990) distinguishes between institutions and organizations and demonstrates that rules-in-use influence economic and political action. Helmke and Levitsky (2004) take this idea one step further and explain that informal institutions can complement, substitute for, accommodate, or compete with formal institutions. This typology can be used at infrastructure sites where the governance space is not completely formalized through contracts and permits. Informal local authority is based on social authority, shared memory, moral expectation, and routinized trust. Berkes (2018) conceptualizes this knowledge as being part of social-ecological relations, not as a decorative tradition. Cleaver (2012) also points out that institutions can be established in a bricolage manner, meaning that actors can construct workable arrangements from available norms, relationships, and practical pressures.

But there are substantial differences behind the informal local authority. Hukum Tua draws on village-government authority and daily social trust. Tona'as is a cultural authority associated with ancestral memory, sacred landscape, and customary legitimacy in Minahasa. Kabela is a customary institution in Bolaang Mongondow that can help validate overlapping land claims and kinship-based territorial memory. Rukun tetangga operates at the micro-neighborhood level and can monitor micro-level nuisances, such as dust, access, and truck behavior. Risk is communicated via trusted moral language in church-based networks and by religious leaders. Calling all these actors 'traditional leaders' would flatten important institutional differences. Their powers vary according to the problem, be it land, sacred places, access to roads, communication of risks, labor allocation, or monitoring of the environment.

Community monitoring as site-level operational accountability

The most solid empirical mechanism in this study is community monitoring. It is not the same as traditional stakeholder involvement because the community actors are not only talking, they are disciplining infrastructure operations. These cases move beyond tokenistic participation in Arnstein's (1969) ladder because they involve residents, fishermen, youth groups, and neighborhood leaders who block equipment, stop trucks, expose illegal sourcing of materials, demand dust control, or require route changes.

This mechanism challenges the assumption of accountability within the internal compliance systems of the client, regulator, consultant, or contractor. In some instances, the initial response was from the residents, fishermen, youth groups, or neighborhood

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authorities. But community monitoring does not necessarily lead to justice. It will only be effective if information is kept open, affected groups can contest decisions, and the local authority cannot dominate the negotiation.

Unequal bargaining in infrastructure business operations

The provision of infrastructure projects is not a negotiation between equal stakeholders. Roads, ports, dams, and industrial estates redistribute land, mobility, water, labor, pollution, and rent. Larkin (2013) views infrastructure as a political and material form. Anand (2017) shows that infrastructure is a form of citizenship and access to services, and Rodgers and O'Neill (2012) link infrastructure with violence and exclusion. In infrastructure business management, this translates to stakeholder management not being able to assume equal bargaining capacity. The project has the power of capital, contract, equipment, schedule pressure, and technical expertise; and the residents have the power of local legitimacy, access, labor peace, and informal sanctioning power.

This is very important because continuity of operations is not always a consensus process under asymmetric bargaining. Project-related incentives can lead a community to force a contractor to change the design of an access route, but they can also enable a local broker to suppress a complaint. Business operations do not serve as the background culture; rather, they make these informal power relations visible as part of project risk governance.

Elite capture and coercive informal authority

Participation and local governance literature has long cautioned against the possibility of processes being captured at the community level. Platteau (2004) suggests that decentralization of development could lead to the local elites capturing benefits and to a misallocation of accountability. Dasgupta and Beard (2007) demonstrate that collective action and community-driven development are still susceptible to elite capture in Indonesia. Fritzen (2007) also shows that design decisions can either increase or decrease the risk of capture. The same applies to infrastructure, where project rents are big, burdensome, and often concealed. When compensation, labor, access to land, or environmental silence is valuable, informal authority can shift from mediation to brokerage.

In this article, I will resist the urge to treat elite capture as a fringe issue. It takes into account the coercive potential of informal governance in certain situations: low transparency, high brokerage concentration, project-related rents, and no countervailing

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community voice. Where this is the case, the local authority does not provide any extra formal governance. It subverts it.

Synthesis and research gap

The article is informed by a variety of literature streams, summarized in Table 1. The lack of research on stakeholders, local authority structures, and infrastructure risk is not the gap. This is because of their poor integration. Studies on engagement, legitimacy, and participation are current, but they seldom account for informal shifts in authority over day-to-day operational decisions in situations of unequal power. On the other hand, political ecology can account for power and dispossession, but it can also be less emphatic about managerial processes, such as how contractors respond to local enforcement. This article serves as a link between the two sides.

Table 1. Literature streams, unresolved gaps, and analytical use in this article

Literature stream	Key insight	The remaining gap for this study
Sustainable infrastructure and project risk	Infrastructure sustainability depends on responsible business conduct, lifecycle risk, and stakeholder management.	Site-level informal enforcement remains weakly specified.
Stakeholder engagement and social license	Trust, legitimacy, and participation shape acceptance.	Engagement often stays formal, perceptual, or platform-centered.
Informal institutions and local wisdom	Local rules and trusted authority shape action beyond formal procedures.	Authority types and operational consequences need clearer differentiation.
Political ecology of infrastructure	Infrastructure redistributes land, risk, mobility, and rents under unequal power.	The operational mechanics of negotiation and correction need closer analysis.
Elite capture	Community governance can become brokered and coercive.	Capture must be treated as a boundary condition, not an anomaly.

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Methodology

Abductive multiple-case design

The study uses an abductive multiple-case design with grounded theory-informed coding. This is a conscious placement. The article is not pure Glaserian grounded theory because the analysis was informed by the concepts of informal institutions, stakeholder management, social license, risk governance, political economy, and elite capture. Abduction was more appropriate for the study, as there were surprises in the business operations, and the analysis alternated between incidents and theory to explain how informal authority governs continuity in business operations.

The case study's logic is also aligned with the research question. Yin (2018) highlights the importance of case studies when researchers study phenomena in real-life contexts. Case particularity is important to interpretive value, as noted by Stake (1995). Case knowledge can lead to analytical rather than statistical generalization, as Flyvbjerg (2006) suggests. This article does just that. The 20 cases are not necessarily all the infrastructure projects in Indonesia, but they do provide theoretically useful variation in sector, ownership, rural-urban context, local authority, and operational disruption.

Cases, data sources, and informants

The empirical basis comprises 20 infrastructure cases in North Sulawesi. The cases include transport and connectivity, water and disaster mitigation, public facilities and strategic areas, energy, industrial infrastructure, and environmental facilities. They were selected because they all had a clear disruption of business operations: work stoppage, redesign pressure, access conflict, social resistance, labor tension, environmental complaint, material-supply controversy, or risk communication breakdown. The cases then allow for an analytical comparison of the various types of projects and a common dependent concern: operational continuity under informal risk governance.

Table 2. Cross-case coverage and infrastructure business operational disruptions

Case group	Examples	Main operational disruption
Transport and connectivity	Toll road, airport, port, bridge	Access loss, noise, land claims, fishing-route disruption, sacred-site conflict

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Water and disaster mitigation	Dams, river normalization, water pipeline, coastal protection	Flooding, relocation, kinship land claims, and coral damage
Public facilities and strategic areas	Government buildings, hospital, market, sports center, and coastal public space	Drainage impact, public access, trade disruption, illegal material sourcing, kiosk displacement
Energy and industry	Geothermal, solar, transmission line, special economic zone, waste facility	Land conversion, mobility barriers, dust, risk fear, pollution concealment

Table 3 differentiates the local authority forms that appear in the cases. The table responds to a common risk in studies of informal local authority: treating all customary or informal actors as interchangeable. The cases show otherwise. Authority has different institutional bases and different operational effects.

Table 3. Local authority forms and business risk-governance functions

Local authority	Institutional basis	Dominant function in the cases
Hukum Tua	Village-government authority combined with daily social trust	Mediates access, compensation, routing, labor issues, and village-level conflict.
Tona'as	Minahasa cultural authority is linked to ancestral memory and sacred landscapes	Legitimizes the protection of Waruga sites and culturally sensitive spatial adjustment.
Kabela	Bolaang Mongondow customary institution and kinship-based memory	Validates ulayat claims, resolves overlapping land boundaries, and creates agrarian legitimacy.
Rukun tetangga / neighborhood youth	Micro-neighborhood social authority	Monitors dust, truck movement, access, and routine contractor compliance.
Religious leaders/church networks	Moral authority and trusted communication channels	Translate technical risk, mediate noise or anxiety, and legitimate social programs.

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Local brokers / captured authorities	Concentrated informal authority linked to opaque rents	Silence complaints, conceal pollution, or convert legitimacy into private coercive control.

Coding, abduction, and trustworthiness

The coding was done in four interrelated movements. Open coding yielded concrete incident-level actions, including blocking equipment, requesting compensation, rerouting access, stopping trucks, changing vendor material, and hiding pollution. Second, actions were related to mechanisms by axial coding, including spatial mediation, grassroots monitoring, distributive inclusion, risk translation, and capture. Third, selective integration examined the mechanisms that influenced the continuity or failure of sustainable operations. Fourth, abductive comparison moved back to the literature to ask which explanation best accounted for the double-edged pattern.

Sensitizing concepts were not used as a coding template, but were derived from the literature. Stakeholder engagement, social license, informal institutions, and elite capture were concepts that focused attention on phenomena, but coding was open to mechanisms that did not fit these concepts. Community monitoring was the most prevalent and operationally clear empirical category, so it was chosen as the main category. The sometimes-contradictory effects of informal authority on sustainability were captured by the key boundary condition of elite capture.

Trustworthiness was achieved by cross-case comparison, negative case analysis, analytic memos, and inter-coder consistency checks. Four cases were double-coded by two coders. The average agreement was 88.5%, and Cohen's kappa was 0.83. Although these figures are not used to convert qualitative interpretation into measurement claims, they do help ensure consistency in interpretation throughout the coding process. Negative cases K11 and K20 did not have outliers removed. They were used to refine the model's boundary conditions.

Table 4. Abductive coding procedure, business operations purpose, and outputs

Analytic step	Purpose	Output
Open coding	Capture concrete incident-level actions and actor moves	Codes such as blocked access, dust enforcement, underpass compromise, vendor replacement, pollution concealment

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Axial coding	Link actions to mechanisms and conditions	Community monitoring, labor absorption, customary mediation, religious risk translation, elite capture
Selective integration	Identify core explanatory pattern	Double-edged informal governance
Abductive comparison	Move between empirical surprises and theory	Boundary conditions around transparency, rents, brokerage, and countervailing voice

Findings

The findings are organized around five mechanisms relevant to infrastructure business management. They do not represent isolated boxes. Monitoring, mediation, labor distribution, and risk communication often overlap on-site. The separation below serves analytic clarity, while the discussion explains their interaction and boundary conditions.

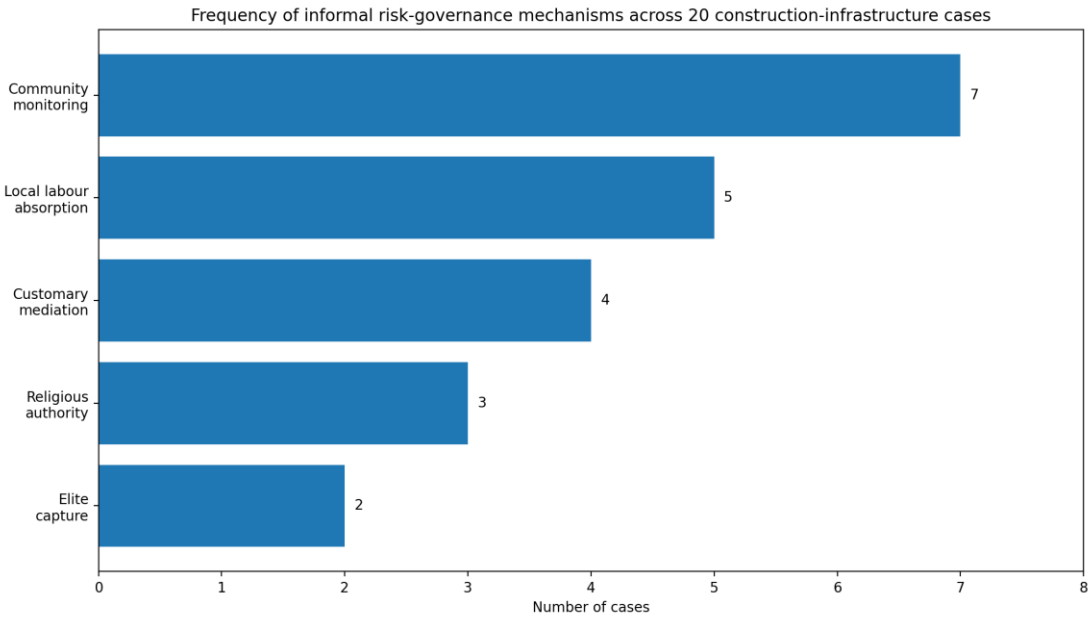


Figure 1. Frequency of informal risk-governance mechanisms across 20 infrastructure business cases.

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Community monitoring as site-level operational discipline

Community monitoring was mentioned in seven cases and was the most robust mechanism in the data. It was effective when affected communities did more than complain. They observed, interfered with, and conditioned construction activities. In the case of Likupang, the placement of coastal protection materials affected coral areas, prompting youth fishers to stop equipment activity. The authority to stop trucks was given to the RT youth in the special economic zone of Bitung if the dust-control watering was not done. In the sports center case, community actors revealed illegal quarrying and pressured the main contractor to change the vendor.

The mechanism thus moves beyond consultation toward risk control at the site level. Residents don't just give social feedback; they establish a sanctioning environment that impacts logistics, supply chains, HSE discipline, and day-to-day productivity. The discipline is still weak, however. It can only support sustainable operations if monitoring is transparent and linked to corrective action, not to private intimidation.

Local labor absorption as workforce conflict management

Five cases of local labor absorption were observed. It was not an employment policy but rather a way to address construction labor disputes. In the case of the *Lolak* dam, external specialist workers caused resentment among unemployed youth. Project management liaised with the village leaders to set a local labor quota for non-specialist labor. In other instances, youth groups or local groups were integrated into access management, dust-control teams, security, or livelihood-substitution programs.

This mechanism brings to light the economic foundations of project legitimacy. Communities are more likely to accept disruption if they see a credible pathway to benefits, whether it be jobs, vendor opportunities or livelihood replacement. But workforce inclusion can also result in brokerage risk. If a local actor has a monopoly over access to labor, a conflict-reducing mechanism can become a rent channel.

Customary mediation as spatial and right-of-way risk settlement

Customary mediation was mentioned in four prominent cases, primarily in the context of land, access, right-of-way, and cultural landscapes. In the Lolak airport case, formal certification was paralyzed by competing claims of customary land by different clans. The Kabela institution helped validate land boundaries on the basis of recognized collective memory. In the case of the Kuwil bridge, Tona'as authority redefined the Waruga site as a design constraint, and the contractor moved a bridge pillar. The

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Manado-Bitung toll case was mediated by the Hukum Tua, resulting in a small underpass and non-cash village road compensation in lieu of a blockade of cattle and farm access.

The cases demonstrate the importance of customary mediation, in the absence of formal documents, in resolving questions of social legitimacy. It is not a replacement for engineering or contract administration. It alters the range of construction options that are allowed. After the local spatial claims are addressed through design, routing, compensation, or sequencing, the contractor can proceed.

Religious authority as trusted risk communication

Religious authority appeared in three cases. It was not only a ceremonial function. It translated business operational risk into trusted language. The church networks raised concerns about night logistics and noise with project management, which led to work-hour restrictions at Sam Ratulangi Airport. In the SUTET case, the residents were worried about the potential long-term health effects of the high-voltage cables, and formal technical explanations were not trusted. Local religious leaders shared safety parameters in a familiar manner and with moral authority.

This is because technical communication is not necessarily socially credible. A contractor may discuss thresholds and standards, but when it comes to our children, our sleep, our land, our livelihood, residents ask a different question: Whom can we trust? Trustworthy risk communication can only diminish uncertainty if it helps to clarify risk, not to stifle dissent.

Elite capture as coercive brokerage in informal business governance

Elite capture appeared explicitly in two cases, but its theoretical importance exceeds its frequency. In the Manado government office case, an informal coalition of project actors and a cultural authority stifled residents' complaints about drainage and flooding. At the local level, there was a brokered silence about leakage from industrial waste that polluted shallow wells. These are not just aberrations of an otherwise benign system. They reveal the nature of informal governance in the presence of project rents, low transparency, and monopoly brokerage.

The data thus redefines informal local authority as contested. The same trust can be used to mediate as it can be used to coerce. Informal access can be used to negotiate away pollution complaints. The same local leader who represents the residents can sell the residents' silence. This is the main theoretical conflict of this article.

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Table 5. Informal risk-governance mechanisms, business-operations effects, and boundary risks

Mechanism	Operational effect	Boundary risk
Community monitoring	Stops, delays, or conditions contractor routines until correction becomes visible.	Brokered monitoring can become private bargaining.
Local labor absorption	Transforms resentment into distributive inclusion and reduces friction.	Labor lists can become rent-seeking instruments.
Customary mediation	Turns spatial or agrarian conflict into an acceptable redesign or compensation.	Customary authority can exclude marginal claimants.
Religious risk translation	Converts technical risk into a trusted local language.	Moral authority can neutralize dissent if captured.
Elite capture	Explains coercive use of informal authority under opaque project rents.	It is the boundary condition of the whole model.

DISCUSSION

From stakeholder participation to site-level risk control

The results help clarify the stakeholder management discussion in infrastructure projects. Some explanation of why formal engagement can become shallow is provided by Reed (2008), Fung (2006), and Babaei et al. (2023), but the North Sulawesi cases show a more robust mechanism: communities establish accountability when they can condition contractors' activity. Monitoring is infrastructure business management when it alters a way of doing work, a route, a schedule, a vendor, a compensation plan, or an environmental-control routine.

This claim also confirms the social license theory. Dare et al. (2014) and Moffat and Zhang (2014) link trust to legitimacy, and the cases show that legitimacy is only functional if it has site consequences. A contractor is not only given a social license but is also mandated to make measurable changes to that license.

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Informal institutions as business risk-governance infrastructure

Helmke and Levitsky (2004) provide an explanation of informal institutions, which can complement formal project governance. This article takes that insight into infrastructure business management one step further. Hukum Tua, Tona'as, Kabela, RT structures, and religious networks operate as risk-governance infrastructure; they communicate information, legitimate claims, mobilize compliance, expose or legitimize neglect, and translate technical risk. This interpretation also aligns with the results of previous studies on leadership for sustainability in the construction industry, which revealed that sustainability is not only about formal commitments but also stakeholder responsiveness, operational innovation, and adaptive leadership (Kampilong, Karauwan, Suatan, Merentek, & Korua, 2025).

Understanding the differences among the various types of authority is important in project planning. Kabela verifies land claims differently from the RT youth who implement dust control. Tona'as authority around Waruga differs from religious authority around risk anxiety. Therefore, it is crucial for infrastructure business managers to map authority functions rather than merely list stakeholders.

Unequal bargaining in infrastructure business operations

The results are not subject to a romantic interpretation in the political ecology approach. Infrastructure is not a neutral meeting place. Larkin (2013), Anand (2017), and Rodgers and O'Neill (2012) provide examples of infrastructure as an enactment of power. The North Sulawesi cases confirm this point. Projects re-distribute mobility, environmental risk, labor opportunity, land control, and silence. A negotiated underpass, a shifted pier, and a road-watering schedule may seem like a consensus, but it also reflects of residents feeling they are being disrupted.

This reading fills a gap in the managerial literature that sees stakeholder engagement as a coordination problem. The process of engagement may be a political-economic negotiation at the site level, where conditions are unequal. Communities do not enter negotiation with equal power. They enter and witness damaged roads, flooded houses, blocked market stalls, threatened fishing grounds, or polluted wells. Informal governance is important because it can help make harm visible and reduce inequality, or it can help turn harm into brokered silence and increase inequality.

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Elite capture as a boundary condition for informal risk governance

Elite capture should not be treated as a last-minute warning. It is the focal point of the model. Platteau (2004), Dasgupta and Beard (2007), and Fritzen (2007) offer explanations for the failure of community-based governance when local elites control information and benefits. The cases show how this failure manifests itself in infrastructure operations. Project-related rents change the moral economy of the local authority. Compensation, access to labor, silence on pollution, and the right to speak for the residents become commodities.

This is not simply a cultural issue; it is an accountability issue. Informal authority contributes to better sustainability by giving affected groups the chance to see agreements, ask questions of brokers, and see operational corrections. It turns coercive when negotiations are conducted behind closed doors, project rents pass through a single gatekeeper, and the voice of marginal residents is not heard. When local authority becomes both informal and opaque, access can become cartelized. That is the most awkward of the study's findings, and its most significant contribution.

Emergent model

Figure 2 presents the revised model for business and infrastructure operations audiences. It avoids a linear celebration of informal authority. Instead, it explains how local wisdom-based mechanisms can either protect operational continuity or convert into capture when accountability safeguards fail.

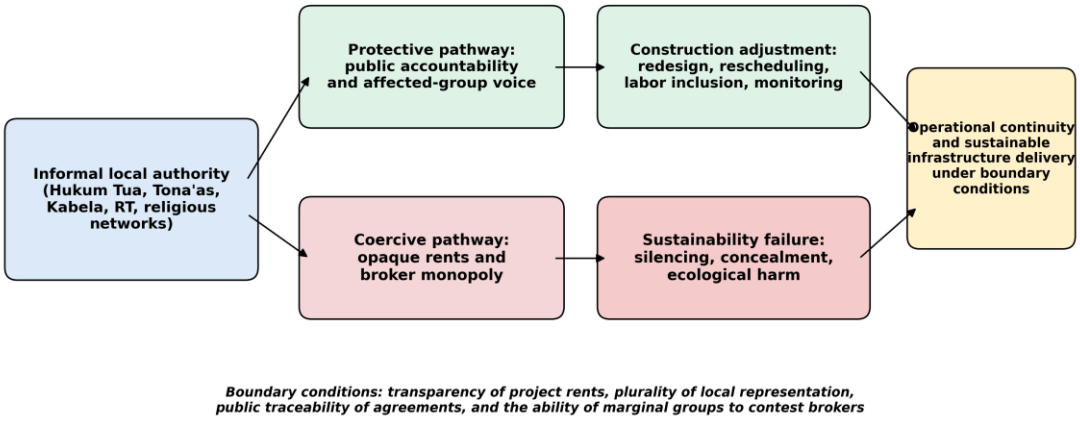


Figure 2. Abductive model of local wisdom-based risk governance in sustainable infrastructure business operations.

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Theoretical Propositions

The revised propositions are conditional rather than merely descriptive. They specify when informal governance supports sustainability and when it produces coercion.

P1. Informal local authority structures strengthen the operations of sustainable infrastructure projects by converting community disruption into verifiable operational adjustments.

P2. Community monitoring becomes site-level risk control when local actors possess recognized authority to interrupt, delay, or condition contractor activity.

P3. Customary and religious mediation reduces construction conflict only when the local authority remains publicly accountable to affected groups rather than privately aligned with project brokers.

P4. Informal risk governance shifts into elite capture when project-related rents, weak transparency, and monopolized brokerage allow local authorities to convert legitimacy into coercive control.

P5. The business-operations value of informal local authority depends less on cultural cohesion itself than on countervailing accountability mechanisms that keep agreements visible and contestable.

Implications for Infrastructure Firms, Project Owners, and Public Agencies

First, infrastructure business managers should map informal authority before mobilization. The map should differentiate land authority, moral authority, neighborhood monitoring authority, labor brokerage, and environmental voice. A generic stakeholder list cannot detect which actor can stop work, verify a claim, translate risk, or capture compensation.

Second, project teams should treat community monitoring as a site-control input. Public logs can record dust control measures, temporary access changes, material sourcing, route closures, compensation commitments, and agreed-upon work-hour limits. These logs should be visible to the owner, contractor, consultant, local representatives, and affected residents.

Third, workforce and benefit-distribution mechanisms need anti-capture safeguards. Labor quotas, vendor opportunities, and compensation lists should use transparent criteria, involve multiple signatories, and be subject to periodic disclosure. No single local broker should control access to work packages or compensation flows.

Fourth, the trusted local authority should support risk communication without replacing technical accountability. Religious and customary leaders can translate risk, but

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the project must still disclose technical evidence, HSE thresholds, monitoring results, and corrective actions.

Fifth, business operational risk registers should include informal-governance risks. Beyond probability-impact scoring, project teams should identify who can speak for affected groups, who may silence them, which rents may appear, and which operational decisions require public verification.

CONCLUSION

This article explored informal local authority as double-edged risk governance in the operation of sustainable infrastructure projects. The study revealed that informal authority can help maintain continuity of operations through redesign, access adjustments, control of working hours, vendor replacement, compensation, and community monitoring, based on 20 cases in North Sulawesi. It can also be a threat to sustainability if it is not transparent, if trust is replaced by coercion, and if environmental damage is concealed.

The study has implications for infrastructure business management, as it moves the focus from formal stakeholder involvement to operational accountability at the site level. It helps with risk governance by showing that informal authority can serve as an external control system, disciplining contractors when formal monitoring is unavailable or slow. It also helps to identify the boundary conditions of informal project governance, namely elite capture, within infrastructure business operations.

There are limitations to the study. The 20 cases are in North Sulawesi, where there are unique local institutions and well-established networks of religious communities. The transferability of the model would be tested in regions with less social cohesion, other customary systems, or more fragmented urban politics. Future research can compare informal risk governance across countries, project delivery systems, procurement modes, and contractual arrangements.

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