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Mobile technology, citizen co-production and public service delivery in Uganda: a policy and practice review introducing the Digitally Mediated Municipal Co-production Framework

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This Policy and Practice Review introduces the Digitally Mediated Municipal Co-production Framework (DMMCF), a formally specified five-layer model that synthesises the current state of scholarship on how mobile technology may generate public value through citizen co-production in sub-Saharan African municipalities, and translates that synthesis into actionable policy and practice guidance. The framework is offered as a conceptual and propositional contribution that organises existing evidence into reform-relevant recommendations and still requires empirical validation, rather than as an already-tested model. It advances three contributions intended to extend international scholarship and to inform governance practice. First, it moves beyond technology-adoption research by specifying five co-production mechanisms through which mobile access may create public value: reporting, monitoring, payment, community mobilisation and feedback evaluation. Second, it integrates Moore's public value theory with digital governance and co-production research to explain how mobile platforms may alter the legitimacy, accountability and responsiveness of local government in low-capacity settings. Third, it specifies a recursive causal architecture incorporating trust accumulation loops, institutional learning pathways, causal asymmetry and non-linear threshold effects, grounded in organisational learning and political trust scholarship, thereby extending the predominantly linear frameworks that currently dominate digital governance research. Bushenyi Municipality, an urbanising secondary city of approximately 46,000 residents in south-western Uganda, serves as an illustrative analytical context rather than an empirical case study; the diagnostic observations reported here are drawn from published policy documents, official statistical sources and secondary literature. Comparative evidence from Kenya, Rwanda, India and Brazil is examined to explore the framework's transferability and to derive cross-context policy lessons. Four formally stated propositions, a mixed-methods research agenda and a structured implementation matrix are advanced for empirical testing and for use by policymakers and practitioners. Digital inclusion, network quality, administrative capacity and political commitment are identified as the critical moderating

boundary conditions that may determine whether digital participation becomes empowering or exclusionary.

KEYWORDS

citizen co-production, digital governance, Digitally Mediated Municipal Co-production Framework, DMMCF, mobile technology, public service delivery, public value, Uganda

1 Introduction

Mobile technology is reshaping the relationship between citizens and public institutions across the Global South. Smartphone penetration, mobile internet expansion and mobile money diffusion have created new channels through which residents report service failures, pay municipal dues, mobilise communities and hold local governments accountable. The theoretical and practical significance of these developments, however, remains contested. Accounts that celebrate digital participation risk overstating the transformative potential of mobile platforms in governance contexts characterised by weak institutional capacity, fragmented infrastructure and unequal access. Sceptical accounts risk dismissing the genuine participatory possibilities that emerge when mobile communication is embedded in civic culture and administratively responsive institutions. Mobile phones and digital platforms are widely linked to service access, citizen voice and development outcomes in low- and middle-income countries (Aker and Mbiti, 2010; Lember et al., 2019; World Bank, 2016).

This Policy and Practice Review intervenes in this debate by synthesising the relevant public administration, digital governance and co-production literature and introducing the Digitally Mediated Municipal Co-production Framework (DMMCF), a formally named, five-layer model that organises existing scholarship into a coherent account of the conditions under which mobile technology may improve public service delivery through citizen co-production, and into actionable guidance for governments, development partners, citizens and civil society. The framework is presented as a theoretically derived and propositional contribution awaiting empirical validation. Three contributions are advanced. The DMMCF moves beyond technology-adoption research by specifying the co-production mechanisms through which mobile access may generate public value, providing analytical precision that existing descriptive accounts lack. It integrates public value theory with digital governance and co-production scholarship to explain how mobile platforms may alter the legitimacy, responsiveness and accountability of local government in low-capacity municipal settings. It specifies a recursive causal architecture incorporating trust accumulation loops, institutional learning, causal asymmetry and non-linear threshold effects that extends the linear frameworks currently dominant in digital governance research, and it converts this synthesis into an implementation matrix and sequenced reform recommendations suitable for practice.

Bushenyi Municipality, Uganda, serves as an illustrative analytical context rather than an empirical case study. Its selection is theoretically motivated: the municipality exemplifies the interaction-intensive, place-based service environment characteristic of rapidly urbanising secondary cities across sub-Saharan Africa. The arguments advanced are intended to be transferable to comparable settings in Kenya, Rwanda, Tanzania, Ghana and Nigeria, and to secondary cities in South Asia and Latin America where mobile technology is reshaping local governance without commensurate development of administrative capacity. Uganda's Digital Transformation Roadmap 2023/2024–2027/2028 provides the policy environment within which these questions acquire immediate practical urgency (Ministry of ICT and National Guidance, 2023). The context is interpreted against Uganda's local-government framework and national digital-transformation policy environment (Ministry of ICT and National Guidance, 2023; Uganda Bureau of Statistics, 2020).

The review engages four ongoing international debates: digitally mediated co-production (Lember et al., 2019; Simonofski et al., 2021), participatory governance in low-capacity states (Joshi and Moore, 2004; Piatak and Holt, 2020), digital public value creation (Twizeyimana and Andersson, 2019) and civic technology ecosystems in the Global South (Peixoto and Fox, 2016; Heeks, 2017). Consistent with the policy and practice review format, the article moves from a synthesis of existing scholarship to explicit, actionable recommendations for reform. The article proceeds as follows. Section 2 explains the approach to evidence synthesis and framework development. Section 3 reviews the theoretical foundations and articulates the research gap. Section 4 presents the DMMCF. Section 5 applies the framework to the Bushenyi illustrative context. Sections 6 and 7 address digital inclusion, trust dynamics and the empirical research agenda. Section 8 articulates the framework's contributions to scholarship. Section 9 presents detailed policy and practice implications, Section 10 provides a structured implementation matrix, Section 11 states the limitations, and Section 12 concludes.

2 Approach to evidence synthesis and framework development

This Policy and Practice Review synthesises existing scholarship using the framework synthesis approach for theory-building in public administration, as elaborated by Jabareen (2009). To increase the transparency and rigour of the synthesis, the development process is reported here in three sequential and auditable analytical steps, together with the inclusion criteria that governed source selection.

In the first step, a purposive literature review was conducted across four bodies of scholarship: public value theory, digital governance and e-government, citizen co-production in public services, and civic technology in the Global South. Sources were selected from peer-reviewed journals in public administration, information systems and development studies, including Government Information Quarterly, Public Administration Review, Public Management Review, Information Technology for Development, Policy and Internet, and VOLUNTAS. Priority was accorded to scholarship published after 2015, supplemented by foundational theoretical works from the early co-production and participation literature (Arnstein, 1969; Ostrom, 1996; Bovaird, 2007; Moore, 1995; Whitaker, 1980). Inclusion required that each source addressed at least two of the following dimensions: mobile or digital technology; citizen participation; public service

delivery outcomes; co-production or co-creation; or governance in low- and middle-income countries. This strategy is consistent with conceptual framework synthesis and theory-building approaches in public administration research (Jabareen, 2009). It is acknowledged in the Limitations that this purposive strategy does not constitute a formal systematic review with exhaustive search protocols and quality appraisal.

In the second step, four Global South country cases were selected to provide comparative grounding for the framework and to derive transferable policy lessons. Kenya, Rwanda, India and Brazil were chosen because each represents a distinct configuration of mobile governance investment, institutional capacity and civic participation infrastructure. Kenya illustrates mobile-first civic technology integration; Rwanda illustrates top-down digital governance reform; India illustrates layered digital public infrastructure; and Brazil illustrates participatory budgeting as a model of digitally enabled citizen co-production. Collectively, these cases represent the principal governance archetypes relevant to Uganda's digital transformation trajectory. The selection follows comparative logic in digital governance research by contrasting mobile-first civic technology, state-led digital reform, layered digital infrastructure and participatory budgeting traditions (Baiocchi and Ganuza, 2014; Heeks, 2017; World Bank, 2016).

In the third step, the DMMCF's five analytical layers were derived by synthesising the structural features common across the reviewed literature into a coherent relational model, and the model was then translated into the actionable implementation matrix presented in Section 10. The recursive dynamics specification was added to address the recognised limitation of linear frameworks in capturing the trust accumulation, institutional learning and non-linear threshold effects documented in longitudinal digital governance and organisational learning research. The framework was subsequently applied to the Bushenyi illustrative context using Uganda Bureau of Statistics population data and Uganda Communications Commission sector reports to ensure contextual specificity. The diagnostic observations reported in Section 5 were derived from these official statistical and policy sources and from secondary academic literature; they were not generated through primary fieldwork, interviews or direct observation, and are therefore presented as illustrative rather than empirically established.

3 Theoretical foundations

3.1 Public value theory and digital governance

Moore's (1995) strategic triangle, requiring the simultaneous satisfaction of citizen needs, construction of institutional legitimacy and development of operational capacity, provides the theoretical anchor for this analysis. Public value, in Moore's formulation, is not unilaterally produced by government but emerges through the interaction of managerial initiative, democratic authorisation and operational effectiveness. The subsequent public value tradition has broadened this account: Bozeman (2007) reframes public values as normative criteria against which governance arrangements may be appraised, while Benington (2009) distinguishes what the public values from what adds value to the public sphere. These extensions broaden the analysis beyond Moore's managerial emphasis and inform the DMMCF's treatment of public value as a contested and collectively negotiated outcome rather than a managerially conferred one.

Digital participation engages all three dimensions of the strategic triangle. Mobile reporting and monitoring channels extend citizen voice and thereby expand the information base available to municipal managers; responsive administrative action reinforces institutional legitimacy by demonstrating that government takes citizen priorities seriously; and mobile-enabled efficiency gains in revenue collection and service monitoring reduce operational costs and improve resource allocation. Bryson et al. (2014) extend this foundation by arguing that public value governance requires multi-stakeholder deliberation, adaptive management and simultaneous attention to procedural and substantive outcomes. Twizeyimana and Andersson (2019) systematically map the public value dimensions of e-government, identifying effectiveness, efficiency, transparency, accountability, equity, participation, collaboration and social value as constitutive outcome domains. The DMMCF's outcome layer draws directly on this taxonomy. The central claim is that mobile technology may create public value only when it is embedded in institutions capable of recognising, validating and acting on citizen contributions, a condition that prior research has named but not structurally modelled.

3.2 Digital governance: from e-government to participatory infrastructure

Janowski (2015) identifies four stages of digital government evolution: digitization, transformation, engagement and contextualisation. Participatory digital governance occupies the most advanced stage, where information and communication technology is integrated with societal needs and democratic accountability structures rather than being used solely for administrative automation. Linders (2012) introduced the concept of we-government to distinguish digitally enabled citizen co-production from one-way electronic service provision. Meijer (2012) extended this by demonstrating that new media can support both individual and collective co-production when citizens move from being informed to being genuinely involved in problem identification and resolution.

The DMMCF's institutional argument also draws on two foundational digital-governance contributions. Fountain's (2001) technology enactment framework demonstrates that the effects of information technology on government are mediated by organisational arrangements and institutional structures, so that identical technologies produce divergent outcomes across bureaucratic contexts. Dunleavy et al. (2006) advance digital-era governance as a successor to new public management, emphasising reintegration, needs-based holism and digitalisation as organising principles of the contemporary state. Together these works underpin the DMMCF's central proposition that mobile platforms acquire public value only through the administrative structures that enact them.

Contemporary scholarship has added important qualifications to these accounts. Ruijer et al. (2020) demonstrate that open data and digital transparency initiatives fail to generate participatory benefits when data literacy, institutional capacity and civic infrastructure are unevenly distributed. Simonofski et al. (2021) show that digital participation in urban governance systematically overrepresents

younger, wealthier and better-educated residents, raising data justice concerns that extend directly to mobile governance contexts. Grimmelikhuijsen et al. (2013) find that transparency initiatives strengthen citizen trust only when accompanied by visible administrative responsiveness, such that information release alone produces no sustained improvement in trust. These findings shape the DMMCF's emphasis on institutional mediation and digital inclusion as necessary conditions for mobile co-production to generate public value.

3.3 Co-production: classical frameworks and digital extensions

Co-production scholarship originates in the recognition that public services are jointly produced by state agents and citizens. Whitaker (1980) identified citizen assistance, mutual adjustment and collective decision-making as distinct modes of co-productive engagement, while Parks et al. (1981) formalised the economic logic of co-production as the mixing of the productive activities of regular producers and consumer producers. Brudney and England (1983) further distinguished individual, group and collective co-production, establishing the analytical vocabulary on which later frameworks rest. Ostrom (1996) established the foundational logic of co-production as the joint delivery of public services through the complementary contributions of providers and users. Bovaird (2007) extended this to encompass co-commissioning, co-design, co-delivery and co-assessment as distinct participatory modes.

Co-production must, however, be distinguished from thinner forms of citizen contact. Arnstein's (1969) ladder of citizen participation differentiates manipulation and tokenistic consultation from genuine citizen power, a distinction that is analytically essential for the DMMCF: mobile reporting that merely registers complaints without conferring influence corresponds to the lower rungs of Arnstein's ladder, whereas genuine co-production requires that citizen inputs shape administrative decisions. The framework therefore treats simple complaint reporting and substantive co-production as qualitatively different, not as points on a single continuum of intensity.

Brandsen and Honingh (2016) distinguished co-production in core services from complementary contributions, and individual from collective participation, a distinction with direct implications for mobile governance design because the institutional requirements of each type differ substantially. Nabatchi et al. (2017) provide a comprehensive integration of co-production with public value theory, arguing that co-production creates public value through three pathways: improving service efficiency, enhancing democratic accountability and strengthening community social capital. Lember et al. (2019) specifically address digital co-production, arguing that mobile and digital platforms create new possibilities for distributed monitoring, crowdsourced problem identification and rapid information transmission, while cautioning that digital platforms can also fragment civic engagement and reduce co-production to transactional complaint management rather than genuine participatory governance. Piatak and Holt (2020) identify three citizen motivations for co-production, namely material self-interest, civic duty and relational trust, all of which interact with mobile technology affordances in ways that the DMMCF explicitly models through its moderating conditions layer.

3.4 Trust and political authority in co-production

Because trust occupies a central position in the DMMCF, the framework engages directly with the political trust literature. Levi and Stoker (2000) synthesise evidence that political trust is relational and conditional, generated by perceptions of institutional trustworthiness, procedural fairness and responsiveness rather than by performance outputs alone. This scholarship grounds the DMMCF's treatment of trust as a dynamic variable produced and eroded through repeated citizen–state interactions, and it provides the theoretical justification for modelling trust accumulation as a recursive rather than static property of governance systems. Trust, on this account, is both an antecedent of participation and an outcome of responsive administrative action, a duality that the recursive architecture in Section 4.3 is designed to capture.

3.5 Research gap

The foregoing review establishes a clear gap in the literature that this Policy and Practice Review addresses. Existing scholarship is strong on enabling conditions and on the descriptive potential of digital tools, but exhibits three persistent limitations that the DMMCF is designed to address. First, classical co-production typologies (Arnstein, 1969; Whitaker, 1980; Parks et al., 1981; Ostrom, 1996; Bovaird, 2007) characterise citizen contributions in general terms but do not specify the mechanisms through which digital technologies enable or constrain each contribution type; they therefore lack the analytical precision required for digitally mediated municipal settings. Second, public value theory (Moore, 1995; Bozeman, 2007; Benington, 2009) and digital governance research (Fountain, 2001; Dunleavy et al., 2006; Twizeyimana and Andersson, 2019) have developed largely in parallel, with limited structural linkage between their central propositions. Third, the digital co-production literature (Lember et al., 2019) identifies possibilities but offers no structural model specifying how those possibilities are mediated, moderated or shaped by dynamic feedback, and offers limited translation of those possibilities into actionable governance guidance. Voorberg et al. (2015) confirm that co-production research has concentrated on enabling conditions rather than outcome mechanisms, and on linear rather than dynamic relationships.

The DMMCF addresses these three gaps jointly within a single relational architecture, rather than in any one of its components considered alone. It disaggregates digital co-production into five specified mechanisms with distinct institutional requirements; it structurally integrates the public value and digital governance traditions; and it specifies recursive dynamics that convert an inventory of possibilities into a testable causal model and an actionable reform agenda. The contribution is therefore one of synthesis, structural specification and practical translation. Consistent with the propositional status of the framework, these claims are advanced as warranted by the synthesised literature and awaiting empirical adjudication, not as demonstrated empirical findings.

4 The Digitally Mediated Municipal Co-production Framework

4.1 Framework definition

4.1.1 Definition

The DMMCF is a relational governance model specifying the antecedents, mechanisms, mediators, moderators and outcomes of mobile technology-enabled citizen co-production in municipal service delivery contexts characterised by developing institutional capacity, unequal digital access and emerging civic trust. The framework treats mobile technology as participatory governance infrastructure whose public value is not inherent in the technology but is socially and institutionally produced through the interaction of citizen agency, administrative responsiveness and trust-building feedback dynamics. Figure 1 presents the framework visually. Its relational specification draws on co-production theory, public value governance and e-government public value scholarship (Bovaird, 2007; Moore, 1995; Twizeyimana and Andersson, 2019).

4.2 Layer-by-layer specification

4.2.1 Layer 1: antecedents

Antecedents are the enabling conditions that determine whether mobile technology generates co-production opportunities in a given municipal context. Mobile access encompasses device ownership, SIM penetration and data affordability. Digital literacy denotes the ability to use SMS, WhatsApp, mobile money and social media for civic purposes, a more demanding requirement than basic phone use. Network quality encompasses signal reliability, bandwidth adequacy and service-interruption frequency. Civic infrastructure encompasses pre-existing social structures such as ward groups, local leadership networks, faith communities and civil society organisations through which collective mobile co-production is organised. These antecedents are interdependent: strong community organisation can compensate for limited individual digital skills through collective intermediation, and conversely, high individual connectivity with weak civic infrastructure may generate fragmented rather than coordinated participation. The access dimensions reflect established digital-divide research and ICT4D evidence on material access, skill access, usage access and connectivity constraints (Aker and Mbiti, 2010; van Dijk, 2020).

4.2.2 Layer 2: co-production mechanisms

Five mechanisms through which mobile technology may generate citizen co-production are specified. Mobile reporting is the transmission of service-failure information through calls, SMS, WhatsApp or social media. Digital monitoring is the tracking of whether reported problems are acknowledged and resolved, transforming citizens from one-time complainants into ongoing accountability actors. Mobile payment and co-financing is the payment of municipal dues and local taxes through mobile money, improving revenue traceability and reducing transaction costs for both citizens and the municipality. Community mobilisation is the organisation of sanitation campaigns, public meetings and emergency response through SMS and WhatsApp groups, transforming individual mobile use into collective civic action. Feedback evaluation is the systematic communication of

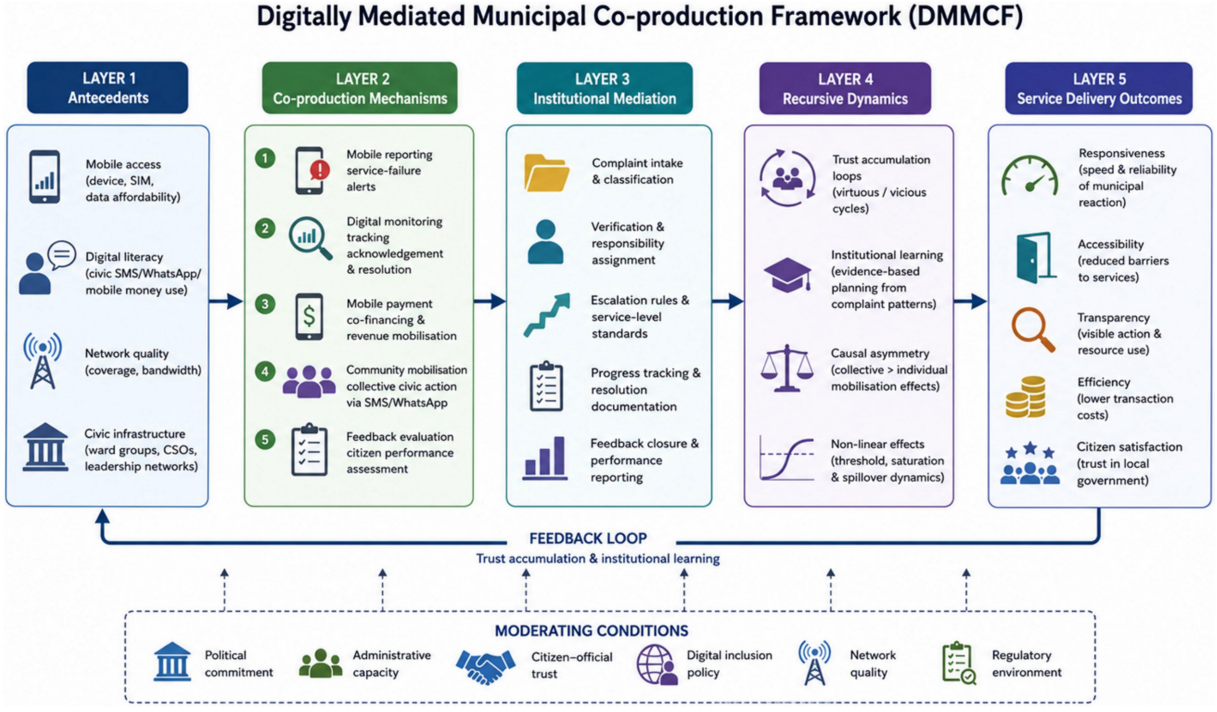


FIGURE 1
The Digitally Mediated Municipal Co-production Framework (DMMCF). Forward arrows indicate the main causal pathway from antecedents through co-production mechanisms and institutional mediation to service outcomes. The lower curved arrow captures recursive trust-accumulation and institutional-learning dynamics. Dashed upward arrows indicate moderator influences on the central pathway.

citizen satisfaction or dissatisfaction with municipal performance, providing municipalities with actionable performance intelligence that can inform planning and resource allocation. Consistent with Arnstein (1969), these mechanisms are co-productive only to the extent that they confer influence over administrative decisions; where they do not, they remain forms of consultation. These mechanisms extend established co-production categories into digitally mediated municipal practices (Bovaird, 2007; Lember et al., 2019; Meijer, 2012; Ostrom, 1996).

4.2.3 Layer 3: institutional mediation

Institutional mediation is the layer through which citizen co-production either generates or fails to generate public value. Effective mediation requires designated intake officers with clear responsibility for mobile complaint channels, documented workflow protocols for complaint verification and assignment, categorical classification systems enabling data analysis by type, location and severity, escalation rules that activate senior management when service standards are unmet, service-level standards defining response time expectations by complaint category, and feedback closure mechanisms that communicate resolution status to reporting citizens. The absence of any single element undermines the effectiveness of all others. For this reason, the DMMCF treats mediation infrastructure as structurally prior to the promotion of mobile participation platforms, not as a supplementary addition to an already-operating system. This emphasis is consistent with technology enactment theory and with evidence that digital participation creates public value only when citizen inputs are embedded in organisational routines and administrative response systems (Fountain, 2001; Grimmelikhuijsen et al., 2013; Peixoto and Fox, 2016).

4.2.4 Layer 4: moderating conditions

Moderating conditions are the boundary variables that strengthen or weaken the relationship between mobile co-production and service outcomes. Political commitment is the primary moderator because administrative responsiveness ultimately depends on willingness to invest in complaint management infrastructure and to act on inconvenient citizen priorities. Administrative capacity encompasses data management skills, human resource availability and technical capacity for complaint data analysis. Trust between citizens and officials is a dynamic moderator, produced and eroded through repeated interactions rather than being a fixed social capital stock (Levi and Stoker, 2000). Digital inclusion policies determine whether governance systems reach the full population or only its connected fraction. A critical interaction effect is specified: high administrative capacity amplifies the benefits of citizen trust, while low capacity suppresses participation gains even in high-trust contexts, an asymmetry with direct implications for the sequencing of governance reform. The moderators synthesise evidence on citizen motivation, administrative capacity, trust and digital inclusion in co-production and e-government research (Alford, 2002; Piatak and Holt, 2020; Ruijer et al., 2020).

4.2.5 Layer 5: service delivery outcomes

Five outcome dimensions are specified, drawing on Twizeyimana and Andersson (2019) and Osborne et al. (2016): responsiveness, measured as the speed and reliability of municipal reaction to citizen reports; accessibility, measured as the reduction of barriers to service information and payments; transparency, measured as the visibility of municipal action and resource use; efficiency, measured as the reduction of transaction costs and service delivery waste; and citizen satisfaction, measured as the subjective evaluation of service quality and trust in local government. These dimensions capture both the procedural and substantive dimensions of public value, ensuring that outcome measurement reflects the full scope of co-production's contribution rather than reducing it to a single metric such as response time.

4.3 Recursive causal architecture

The DMMCF's most distinctive feature is its specification of recursive, non-linear causal dynamics between layers rather than a simple input-output sequence. This specification responds to calls for stronger outcome mechanisms and dynamic explanations in co-production research (Voorberg et al., 2015) and is grounded in established organisational learning and political trust scholarship. It is presented as a theoretically derived proposition set that awaits longitudinal empirical verification. Three mechanisms are proposed.

Trust accumulation operates as a positive feedback loop with potential for both virtuous and vicious cycles. This mechanism is grounded in the political trust literature, which holds that trust is relational and conditional on perceived responsiveness rather than fixed (Levi and Stoker, 2000), and in evidence that transparency strengthens trust only when paired with visible administrative action (Grimmelikhuijsen et al., 2013). Citizens who experience responsive municipal action report more frequently, more accurately and more constructively, creating conditions for institutional learning and sustained service improvement. Citizens whose reports are consistently ignored experience trust erosion that suppresses participation and degrades information quality. Early responsiveness is therefore disproportionately consequential: it creates durable participation habits, while early neglect creates durable disengagement patterns that are costly to reverse.

Institutional learning is the adaptive mechanism through which municipalities improve complaint management routines in response to citizen-generated data patterns. The mechanism draws on organisational learning theory, in which organisations encode inferences from experience into routines that guide behaviour (Levitt and March, 1988), and on the absorptive-capacity argument that the value of new information depends on an organisation's prior capacity to assimilate and apply it (Cohen and Levinthal, 1990). Repeated reporting of the same failure in a specific ward signals the need for infrastructural investment; spatial mapping of complaint density guides resource allocation; analysis of resolution times identifies administrative bottlenecks. Mobile co-production thus functions as an evidence generation system that can progressively improve the quality of evidence-based municipal planning, not merely as a complaint channel. This grounding also clarifies why administrative capacity moderates learning: municipalities with limited absorptive capacity cannot convert citizen-generated data into improved routines.

Causal asymmetry captures the non-equivalence of different co-production inputs. Collective mobilisation through ward WhatsApp groups is proposed to produce stronger accountability effects than equivalent volumes of individual reporting because it generates social

pressure, shared monitoring and public visibility that individual complaints cannot, a distinction anticipated by classical treatments of collective co-production (Brudney and England, 1983; Whitaker, 1980). Verified, documented complaints are expected to generate more administrative action than anecdotal calls. These asymmetries have direct implications for research design, which must measure co-production type rather than volume alone, and for platform design, which should actively facilitate collective as well as individual participation. Threshold and saturation effects, described in Section 7, complete the non-linear specification and are likewise advanced as propositions for empirical testing.

5 Mobile co-production in the Bushenyi illustrative context

This section applies the DMMCF to Bushenyi Municipality as an illustrative analytical context rather than as an empirical case study. The municipal description and diagnostic observations are derived from official Ugandan statistical and policy sources and from secondary literature; they do not rest on primary data collection, interviews or direct field observation. Readers should therefore interpret the section as a theoretically structured illustration of how the framework could be applied in practice, not as a presentation of primary empirical evidence.

Bushenyi Municipality is located in Bushenyi District, southwestern Uganda, and serves as the administrative centre of the district. With an estimated population of approximately 46,000 residents based on Uganda Bureau of Statistics (2020) projections, it is classified as a municipality under the Local Governments Act (Cap. 243), which devolves responsibility for urban service delivery to elected municipal councils and appointed town clerk administrations. The municipality administers waste management, road and drainage maintenance, market infrastructure, public health communication, local revenue collection and water-related services across its urban divisions. Population and administrative context are drawn from official Ugandan statistical and policy sources (Uganda Bureau of Statistics, 2020; Local Governments Act (Cap. 243), 1997).

Drawing on published policy reports and secondary literature, Bushenyi Municipality appears to exemplify the service-delivery challenges common to Uganda's rapidly growing secondary cities. Available documentation suggests that waste management collection coverage is inconsistent across divisions, with informal dumping sites creating public health risks in under-served wards. Road and drainage maintenance is reported to be constrained by revenue mobilisation limitations: the municipal budget relies substantially on local service taxes, market fees and central government transfers, with mobile money adoption in revenue collection still at an early stage. These are precisely the interaction-intensive, place-based, information-rich service failures that mobile co-production is theoretically well positioned to address because they are visible, locatable and amenable to citizen monitoring.

The mobile connectivity environment is broadly enabling. The Uganda Communications Commission reports over 26 million active mobile subscriptions nationally, alongside among the highest rates of mobile money adoption in sub-Saharan Africa, with MTN Mobile Money and Airtel Money operating across Bushenyi District (Uganda Communications Commission, 2024, 2025). WhatsApp group communication is documented among community leaders, market associations, health workers and ward councillors. Network reliability in peri-urban wards is nonetheless uneven, smartphone ownership remains lower among elderly, low-income and female residents, and structured municipal complaint channels remain largely informal or absent, according to available sector and policy reporting. National telecommunications-sector data indicate substantial mobile subscription and mobile-money growth in Uganda (Uganda Communications Commission, 2024, 2025).

Applying the DMMCF's five-layer diagnostic to the Bushenyi context reveals a pattern familiar from the Global South comparisons reviewed in Section 3, while remaining an analytically derived rather than empirically verified interpretation. Layer 1 antecedents, including mobile access and civic infrastructure, appear partially present, particularly in urban wards. Layer 2 mechanisms, particularly reporting and mobilisation, appear to occur informally but without structured integration into administrative workflows. Layer 3 mediation appears underdeveloped: published sources indicate no documented complaint classification systems, escalation rules or feedback closure protocols within the municipality's current administrative structure. Layer 4 moderators, specifically administrative capacity and political commitment, appear to constrain co-production effectiveness. Layer 5 outcomes, notably responsiveness and transparency, remain difficult to assess because data collection and performance reporting systems are insufficient. The DMMCF thus functions not only as an explanatory model but as a governance diagnostic, identifying administrative mediation as the priority intervention point consistent with the design lessons emerging from Kenya, Rwanda, India and Brazil. This diagnostic interpretation follows the comparative lessons that platform adoption must be matched by workflow integration and feedback closure (Peixoto and Fox, 2016; World Bank, 2016), and would require primary empirical work to confirm.

6 Digital inclusion, trust dynamics and administrative responsiveness

6.1 Structural dimensions of digital exclusion

van Dijk's (2020) four-barrier model provides the analytical structure for understanding digital exclusion in mobile governance contexts. The model identifies motivational access, meaning reasons to use digital technology for civic purposes; material access, meaning device and connectivity ownership; skill access, meaning digital literacy for governance participation; and usage access, meaning practical opportunities for civic digital engagement. In the Bushenyi context, women with limited phone ownership, elderly residents, persons with disabilities, low-income households and peri-urban residents with weak network coverage are likely to face multiple simultaneous barriers. Mobile governance strategies that address only material access while neglecting motivational, skill and usage barriers risk producing digitally mediated inequality rather than inclusion. Taylor (2017) further cautions that participation systems amplify already-heard voices

while marginalising those with the greatest service needs, a data justice concern that demands explicit design attention in any mobile governance strategy.

6.2 Trust as a dynamic variable

Trust between citizens and public institutions is not a stable background condition but a variable produced and eroded through repeated interactions (Levi and Stoker, 2000). Grimmelikhuijsen et al. (2013) demonstrate that transparency initiatives strengthen citizen trust only when accompanied by visible administrative responsiveness. Alford (2002) shows that co-production motivation is shaped by perceived institutional integrity and the expectation of reciprocal engagement. The DMMCF models trust as a dynamic moderating variable: high-trust contexts generate higher volumes of accurate, constructive reports, enabling institutional learning and service improvement; low-trust contexts suppress participation quality and prevent the virtuous cycles through which co-production generates public value. Trust recovery following periods of administrative neglect requires sustained investment in feedback closure, transparent communication and demonstrated responsiveness to citizen-identified priorities.

6.3 Administrative responsiveness as institutional infrastructure

Administrative responsiveness is an institutional capability constructed through organisational design, resource allocation and accountability frameworks, not an individual official's disposition (Fountain, 2001). The DMMCF's mediation layer specifies its necessary structural elements: intake officers with clear responsibility for mobile complaint channels, documented workflow protocols, categorical classification systems, escalation rules, service-level standards and periodic performance reporting. Comparative evidence from Kenya and Rwanda suggests that administrative responsiveness is the binding constraint on co-production effectiveness: front-end digital innovation without back-end institutional integration systematically fails to deliver participation benefits (Peixoto and Fox, 2016; Heeks, 2002). The most direct policy implication of the DMMCF is therefore that mediation infrastructure should be established before mobile participation platforms are publicly promoted, not retrospectively added after participation has already begun to decline.

7 Testable propositions and research agenda

The DMMCF generates four formally stated propositions for empirical testing. These propositions are designed to be simultaneously theoretically derivable from the framework and operationally testable through mixed-methods research in Bushenyi Municipality and comparable municipal settings. Because the framework is conceptual, the propositions express expected rather than established relationships.

Proposition 1 (antecedents). Mobile technology use is positively associated with citizen co-production in municipal service delivery when residents have affordable access, sufficient digital literacy and trusted reporting channels. The strength of this relationship is moderated by network quality, gender, age, income, disability status and geographic proximity to municipal centres, with interaction effects among moderators.

Proposition 2 (mechanisms and outcomes). Citizen co-production is positively associated with public service delivery effectiveness through improved problem identification, monitoring accuracy and accountability visibility. The magnitude of this effect is expected to vary by co-production type: collective mobilisation effects exceed individual reporting effects because of the amplifying role of social pressure and shared monitoring, a causal asymmetry that a single aggregate co-production measure would fail to detect.

Proposition 3 (mediation). Municipal responsiveness partially mediates the relationship between citizen co-production and service delivery effectiveness. Partial rather than full mediation is hypothesised because high reporting volume may improve problem visibility and political prioritisation even without formal administrative response, but full outcome improvement across all five outcome dimensions requires institutionalised complaint management.

Proposition 4 (moderation). Digital inclusion, trust, network quality, affordability, administrative capacity and political commitment moderate the relationship between mobile technology use and citizen co-production. High administrative capacity amplifies the benefits of trust; low administrative capacity suppresses participation gains even in high-trust contexts.

Beyond these four propositions, the DMMCF identifies three recursive dynamics requiring longitudinal investigation. Threshold effects refer to the possibility that the relationship between reporting volume and administrative responsiveness is non-linear, with responsiveness improving sharply only after complaint volumes exceed bureaucratic attention thresholds. Saturation effects refer to the possibility that prolonged non-response triggers irreversible trust erosion and participation withdrawal. Spillover effects refer to the possibility that effective co-production in one service domain generates positive participation effects in adjacent domains through increased confidence in municipal responsiveness.

Mixed methods are required to test these propositions comprehensively. Quantitative household surveys should measure mobile phone use, co-production type, perceived responsiveness, transparency, accessibility, efficiency and citizen satisfaction. Municipal administrative records should capture complaint volumes, response times, closure rates and spatial distribution of service failures. Qualitative interviews with officials, councillors, community leaders, market traders, women's groups, youth organisations, elderly residents and digitally marginalised groups should document how mobile participation is experienced and how institutional learning occurs over time. A longitudinal design is particularly valuable for detecting the trust accumulation and saturation dynamics specified in the recursive causal architecture.

8 Contribution to scholarship

This Policy and Practice Review advances four contributions that extend and synthesise existing scholarship. Consistent with the framework's propositional status, these are presented as conceptual advances that require empirical adjudication rather than as demonstrated results.

The first contribution extends the classical co-production typologies of Whitaker (1980), Parks et al. (1981), Ostrom (1996), and Bovaird (2007). Existing frameworks characterise citizen contributions in general terms without specifying the mechanisms through which digital technologies enable or constrain each contribution type. The DMMCF's five-mechanism specification in Layer 2 disaggregates co-production into analytically distinct types with different institutional requirements and accountability implications, while using Arnstein's (1969) ladder to distinguish genuine co-production from tokenistic complaint reporting. This granularity is absent from classical typologies and enables both more precise research design and more specific governance reform recommendations.

The second contribution extends the digital co-production analysis of Lember et al. (2019). Lember et al. identify the potential impacts of digital technologies on co-production but do not provide a structural model specifying how those impacts are mediated, moderated or shaped by recursive dynamics. The DMMCF provides a five-layer architecture connecting digital access conditions to co-production mechanisms, through institutional mediation, to outcome domains, with moderating conditions and recursive feedback loops specified at each juncture. This transforms an inventory of possibilities into a testable causal model and an actionable reform agenda.

The third contribution integrates the public value tradition (Moore, 1995; Bozeman, 2007; Benington, 2009) with the digital governance literature (Fountain, 2001; Dunleavy et al., 2006; Twizeyimana and Andersson, 2019). These traditions have developed largely independently, with limited structural linkage between their central propositions. The DMMCF integrates them by mapping the public value creation process onto the specific mechanisms, mediation requirements and outcome dimensions of mobile co-production, allowing it to specify not only whether mobile co-production may improve services but which type of public value each co-production mechanism is best positioned to generate.

The fourth contribution advances a recursive causal architecture that addresses the limitations observed by Voorberg et al. (2015), who found that co-production research has focused more on enabling conditions than on outcome mechanisms, and more on linear relationships than on dynamic processes. Grounded in political trust (Levi and Stoker, 2000) and organisational learning scholarship (Cohen and Levinthal, 1990; Levitt and March, 1988), the DMMCF's recursive specification incorporating trust accumulation loops, institutional learning pathways, causal asymmetry and threshold effects directly addresses these gaps. By modelling co-production as a dynamic, iterative process rather than a static input-output relationship, the DMMCF provides a theoretical basis for longitudinal research designs and for explaining why mobile governance initiatives with similar technological endowments may produce divergent service delivery outcomes across different institutional contexts.

9 Policy and practice implications

Because the DMMCF is a conceptual framework awaiting empirical validation, the following implications are offered as theoretically motivated guidance to inform reform design and to be tested in practice, rather than as evidence-based prescriptions. Consistent with the policy and practice review format, they are organised by the principal actor groups responsible for implementation and are summarised in the implementation matrix presented in Section 10.

9.1 For municipal governments

The DMMCF's most consequential implication concerns sequencing: feedback closure infrastructure should be established before mobile participation platforms are actively promoted. A municipality that launches a WhatsApp complaint line without designated intake officers, escalation protocols and feedback closure mechanisms risks generating unrequited reporting that erodes civic trust durably, activating the vicious cycle in the DMMCF's trust accumulation loop and suppressing the future participation on which sustained co-production depends. Municipal governments should additionally treat citizen-generated complaint data as a planning intelligence resource, using spatial analysis of complaint frequency, type and resolution time to guide evidence-based infrastructure investment and personnel deployment.

9.2 For national policymakers and development partners

Digital transformation strategies should be evaluated not only by infrastructure metrics such as device penetration, internet coverage and platform adoption rates, but by participation quality, inclusion depth and measurable service delivery outcomes. Digital public infrastructure frameworks gaining traction in African Union digital strategy discussions should explicitly incorporate local governance co-production as a design use case, directing investment towards back-end administrative capacity alongside front-end platform development. Uganda's Local Government Finance Commission and Ministry of Local Government should consider integrating mobile co-production performance metrics into existing municipal performance assessment frameworks. This implication is consistent with public-value approaches to e-government evaluation (Twizeyimana and Andersson, 2019; World Bank, 2016).

9.3 For citizens and civil society

Mobile co-production creates opportunities for evidence-based civic engagement extending beyond complaint-making. Residents and civil society organisations can systematically document recurring service failures, monitor response patterns, mobilise collective accountability platforms and use municipal performance summaries to demand public explanation. For such engagement to generate public value rather than political polarisation, it must remain constructive, verifiable and inclusive of residents across the digital divide, including those whose participation depends on community intermediaries rather than individual smartphone ownership.

10 Implementation matrix for mobile co-production governance

Table 1 presents a structured, DMMCF-derived implementation matrix for mobile co-production governance in the Bushenyi illustrative context. Each row maps an illustrative governance gap to a specific framework-derived intervention and an expected outcome, and

TABLE 1 DMMCF-derived implementation matrix for mobile co-production governance in the Bushenyi illustrative context.

Domain	Illustrative gap	DMMCF-derived intervention	Expected outcome
Digital access	Unequal smartphone, data and connectivity access across the population	Multi-channel design combining SMS, voice calls, WhatsApp, community radio and offline mechanisms	Representativeness of participation across the full resident population
Citizen reporting	Service complaints remain informal, fragmented and poorly documented	Structured mobile reporting channels categorised by service type, location and severity	Traceability, comparability and prioritisation of service failures
Feedback closure	Reports submitted without acknowledgement or resolution communication	Mandatory acknowledgement messages, progress updates and resolution notifications via accessible channels	Trust accumulation and sustained citizen participation
Workflow integration	No standard system for receiving and processing mobile complaints	Designated intake officers, categorical classification, escalation rules and a digital complaint register	Conversion of citizen input into accountable municipal action
Mobile revenue	Local revenue collection is inconvenient, opaque or vulnerable to leakage	Secure mobile payment for municipal dues, market fees and licences with transparent receipting	Improved revenue traceability and co-financing transparency
Data utilisation	Citizen feedback does not inform planning, budgeting or resource allocation	Routine complaint analysis by location, type, response time and resolution status	Institutional learning and evidence-based service planning
Public accountability	Residents cannot verify whether reported problems have been acted upon	Periodic public performance summaries published at ward and municipal level	Transparency, trust reinforcement and political accountability

Each row corresponds to a specific DMMCF layer. Digital access addresses antecedent conditions (Layer 1). Citizen reporting and workflow integration operationalise co-production mechanisms (Layer 2) and institutional mediation (Layer 3) respectively. Feedback closure addresses the trust-accumulation dynamic in the recursive architecture. Mobile revenue and data utilisation address moderating conditions and institutional learning. Public accountability addresses the transparency and citizen satisfaction outcome dimensions (Layer 5). The gaps listed are illustrative and derived from secondary sources, not from primary fieldwork.

corresponds to a specific DMMCF layer. The matrix is intended for direct use by municipal reform teams, national policymakers and development partners as a sequenced planning instrument.

11 Limitations

This Policy and Practice Review does not present primary empirical data from Bushenyi Municipality, which serves throughout as an illustrative analytical context rather than an empirical case study. The DMMCF's propositions require testing through surveys, administrative records, qualitative interviews and comparative municipal analysis. The recursive dynamics, including trust accumulation cycles, institutional learning pathways and threshold effects, are theoretically derived and await longitudinal empirical verification. The framework may require adaptation in municipalities with substantially different administrative traditions, political cultures, demographic compositions and infrastructure endowments.

The diagnostic observations regarding Bushenyi were derived from official municipal and statistical documents, national policy reports and secondary academic literature rather than from primary observation, interviews or document audit conducted by the authors; they should therefore be read as illustrative inferences pending empirical confirmation. The four comparative cases were selected to represent distinct governance archetypes and have been interpreted through published academic and policy literature rather than primary fieldwork. Context-specific features of each setting may not transfer to Bushenyi Municipality. The purposive literature review, while systematic in its scope, does not constitute a formal systematic review with exhaustive search protocols and quality-appraisal procedures. These limitations define the boundaries within which the DMMCF's claims should be interpreted and tested rather than undermining its conceptual validity.

12 Conclusion

This Policy and Practice Review has synthesised the public administration, digital governance and co-production literature and introduced the Digitally Mediated Municipal Co-production Framework, a formally named and theoretically specified model that proposes how mobile technology may generate public value through citizen co-production in sub-Saharan African municipalities, and that translates this synthesis into actionable governance guidance. The framework advances four contributions: it disaggregates co-production into five specified mechanisms; integrates the public value tradition with digital governance and co-production research; specifies a recursive causal architecture, grounded in political trust and organisational learning scholarship, that extends existing linear frameworks; and positions the analysis within international digital governance debates through structured comparative reference to Kenya, Rwanda, India and Brazil. These contributions are offered as conceptual advances awaiting empirical validation, accompanied by a structured implementation matrix

and sequenced reform recommendations intended for practical use.

The central argument may be stated precisely. Mobile technology is likely to improve public service delivery effectiveness when it activates meaningful citizen co-production through trusted channels, and when that co-production is absorbed into institutionalised municipal response routines that close feedback loops, generate administrative learning and build civic trust iteratively over time. The Bushenyi illustrative profile, with partial antecedent conditions, informal co-production mechanisms and underdeveloped institutional mediation, locates it at the most consequential intervention point: building the mediation infrastructure that converts citizen participation into accountable, sustained service improvement.

Future research should test the DMMCF's four propositions empirically using mixed methods, examine its recursive dynamics longitudinally and adapt the framework comparatively across diverse municipal contexts in Uganda and the wider Global South. The goal is a model of digital local governance that is not only technologically enabled but participatory, inclusive and durably accountable.

Author contributions

JU: Visualization, Conceptualization, Validation, Writing – review & editing, Writing – original draft, Methodology. TN: Visualization, Writing – review & editing, Validation, Methodology, Writing – original draft, Supervision, Investigation, Conceptualization. IO: Conceptualization, Validation, Supervision, Writing – review & editing, Methodology, Writing – original draft, Visualization. AM: Writing – original draft, Writing – review & editing, Visualization, Validation, Methodology, Supervision, Conceptualization. TM: Visualization, Validation, Writing – review & editing, Methodology, Supervision, Conceptualization, Writing – original draft. OU: Methodology, Validation, Writing – review & editing, Writing – original draft, Conceptualization, Supervision, Visualization.

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The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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