

# Collaborative-Diffusion Governance for Street-Connected Children: Evidence from Indonesia

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## Abstract

Street-connected children remain marginalized in Indonesia's cities. This study evaluates effectiveness beyond uptake, focusing on TRC Saribattang, a Pentahelix intervention uniting government, academia, business, civil society, and media in Makassar (2021–2023, including an 18-month pilot). We aim to assess whether the collaborative configuration enables durable protection and socio-economic reintegration. Using a phenomenological design, we conducted 12 semi-structured interviews with adult stakeholders, observed patrols and coordination meetings, and reviewed municipal documents. Data were triangulated and analyzed thematically, guided by Rogers' diffusion-of-innovation attributes. Findings indicate that the 112 emergency hotline and joint patrols improved "relative advantage" and "observability," contributing to a decline in street-connected children from 268 (2021) to 87 (2023). However, displacement to peripheral zones and the lack of livelihood support and integrated data systems weakened "compatibility" and heightened "complexity." We propose a collaborative-diffusion framework combining economic support, digital case dashboards, and neighborhood co-design. While promising, the study is limited by its single-city scope and reliance on adult informants. Future phases should adopt child-safe, participatory methods to enhance inclusivity and empirical depth. Findings offer a transferable lens for collaborative governance and inform policy reforms in the Global South, thereby advancing both theory and practice.

## Keywords

Collaborative governance; diffusion of innovation; Pentahelix; street-connected children; urban policy

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## Introduction

Urban child vulnerability remains a persistent global challenge, particularly in contexts marked by poverty, informality, and fragmented service provision. In this context, street-connected children, defined as minors who live, work, or spend substantial time in public urban spaces, face heightened risks of exploitation, exclusion, and criminalization. In Indonesia, despite programs such as PKSA and Child-Friendly City initiatives, implementation remains inconsistent, especially in urban centers like Makassar, where inter-agency coordination and reintegration efforts face persistent obstacles. Official data suggest a decline in the number of identified street-connected children from 268 in 2021 to 87 in 2023, but scholars caution against interpreting these figures as success without evaluating structural factors and long-term outcomes (Greeson et al., 2024; United Nations Children's Fund [UNICEF] & World Health Organization [WHO], 2022).

There is growing recognition in public administration literature that complex social problems require integrated governance and multi-sectoral collaboration (Ansell & Gash, 2008). The Pentahelix model, a five-sector collaborative model (government–academia–business–civil society–media) used in Indonesia to address complex social problems, has emerged as a promising framework for navigating these challenges. Unlike linear, top-down public policy approaches, the Pentahelix encourages co-production of knowledge, resource pooling, and legitimacy building among diverse actors. Its application in Southeast Asia has been particularly salient in child welfare contexts, especially during crisis periods such as COVID-19, when government capacity was strained (Bhattacharya et al., 2024; Mora et al., 2021).

Recent studies confirm that the involvement of civil society and media can amplify outreach and foster accountability, while academia and private actors contribute innovation and operational scale (Yirga, 2021). These collaborative frameworks are especially crucial when addressing the multifaceted needs of street-connected children, who often fall between institutional silos.

Simultaneously, the Diffusion of Innovation (DOI) theory provides an analytical lens for understanding how public policy innovations are adopted and internalized by stakeholders. Rogers et al. (2019) identified five attributes: relative advantage, compatibility, complexity, trialability, and observability that affect the adoption curve of an innovation. Recent literature highlights the importance of perceived compatibility and relative advantage in the context of social service reforms, especially in communities accustomed to informal or fragmented care systems (Omari et al., 2021; Weatherill et al., 2023). Coordinated service initiatives for street-connected children, such as unified emergency hotlines and outreach programs, often appeal to agencies seeking improved efficiency. However, adoption may falter when initiatives fail to align with local cultural values or when inter-agency competition hampers data sharing (Lehtonen, 2025).

The intersection of Pentahelix governance and innovation diffusion offers a theoretical opportunity to explore the effectiveness of collaborative innovation. Prior studies have examined either governance configurations or diffusion mechanisms in isolation, but few have integrated both to understand real-world policy uptake. Moreover, research gaps persist in assessing how collaborative arrangements influence not just adoption, but also the sustained effectiveness and adaptability of child welfare interventions. Specifically, there is limited empirical insight into how actor interdependence within Pentahelix configurations

mediates the diffusion process, or how contextual factors such as urban informality, decentralization, and community trust impact outcomes over time (Subedi et al., 2024).

This study addresses these gaps by shifting the analytical lens from adoption and rollout, common focuses in previous research, toward evaluating the actual effectiveness of the TRC Saribattang program in Makassar City, an innovative, multistakeholder initiative established in 2021 to coordinate child rescue, protection, and reintegration. The novelty of this study lies in its emphasis on assessing whether such innovations result in durable reintegration and institutionalization. Specifically, we examine whether the Pentahelix configuration enhances sustained outcomes such as reduced child street presence, improved coordination, and socio-economic reintegration. In doing so, we integrate Diffusion of Innovation theory not as a descriptive end in itself, but as an interpretive framework to analyze stakeholder perceptions of effectiveness, institutional uptake, and alignment with community values.

To address these gaps, we embed theoretical constructs from both collaborative governance and innovation diffusion into a unified analytical model. We refer to this synthesis as collaborative diffusion effectiveness, defined as the extent to which multi-actor governance enhances the perceived advantages, compatibility, and sustainability of policy innovations. This model situates the study within broader debates in public administration on policy design, implementation, and legitimacy. Accordingly, this paper asks: How and to what extent does the Pentahelix-based TRC Saribattang model contribute to sustainable child welfare innovation in Makassar City?

## Literature review

### Collaborative innovation for street-connected children

Public administration literature identifies street-connected children as a quintessential “wicked problem,” a challenge defined by intersecting causes and contested responsibilities (Head, 2019). Single-agency approaches often fall short because they neglect systemic interdependencies across education, labor, urban governance, and social protection (Spours, 2021). In response, scholars promote collaborative innovation, which entails co-developing and jointly implementing new solutions through pooled resources and distributed authority (Ansell et al., 2022).

Recent cross-context evidence confirms the value of multi-sector approaches. In Delhi, mobile health vans improve access to primary services, health literacy, and tertiary referrals for street children (Seth et al., 2025). In Kerman, virtual drug-prevention education programs improve street children's knowledge and attitudes (Padir et al., 2025). In Addis Ababa, narratives from homeless women highlight urgent needs around basic services and safety (Yohannes et al., 2025), while an ethnographic study in Antioquia stresses the importance of historical-emotional recognition and contextual learning for children with street experiences (Lopera-Álvarez et al., 2025).

These interventions are shaped not only by institutional design but also by material and urban-ecological factors. For instance, complementary feeding and food insecurity in Vietnam influence the success of family-centered programs (Vuong & Tran, 2025). In Nairobi's informal settlements, hygiene-related disease risks are tied to street food consumption (Ongadi et al.,

2025). In Auckland, children in high-deprivation neighborhoods face higher exposure to unhealthy food advertising (Kneller et al., 2025). Meanwhile, child-responsive urban design insights have emerged from eye-tracking studies on road perception (Sheng et al., 2025).

## **Pentahelix governance: Potentials and pitfalls**

The Pentahelix model embodies collaborative innovation by institutionalizing five actor groups: government, academia, industry, civil society, and media into one governance arrangement (Calzada, 2020). Evidence from Southeast Asia shows that such configurations improve problem diagnosis, diversify resources, and legitimize difficult reforms in child welfare (Bhattacharya et al., 2024; Greeson et al., 2024). In Indonesia, child-rescue units integrating civil-society caseworkers and media have achieved faster reunification rates than those relying only on social services (Quarshie et al., 2021). Still, inclusion breadth does not always translate to meaningful co-production. Longitudinal studies from Surabaya and Manila reveal that private and media actors often disengage post-crisis (Edmonds et al., 2022), prompting calls for mechanisms to sustain engagement and equitable participation (Yirga, 2021).

The model's scope has also been extended to environmental-health governance, underscoring the need for sectoral coordination. For example, industrial-government collaboration is essential in mitigating road dust contamination in Kermanshah (Asgari et al., 2025). Classroom ventilation and layout in Cairo influence learning engagement (Afifi et al., 2025), while influenza transmission dynamics in Quzhou highlight the integration of public health. Meanwhile, migrant-receiving communities along the Venezuelan-Colombian border demand public security, legal aid, and access to health care (Bautista et al., 2025).

Child vulnerability persists post-institutional care as well. In Colombia, adolescents leaving treatment face social stigma and road exposure (Noreña-Herrera et al., 2025). In Mahikeng, street children cite a lack of family support, services, and livelihoods, underscoring the role of community-religious partnerships (Shophi & Maforah, 2025). A contrasting example comes from Toronto, where adult congenital heart disease services have evolved from pilot to institutionalized systems via referrals and cross-actor networking (Colman et al., 2025).

## **Diffusion-of-innovation as an effectiveness lens**

Most studies use Rogers' Diffusion of Innovation (DOI) theory to understand innovation adoption, but recent work adapts it to evaluate post-adoption effectiveness (Lee & Worthy, 2021; Weatherill et al., 2023). Its five core attributes, relative advantage, compatibility, complexity, trialability, and observability, are increasingly used to assess sustainability. In child protection, for instance, perceived advantage influences long-term funding, while compatibility with household livelihoods affects the success of reintegration efforts (Omari et al., 2021). Observability, meanwhile, enhances legitimacy and stakeholder momentum (Lehtonen, 2025). However, these attributes often interact with governance structures: fragmented inter-agency coordination, for instance, can hinder diffusion even for well-aligned innovations (Fundytus et al., 2023).

DOI attributes have also been contextualized through child-focused studies. Nutritional patterns linked to emotional-behavioral outcomes suggest that compatibility should include food ecology (Zhao, D., et al., 2025). Predictors of drug use among street children in

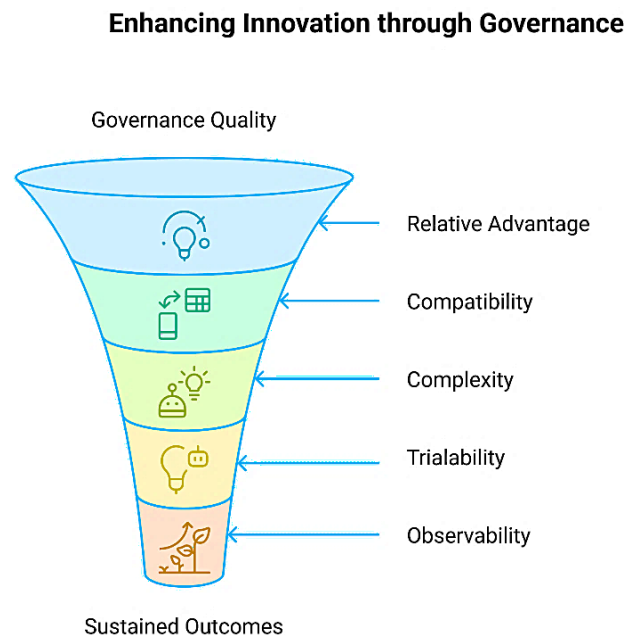
Islamabad, such as peer influence and street sleep, amplify complexity and relapse risk. Trialability and relative advantage emerge in mobile health vans that expand services incrementally for vulnerable children (Seth et al., 2025). Observability is reflected in safety concerns in public spaces (Kayitmazbatir et al., 2025) and in patterns of unhealthy food marketing that disproportionately affect children in high-deprivation neighborhoods (Kneller et al., 2025). Finally, school-based vaccine uptake among Beijing parents, shaped by price, location, and experience, illustrates how perceived attributes influence the adoption of innovation in child-centered service delivery (Zhao, Y., et al., 2025).

## Synthesis and research gap

The review reveals two gaps. First, studies typically treat Pentahelix governance and DOI as separate strands, ignoring how actor interdependence may reshape diffusion attributes through implementation. Second, even integrated studies focus on early adoption (e.g., stakeholder sign-up) rather than long-term impact, whether collaborative innovations deliver sustained benefits or mask displacement (Subedi et al., 2024).

We define collaborative-diffusion effectiveness as the intersection between governance quality (breadth, depth, equity) and stakeholder perceptions across the five DOI attributes, all shaped by material urban realities. Figure 1 illustrates our analytical framework. Mediating conditions include food, water, and hygiene access (Ongadi et al., 2025; Vuong & Tran, 2025), commercial and food advertising (Kneller et al., 2025), learning environments (Afifi et al., 2025), safety infrastructure (Kayitmazbatir et al., 2025), and environmental risk (Asgari et al., 2025). These explain why similar governance arrangements yield different outcomes across cities.

**Figure 1:** Analytical Framework



*Note: Adoption of Rogers et al. (2019).*

Future research should test how shared data systems or co-located services affect observability and complexity, and whether such models can scale across urban contexts. It

must also include children and families meaningfully, not just consultatively, ensuring that compatibility reflects real-life conditions (Lopera-Álvarez et al., 2025; Yohannes et al., 2025). Mixed-methods longitudinal designs, aided with participatory tools, can help track reintegration, displacement, and economic stability. This framework informs our coding and analysis of TRC Saribattang's implementation, examining not only whether it diffused but also how governance and context shape its long-term effectiveness for street-connected children.

## Methodology

This study evaluates the effectiveness rather than the mere adoption of the TRC Saribattang collaborative innovation. Our methodological choices were therefore guided by the need to understand not just how the model diffused, but how, and for whom, it delivers sustained outcomes. In line with reviewer guidance to deepen analytical Rigor and Anchor choices in comparable designs, we explicitly benchmark key procedures against recent studies with street-connected or urban-marginalized populations, including mixed-methods outreach using routine program data (Seth et al., 2025), quasi-experimental behavior change education among street-connected children (Padir et al., 2025), and qualitative participatory approaches (Lopera-Álvarez et al., 2025; Yohannes et al., 2025).

### Philosophical orientation and research design

We employed a phenomenological qualitative design rooted in the constructivist paradigm to capture the lived experiences and sense-making of stakeholders involved in TRC Saribattang. Phenomenology is increasingly applied in social policy research to illuminate the context-specific realities of marginalized groups and those who govern them (Bhattacharya et al., 2024; Zewude et al., 2023). This approach is well-suited to evaluating effectiveness because it foregrounds stakeholder perceptions of program value and aligns with two key dimensions of the Diffusion of-Innovation: relative advantage and compatibility.

To strengthen interpretive depth, we treated family dynamics and intergenerational emotion regulation as sensitizing concepts for reading stakeholder accounts of reintegration (Tafà et al., 2025). We drew on validated constructs of violence exposure to frame discussions of safety and referral pathways (Burgos-Benavides et al., 2025). While our design is not photovoice or child-ethnography, we align with participant-centered traditions that prioritize experiential knowledge (Lopera-Álvarez et al., 2025; Yohannes et al., 2025).

### Site and program context

Makassar City, with a population of approximately 1.4 million, was selected as the field site for piloting TRC Saribattang in 2021 as part of its Child-Friendly City roadmap. The program operates through nightly rescue patrols, temporary shelter services, and reintegration coordination with schools, social services, and labor offices. To contextualize findings, we triangulated program documentation, municipal decrees, and media reports, and verified authenticity using official city records.

Recognizing that environmental and public-health factors shape program effectiveness, we conducted a contextual scan of urban exposures affecting street-connected children. These included toxic elements in street dust (Asgari et al., 2025); enteric risks from informal food environments (Ongadi et al., 2025); unhealthy food marketing near schools (Kneller et al., 2025); indoor air quality and ventilation in classrooms (Afifi et al., 2025); and children's visual engagement with urban design elements (Sheng et al., 2025). These considerations helped guide field observations, particularly around markets, school-adjacent areas, and informal vending zones, and shaped our interpretation of program compatibility.

## **Participant recruitment and sampling adequacy**

Consistent with phenomenological best practice, we used purposive maximum-variation sampling to capture heterogeneity across the five Pentahelix sectors. Twelve key informants were recruited: four government officials (social service, public order, education, labor), two academics, two business sponsors, two NGO social workers, and two journalists. Although small in absolute terms, this sample is sufficient because it balances role diversity with conceptual richness, enabling deep interpretive insight across sectors. This constellation reflects information power when cases are rich (Lehtonen, 2025) and aligns with phenomenological traditions that prioritize experiential depth over numeric generalization.

We also note that our sample size aligns with norms in phenomenological research, which emphasizes depth of insight over breadth of coverage, particularly when participant roles are diverse, and data saturation is achieved. Theoretical saturation was assessed continuously; no novel categories emerged after interview 10, indicating adequacy. Stakeholder diversity rather than numerical size was prioritized to illuminate inter-sector dynamics that condition effectiveness. To enhance transparency, we report recruitment logic alongside analogues from recent designs: purposive interviews with street-connected children in Mahikeng that center lived experience (Shopi & Maforah, 2025); multistage household sampling under migration stressors to capture receptor/migrant perspectives (Bautista et al., 2025); and cross-sectional sampling frames in food-environment/feeding-practice studies that inform equity-aware recruitment (Vuong & Tran, 2025).

## **Data collection procedures**

Data were collected between March and May 2024 through a triangulated, phenomenologically informed design to support a rich interpretation of innovation effectiveness and attribute alignment:

1. Semi-structured interviews (60–90 minutes) followed an evolving guide designed to elicit stakeholder perceptions of program effectiveness, Pentahelix collaboration, and alignment with Diffusion of Innovation (DOI) attributes. Probing questions incorporated themes from recent studies on substance use (Waheed et al., 2025), public-space safety (Kayitmazbatir et al., 2025), rights during transitions from care (Noreña-Herrera et al., 2025), and health-promotion interventions (Padir et al., 2025; Zhao, Y., et al., 2025).
2. Non-participant observations of three outreach patrols and two coordination meetings provided interactional and spatial insights. Field notes tracked displacement patterns

(e.g., around markets and schools) and administrative boundaries, which were noted as relevant for future spatial or mobility analysis (Gao et al., 2025).

3. Document review included 23 decrees, annual reports, and media coverage (2021–2024) to validate interview claims and map program evolution. Parallels with programmatic data use in mobile-health outreach (Seth et al., 2025) highlighted opportunities to align TRC dashboard metrics with mixed-methods extensions.

This multimodal data collection strategy allowed cross-verification of stakeholder accounts and institutional context, ensuring consistency with the research questions and the phenomenological emphasis on lived, situated understanding.

## **Data management and analysis**

Data were analyzed using a phenomenological thematic procedure (Bromfield et al., 2023). Interview transcripts and field notes were first horizontally aligned, with each statement treated as having equal value to identify significant meaning units. These units were then clustered into provisional themes that reflected perceptions of program effectiveness and alignment with Pentahelix roles and Diffusion of Innovation attributes. Finally, textural-structural descriptions were written to synthesize how stakeholders experienced and interpreted the TRC Saribattang model. In line with recent psychometric and survey work, we documented coding decisions and theme-generation criteria (Burgos-Benavides et al., 2025; Serrate-González et al., 2025), and we pre-specified analytic memos about potential mediating constructs (Zhao, Y., et al., 2025) as sensitizing, not testing devices.

All coding was conducted manually in Microsoft Excel tabular matrices; no CAQDAS software (e.g., NVivo) was used, consistent with reviewer guidance. Two researchers independently coded 25% of transcripts and achieved an intercoder agreement of 82%. An analytic log recorded codebook iterations and reflexive memos, ensuring transparency and dependability. To strengthen auditability, we adopted registry-style documentation practices from long-running clinical programs (Colman et al., 2025) and recorded decision rules akin to those used for specification transparency in predictive modelling studies (He et al., 2025).

## **Trustworthiness and verification of authenticity**

We employed multiple strategies to enhance rigor:

- **Credibility:** Member checks were conducted with nine participants, who affirmed the thematic resonance. Triangulation across interview, observation, and document sources mitigated single-method bias. Where applicable, we cross-validated administrative figures against routine records and media releases, thereby verifying findings in programmatic evaluations (Seth et al., 2025).
- **Transferability:** Thick descriptions of context and actor roles facilitate assessment of applicability to other urban child-welfare settings. Context notes included environmental/public-health conditions (Afifi et al., 2025; Asgari et al., 2025; Kneller et al., 2025; Ongadi et al., 2025), clarifying boundary conditions for implementation.



- **Dependability:** An audit trail comprising raw data, codebook versions, and reflexive memos is archived on an encrypted university server.
- **Confirmability:** Reflexive journals captured researcher assumptions; external peer debriefing sessions challenged interpretive leaps.

Document authenticity was further validated by comparing media reports with original press releases and by inspecting the city seal watermark under ultraviolet light, following the guidance of Sadzaglishvili et al. (2023).

## **Ethical considerations**

Ethical clearance for this study was obtained from the Nobel Indonesia Institute Social Research Ethics Committee (Ref 2024-NII-19). Written informed consent was secured from all participants, and for those with limited literacy, oral consent was audio-recorded in the presence of an impartial witness. All personal identifiers were replaced with pseudonyms, while place names were aggregated to the precinct level to minimize re-identification risk. Participants were informed of their right to withdraw their data up to two weeks after the interview. Fieldwork scheduling was carefully coordinated to ensure that outreach activities were not disrupted and that street-connected children were not exposed to additional scrutiny or harm. Given the vulnerabilities documented among women experiencing homelessness (Yohannes et al., 2025) and care-leavers (Noreña-Herrera et al., 2025). We employed heightened safeguarding and data-minimization protocols, as education/health topics can surface sensitive personal beliefs (Zhao, Y., et al., 2025). We avoided collecting any protected health information or school-linked identifiers.

## **Researcher positionality and limitations**

The lead author previously served as a volunteer mentor at a Makassar youth shelter, which may have influenced rapport and interpretation. Reflexivity memos tracked such positionality effects. This study's limitations should be acknowledged upfront: notably, no street-connected children were directly interviewed, and the findings rely exclusively on adult stakeholder perceptions due to ethical constraints. This limits the ability to triangulate perspectives and may underrepresent children's voices. Other limitations include potential positive bias among government informants and the inherent subjectivity of self-reported accounts. Future mixed-methods work incorporating longitudinal child-level outcomes is warranted.

We acknowledge unmeasured contextual exposures such as environmental hazards, food marketing near schools, and classroom conditions that may shape program outcomes (Afifi et al., 2025; Asgari et al., 2025; Kneller et al., 2025). Future studies should incorporate child-safe participatory methods (Lopera-Álvarez et al., 2025), youth-participatory action research with care-experienced adolescents (Noreña-Herrera et al., 2025), and integration of routine program data with simple spatial diagnostics (Gao et al., 2025). Behavioral and health-risk domains were also not directly measured; such modules (Waheed et al., 2025) could be added in future mixed-methods phases.

## Results

The findings reveal a nuanced picture of how the TRC Saribattang model operates in practice and how stakeholders interpret its effectiveness through the lens of Diffusion of Innovation theory. Across interviews, observations, and documentary evidence, participants consistently referred to the five innovation attributes: relative advantage, compatibility, complexity, trialability, and observability when describing both the program's achievements and its unresolved challenges. Their narratives underscore that the model's collaborative architecture is necessary but not sufficient; the tangible outcomes depend on how each attribute is experienced by frontline workers, partner agencies, families, and the wider public.

### Relative advantage

Respondents from every Pentahelix sector emphasized that the program delivers a step change compared with Makassar's previous ad hoc interventions. A city official reflected that "before Saribattang, each agency saved children on its own terms; now we share one gate and one story." This single-entry system, anchored by the 112 emergency hotline and a joint case-management team, is widely credited with accelerating rescues and reducing bureaucratic duplication. However, the advantage appears to taper once children leave the shelter. Social workers and NGO staff noted that vocational placements and family-support stipends are still funded on a project-by-project basis, creating a "revolving door" that can pull children back into street work. These views suggest that perceived advantage is contingent upon a continuum of care that extends beyond immediate rescue.

### Compatibility

Institutionally, Saribattang dovetails with the city's Child-Friendly agenda and national child-protection statutes, a fit that expedited mayoral endorsement and budget allocation. However, household-level compatibility remains uneven. Several caregivers described patrols as punitive, noting that "if no alternative income comes, we lose twice our child and our earnings." Such sentiments illustrate that regulatory alignment does not guarantee cultural or economic congruence. Journalists observed that community acceptance rose markedly when local traders' associations began funding weekend food stalls for affected families, demonstrating that compatibility is strengthened when interventions accommodate livelihood realities.

### Complexity

Despite its perceived benefits, Saribattang's governance structure is often experienced as administratively heavy. Coordination requires multiple sign-offs across the Social Service, Public Order Agency, and Education Department, a process exacerbated by the absence of a shared digital database. One frontline officer admitted keeping two sets of spreadsheets, "one for us and one for the social workers," to compensate for incompatible templates. Such duplication not only consumes staff time but also risks data loss, which directly affects follow-up visits and monitoring of school attendance. Complexity, therefore, emerges not from the rescue operation itself but from the layered reporting requirements that accompany inter-agency collaboration.

## Trialability

Stakeholders viewed the 18-month pilot phase as a flexible platform for testing and refining the program's core components. Adaptations included shifting patrol schedules from weekday nights to weekend afternoons in response to observed patterns of child congregation at Sunday markets. Trauma-informed counselling was also introduced after field staff reported high levels of distress among rescued children. These iterative changes reflect a responsive, learning-oriented approach. Document reviews and patrol logs supported these adaptations, showing repeat encounters with children in specific hotspots before the adjustments.

However, participants noted that the relatively short pilot window limited their ability to assess the durability of the reintegration component. The lack of longitudinal data hindered confirmation that initial improvements were sustained over time. Observational data contributed valuable insight, but remained temporally constrained. As such, while the pilot demonstrated operational flexibility and early responsiveness, further evidence is needed to establish whether these gains endure beyond the pilot's duration.

## Observability

Official dashboards report a reduction in street-connected children, from 268 in 2021 to 87 in 2023. This quantitative drop has been publicly framed as a key success metric. However, interviews with NGO monitors and journalists revealed concern over displaced visibility cases where children re-emerge in unmonitored districts or informal zones beyond the reach of patrol coverage. Their field documentation cited recurring encounters with the same children in different urban corners. This phenomenon of "displacement" was interpreted not as outright program failure, but as a shift in the scope of observation, in which apparent success in one zone coincides with a loss of visibility in another. Document reviews and observational scans of patrol zones validated these spatial gaps, suggesting the need to augment dashboard claims with geospatial and field-based triangulation.

## Discussion

The evaluation of TRC Saribattang presents empirical findings indicating that collaborative innovation coincided with early improvements in urban child welfare, particularly when diffusion attributes (such as relative advantage and trialability) aligned with political economy and community practices. Respondents frequently cited the single-entry emergency hotline and joint patrol model as helpful for reducing duplication and improving visibility. These patterns were also seen in Accra and Manila, where similar models supported early program uptake (McAlpine et al., 2025; Quarshie et al., 2021). As the initiative progressed, interviewees reported that compatibility and complexity became more salient. In particular, they raised concerns about household income loss and administrative delays similar to constraints documented in contexts where informal livelihoods and bureaucratic systems intersect (Nyumayo et al., 2022; Skylstad et al., 2022).

Complementary evidence from Delhi showed that mobile health vans contributed to sustained community engagement, as reflected in increased child service visits (Seth et al., 2025). In Iran, evaluations of virtual prevention modules documented improvements in

substance-use awareness among street children, suggesting that trialability when supported by digital tools can facilitate gradual uptake across actors (Padir et al., 2025).

Several environmental and infrastructural conditions were also described as affecting program compatibility. Studies on enteric risks in informal settlements underscore the importance of access to sanitation and public health infrastructure for reintegration outcomes (Kasumba et al., 2023; Njuguna et al., 2019; World Health Organization [WHO], 2024). Respondents in our study echoed similar concerns. Other qualitative research from Addis Ababa and Colombia found that safety concerns, unmet basic needs, and rights violations persisted after care and undermined the legitimacy of service systems (Noreña-Herrera et al., 2025; Yohannes et al., 2025). These sources reinforce the need to include community voice and lived experience in program planning. Additionally, education studies from Antioquia support child-responsive learning strategies that reflect local social realities (Lopera-Álvarez et al., 2025).

Evidence on environmental perceptions also helps contextualize observability. Analyses of “nature deficit” and screen overuse show that perceptions of child visibility in public space are shaped by broader cultural and ecological dynamics (Serrate-González et al., 2025). These findings suggest that observability should be analyzed not just as a measurable indicator but as a socially influenced concept. Collectively, these results help inform future design strategies that can strengthen perceived advantage, reduce administrative complexity, and improve compatibility with the everyday conditions of children’s lives.

## Theoretical contributions

This study contributes to theory by proposing a clearer definition of what we term collaborative diffusion effectiveness, the idea that the success of policy innovation depends not just on having many actors involved, but on how well those actors coordinate and meet the real needs of children and families. First, our findings show that collaborative breadth alone is insufficient. Effectiveness improves when services align with economic realities, such as whether an intervention helps reduce household burdens. In this context, Rogers’ diffusion attributes, especially relative advantage and compatibility, must be reinterpreted. Relative advantage, for instance, must consider whether the program improves family income, and compatibility must account for how the innovation fits within the cultural norms around child labor or informal work.

Second, we add practical insight by linking features like “visible access points” (e.g., mobile outreach vans) and “micro-trialability” (e.g., modular digital content) to increased uptake and usability across different service layers (Padir et al., 2025; Seth et al., 2025). These mechanisms show how small, testable components help agencies and communities build trust and adapt gradually.

Lastly, building on lived-experience research and rights-based perspectives (Lopera-Álvarez et al., 2025; Noreña-Herrera et al., 2025; Yohannes et al., 2025), we argue that compatibility is not just about systems or service formats, but it is relational. Compatibility grows through meaningful participation, rights safeguards, and culturally grounded forms of learning. These perspectives help explain why even well-designed programs may fail unless they feel legitimate and responsive to the people they serve.

## Policy implications

The conditional nature of effectiveness suggests three interlinked imperatives for urban child-welfare policy, each grounded in specific findings from the Makassar case. First, economic empowerment must be embedded alongside rescue operations. In TRC Saribattang, caregivers consistently described income loss as a barrier to sustained reintegration, suggesting that linking families to micro-credit schemes, vocational training, and targeted social assistance could transform short-term rescue into a stable livelihood transition. This directly addresses the income-compatibility tension raised in interviews and aligns with programmatic evidence from Lagos and Recife (Omari et al., 2021).

Second, an integrated data infrastructure is essential to overcome administrative complexity. As frontline workers noted, delays in referrals and follow-up stemmed from disconnected recordkeeping across agencies. A unified, real-time child-case dashboard accessible across Pentahelix actors would reduce duplication and increase accountability, mirroring successful digital integration hubs in Bogotá that halved case-processing times (Macleod et al., 2023).

Third, community co-design should go beyond consultation and be institutionalized through neighborhood-level committees. Several stakeholders proposed routine dialogue mechanisms between patrol teams, social services, and local community representatives. This approach reflects street-level knowledge and improves the relational legitimacy of intervention efforts. Operationally, low-threshold, high-observability components such as periodic mobile outreach clinics and modular digital prevention sessions can strengthen public visibility while reducing frontline complexity (Padir et al., 2025; Seth et al., 2025). Embedding participatory methods and rights safeguards responds directly to post-care vulnerabilities and underreported needs (Noreña-Herrera et al., 2025; Yohannes et al., 2025). Meanwhile, school- and community-based learning formats tailored to local contexts have proven effective in supporting durable reintegration (Lopera-Álvarez et al., 2025). Finally, public health protections, particularly around enteric and respiratory exposure risks, should be integrated into patrol and follow-up protocols (Aguilera et al., 2022; Ortégón-Sánchez et al., 2022; Rana et al., 2024; Zewude et al., 2024).

## Limitations and future research

This study is constrained by its single-city focus and reliance on adult stakeholder perspectives. While data saturation was achieved, the absence of direct child interviews limits insight into the lived experiences of reintegration. These limitations were noted throughout the research process and suggest the need for greater inclusion of child perspectives in future work.

Future evaluations should integrate routine program data with participatory methods such as photovoice and post-care tracing to capture children's perspectives on rights, safety, and livelihood stability over time (Noreña-Herrera et al., 2025; Yohannes et al., 2025). Design-oriented research can test situated learning strategies and community-based co-design mechanisms to determine when and how collaborative breadth leads to durable child-welfare gains (Lopera-Álvarez et al., 2025). Pragmatic trials involving mobile outreach and digital prevention initiatives can help identify scalable service combinations that balance observability and complexity (Padir et al., 2025; Seth et al., 2025). Finally, cross-city

comparative studies should integrate environmental health metrics to reflect context-specific compatibility barriers common in dense urban environments.

## Conclusion

TRC Saribattang demonstrates that collaborative innovation, when assessed by effectiveness rather than just uptake, can deliver tangible gains in urban child welfare. Procedural advances such as the single-entry emergency hotline and joint patrols improved coordination, while evidence of displacement highlighted the limits of relying solely on performance dashboards. These results inform a framework we describe as “collaborative diffusion effectiveness,” which connects innovation attributes to real-world, multi-actor governance.

The study offers a practical and theoretical model for evaluating child-focused interventions in complex urban systems. Positioned alongside comparable cases in Accra, Bogotá, and Lagos, the Makassar experience contributes to global learning on scaling rights-based, participatory approaches. While future research must expand empirical scope and include child voices, this study provides a replicable foundation for advancing equitable and accountable child-welfare reform.

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