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Pathways for collaboratively strengthening water and sanitation systems

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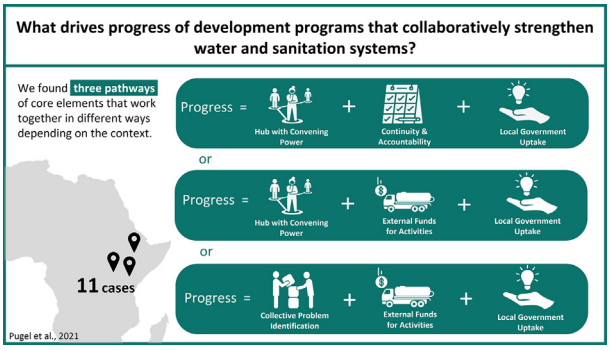
HIGHLIGHTS

- Collaborative approaches convene diverse entities to solve complex problems.
- Current understanding of their use in international development is limited.
- We compared eleven cases in Eastern Africa to provide evidence-driven guidance.
- Multiple pathways can lead to progress; designs should be tailored to the context.
- Successful pathways secured uptake by government and had flexible programming.

GRAPHICAL ABSTRACT



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ABSTRACT

Collaborative approaches are seen as a promising way to strengthen Water, Sanitation, and Hygiene (WASH) service delivery systems when challenges exceed the mandates and capabilities of any single entity. While collaborative approaches are well studied in high-income country contexts, current understanding of their application to international development contexts is limited. This paper uses fuzzy-set Qualitative Comparative Analysis to assess what conditions and pathways drove or impeded progress within eleven collaborative approaches for WASH service delivery in Eastern Africa. Evidence supported three main findings: (1) Government uptake of recommendations is necessary for progress but cannot be guaranteed solely by government participation in the collaboration, (2) different forms of problem identification are possible; problem scopes are often predefined to align with funders and partner government agendas, but flexible scopes that foster collective problem identification can reap benefits, and (3) hub convening power can be critical and convening power can be gained in different ways. Political dynamics, shifting priorities, and turnover undermine collaborative efforts, but collaborative approaches can still make progress in spite of turnover if funds are available for implementation of

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activities (i.e. in addition to funds for meetings and hub roles) and program implementers either facilitate collective problem identification or establish a hub with convening power. Yet even these tactics are vulnerable to instability, thus in highly unstable contexts, stakeholders and funders should be realistic from the outset about what they may be able to achieve. Building on existing theories of collaborative approaches, this work revealed that there is no single best design for collaborative approaches in WASH, rather, core elements worked together in different ways depending on the context.

1. Introduction

Water, Sanitation, and Hygiene (WASH) service delivery remains unequal, unreliable, and unsafe for a large portion of the world's population. Many low- and middle-income country governments are still in the early stages of establishing robust systems and arrangements for WASH service provision and management (Banerjee and Morella, 2011; Huston and Moriarty, 2018). Deeply-rooted, systemic challenges such as water scarcity, rural-urban migration, historical influences, and global events further complicate reform efforts (Chitonge, 2011, 2014). Overcoming these challenges exceeds the mandates and capabilities of any single entity, spurring implementers to use collaborative approaches to strengthen service delivery systems. More intensive than typical coordination platforms and more structured than colloquial uses of the term "collaboration," we define collaborative approaches as development programs that bring local-level stakeholders together to address shared, complex problems through joint action and mutual responsibility (Darteh et al., 2019; Millennium Water Alliance, 2020; SWS, 2020). Implementers are increasingly turning to collaborative approaches because they expect them to bring more success than conventional approaches.

The emergence of collaborative approaches is part of a broader movement to "strengthen systems" in the global WASH sector. Systems strengthening approaches aim to improve service delivery and sustainability by seeking to "understand, engage with, and positively [influence] the network of actors and the interacting factors that deliver services" (Hollander et al., 2020, p. 2; see also Valcourt et al., 2020). With 1 in 4 handpumps in Sub-Saharan Africa not working at any given time (Foster et al., 2019; RWSN, 2010) and over two-thirds of Africans lacking sewage infrastructure (Walker, 2016), systems strengthening efforts seek to address the underlying enablers and barriers to WASH service delivery and management. In so, systems approaches offer an alternative to traditional modes of WASH service delivery, such as community-based management (Chowns, 2015; Dube, 2013; Huston et al., 2021).

Due to their recent emergence and inconsistent terminology (Pugel et al., 2020), knowledge on collaborative approaches in the WASH sector remains widely dispersed, unstandardized, and understudied. As a result, implementers, funders, and participants of collaborative approaches lack evidence-driven guidance on how they should be designed, including which factors contribute to or hinder their progress. Collaborative approaches are well-studied in high-income countries within ecology, public health, education, and many other fields (e.g. Ansell and Gash, 2007; Emerson and Nabatchi, 2015a; Meek, 2021) but remain largely under-studied in development contexts.

We addressed this gap of knowledge and application by investigating what drove or impeded progress of collaborative approaches in WASH in Eastern Africa. We used fuzzy-set Qualitative Comparative Analysis (fsQCA) to compare eleven cases. This research provides an evidence base for implementers, funders, and governments, calling attention to fundamental decisions required to tailor an approach to its operating context. By reflecting on the application of widely-applied frameworks of collaborative approaches in public service delivery in developing country contexts, we build on and expand their theoretical underpinnings to hasten the realization of global and national goals for local development.

2. Literature review

Below we review literature in three broad categories: collaborative approaches in development contexts, outcomes of these approaches, and conditions posited to contribute to those outcomes.

2.1. Collaborative approaches

For decades, organizations, program funders, and researchers have sought a 'new frontier' of collaboration, improving how different organizations can work together to achieve outcomes that none could achieve on their own. The predominant frameworks and theories on the topic are built on experiences in North American, Australian, and European contexts, including the literature on Inter-organizational Collaboration (Gray, 1989), Collaborative Management (Margerum, 2011), Collaborative Public Management (Meek, 2021), Collaborative Governance (Ansell and Gash, 2007; Emerson and Nabatchi, 2015a), Network Governance (Provan and Kenis, 2007), and Multi-Stakeholder Partnerships (Gray and Purdy, 2018). Despite the wide use of collaborative approaches in development contexts using terms such as "collective action" or "collective impact" (e.g. Kania and Kramer, 2011; Nkum Associates, 2014; Salinger et al., 2018; Smits and Moriarty, 2007; Warner, 2016; Wolff, 2001), recent scholarly reviews on collaborative approaches have not included these examples (Bryson et al., 2015; Gray and Purdy, 2018; Kekez et al., 2019; Morçöl et al., 2021; Stout and Keast, 2021).

Service delivery systems in high-income countries are vastly different from those in low- and middle-income countries, which can be characterized by: the significant influence of donors and their priorities (DiCaprio, 2013; Hope et al., 2020), lack of accountability for improved services (Katusiimeh, 2015), higher deference to power (Hofstede, 1980; Ibarra, 1996), low infrastructure investments and funding gaps (Chitonge, 2014), inconsistent or ambiguous devolution/ decentralization of service mandates (Larbi, 1998; Olowu, 2003), unfavorable institutional support and financing mechanisms for service delivery models (Hope et al., 2020), limited capacity for the state to carry outs service mandates (Mo Ibrahim Foundation, 2019; Post et al., 2017), and the reliance on personal connections over institutions amidst high turnover (Lund, 2006; Owusu and Ohemeng, 2012). In no way do these challenges plague all development contexts; instead, they demonstrate that collaborative approaches for public service delivery will look different when applied in development contexts.

The authors previously conducted a study that found that collaborative approaches applied to service provision in international development contexts have fundamental differences in political dynamics, avenues for government engagement, the influence of donors, and high turnover rates of government staff (Pugel et al., 2020). We hypothesize that because collaborative approaches are highly dynamic and contingent on context (Scott and Davis, 2015), basic assumptions underlying the major frameworks in literature may change when seeking to build collaborative approaches for public service delivery in low- and middle-income countries.

2.2. Outcomes of collaborative approaches

Collaborative approaches seek systems-wide, complex changes – they do not happen linearly, nor quickly, and are influenced by many

factors (Ajroud et al., 2020). Efforts to define and assess outcomes have broadly fit into three overarching categories: (a) *outputs*, or indictors of proper functioning of the collaborative itself[1]; (b) *intermediate results*, or tangible actions being taken and activities being implemented by the collaborative[2]; and (c) *impact*, or the changes that those actions created towards the resolution of the objective the collaborative sought to achieve.[3] Because of our cases' maturity level, we determined the *intermediate result* level was the most appropriate level of assessment, which captures the incremental progress made towards implementing tangible activities. We will refer to these simply as "outcomes" for this work.

Literature has focused on evaluating outcomes of collaborative approaches but has not identified how to compare outcomes to one another. In the WASH sector, examples of systems strengthening outcomes that collaborative approaches have sought to achieve include: establishing a new mandate for the government to oversee professional maintenance services (Harvey and Mukanga, 2020); resolving a longstanding conflict between industry and a municipality to construct a fecal sludge dumping site (Henry and Annis, 2018); strengthening water user demand for sustainable services despite a lack of willingness to pay for water (Magara, 2021); establishing a monitoring system used by all service providers in the county (REACH, 2016); and achieving more significant resource allocation and staffing for a district water office. These outcomes vary drastically: some require overcoming controversy and conflict while others seek to change the ways of working in an entire county or country.

A comprehensive comparison of collaborative approaches in the WASH sector should consider the variation in the difficulty of the intended outcomes (Liu, 1999). An outcome is more difficult than another if it has aspects that are inherently harder to achieve (Dao et al., 2017; Ralston, 2014). Literature from economics, politics, development, and engineering can contribute relevant measures for comparing outcome difficulty. Measures can assess the extent to which the outcome: is *multifaceted* and thus requires activities that span social, political, environmental, financial, institutional, and technical scopes (An et al., 2018; Crane et al., 2019; Denizer et al., 2013; Ralston, 2014); requires the *widespread adoption of new practices*, such as by the public or all stakeholders in a sector (Larson, 2018); is *novel*, if the outcome was unfamiliar to many of the stakeholders involved in the collaborative (An et al., 2018; Browning, 2019; Denizer et al., 2013; Kermanshachi et al., 2020; Kim and Wilemon, 2007); and is *dependent on stakeholders that are distributed*, either horizontally across sectors or vertically across administrative levels (OECD, 2012).

2.3. Contributors to Progress of collaborative approaches in development contexts

To address the dearth of literature on collaborative approaches in development, Pugel et al. (2020) convened an expert panel to rate the relative importance of over sixty factors found to contribute to the progress of collaborative approaches in development contexts and service delivery applications. The panelists brought together experience from more than 70 collaborative approaches across more than 20 countries. Factors fell into five broad themes: (1) government involvement and uptake of recommendations; (2) goal identification and measurement; (3) legitimate, capable leadership and facilitation; (4) consistent, committed membership; and (5) structures and processes for functioning. We briefly cover the theoretical backgrounds and practical implications of these themes below, recognizing that no studies to date have investigated these factors in combination.

2.3.1. Government involvement and uptake of recommendations

Literature has outlined various forms of government involvement: some approaches define themselves as being government-led (Ansell, 2019; Ansell and Gash, 2007, 2018); others define themselves as not being government-led (Emerson et al., 2012; Emerson and Nabatchi, 2015a; Nabatchi and Emerson, 2021); some describe the government as an important, equal partner in these approaches (Gray and Purdy, 2018); and some have simply cited the importance of getting the government's endorsement (Lasker et al., 2001).

However, involvement and endorsements do not always equate to commitment. Research to date has not explored the complicated process of *how* government support is obtained nor investigated the role of government uptake of recommendations compared to verbal endorsements or statements of support. These aspects are essential to understand when applying collaborative approaches to development contexts because the international development field is now prioritizing government-centered development (Denizer et al., 2013; USAID, 2014, 2019a; Winpenny et al., 2016) over more traditional forms of community-based management of services (Chowns, 2015; Dube, 2013; Hutchings et al., 2015; Kyessi, 2005) and other forms of nonstate management of services (Dahan et al., 2010; Katusiimeh, 2015). This shift to government-led management recognizes that uncoordinated management forms ultimately circumvent and weaken existing governmental structures and institutions, undermining the long-term sustainability of services. Government involvement and uptake cannot be assumed nor be an afterthought when applying collaborative approaches in these contexts.

2.3.2. Goal identification and measurement

Literature generally agrees that collaborative approaches require consensus on a shared vision (Kania and Kramer, 2011; Salmoral et al., 2020). However, the degree of flexibility in the scope of the collaboration, meaning the specific activities that will help reach that vision, differentiates prominent streams of literature. Collaborative governance approaches clearly define the collaborative process as beginning with an open slate, having little to no scope limitations, i.e.: collaborative governance involves setting the terms of engagement and then using those terms to create and execute agendas and strategies" (Nabatchi and Emerson, 2021, p. 402). Most literature on collaborative governance actively warns against predefining the problem scope for a collaborative process (Stout and Keast, 2021). Because of this, most studies on collaborative approaches have not explored how more rigid problem scopes may influence outcomes.

However, in practice, program structures, donor interests, and government priorities often set some scope limitations on collaborative approaches applied in development contexts. Many program funders and governments that oversee the work of organizations in their jurisdiction cannot feasibly support a program whose goals are, by definition, open-ended and collectively decided through the process. This study will thus include multiple types of problem identification in line with other scholars such as Nambisan (2009).

2.3.3. Legitimate, capable leadership and facilitation

Collaborative approaches typically require an entity that initiates, convenes, and manages the collaborative approach (e.g., all logistical, facilitation, convening, leadership, negotiation, and administrative functions). Literature refers to this entity as a "backbone organization" (Kania and Kramer, 2011), a "lead organization" or "Network Administrative Organization" (Provan and Kenis, 2007), a "collaborative manager" (Liu et al., 2021), or the "convening organization" (Emerson and Nabatchi, 2015a). Some in the water and sanitation sector colloquially

[1] Within the literature, *outputs* include creating value (Austin and Seitanidi, 2012; Page et al., 2015), social capital (Bisung et al., 2014), gaining authority or legitimacy (Koschmann and Burk, 2016; Provan and Milward, 2001), engaging participants in discursive processes and developing a collective identity (Hardy et al., 2005), as well as actively participating, shifts in network structure, and trust built (Gray, 2000).

[2] Examples of *intermediate results* include a change in operation or strategy of actors (Douglas and Ansell, 2021) or simply implementing agreed actions (Emerson and Nabatchi, 2015b; Nabatchi and Emerson, 2021; Roll et al., 2017).

[3] *Impact* has been evaluated through problem resolution (Gray, 2000) and reported improvements by participants (Emerson and Nabatchi, 2015a).

refer to this as the "hub," (e.g. Moriarty et al., 2021), which is the term we use.

Two critical aspects of the hub are its (a) capacity and (b) legitimacy. The capacities (a) of the hub mean "network-level coordinating skills and task-specific competencies" (Provan and Kenis, 2007, p. 240), including the time, staff, and skills to organize, facilitate and follow up on meetings. Hub legitimacy or convening power (b), defined as the "informal power and relationship capital of initiating leaders" (Emerson and Nabatchi, 2015a, p. 50), gives them "the influence and ability to bring people together for meetings and other activities" (Lasker et al., 2001, p. 190).

2.3.4. Consistent, committed membership

One of the less controversial contributors to the progress of a collaborative approach is a committed membership, i.e., where members show up consistently, send the appropriate representatives, and feel accountable to carry out actions assigned to them (Millennium Water Alliance, 2020; Pugel et al., 2020). Literature has approached this concept in different ways: some highlight that members must have the resources and capabilities to carry out assigned activities (Kekez et al., 2019), others assert that members should be motivated to engage, including seeing value in their engagement (Page et al., 2015), and others explain how membership should include all relevant stakeholders who play a role in the service delivery system (Darteh et al., 2019). However, literature has not looked at the role of membership consistency in combination with other factors, for example, unstable political environments where a consistent, committed membership may be unattainable. The stability of the environment in which the collaboratives operate, including political shifts and the frequency of staff turnover (Kennedy-Walker et al., 2015; Munamati et al., 2016), plays a vital role in member continuity and accountability. Whether predictable or unpredictable, disrupting events such as natural disasters, global pandemics, political unrest, or election seasons can suddenly shift members' priorities, change budget allocations, and dissolve buy-in and commitments. When the institutions within a local WASH system are less reliable or less established, the system becomes overly reliant on personal relationships and commitments, making them particularly vulnerable to such instances of instability (Lund, 2006).

2.3.5. Structures and processes for group functioning

Having suitable structures and processes for functioning is also needed for any collaborative approach (Pugel et al., 2020), including structures such as norms, rules, and procedures, as well as processes to build and maintain transparency, trust, legitimacy, and authority (Bryson et al., 2015). Literature generally recommends that these be collectively developed, followed, and adapted over time (de Abreu and de Andrade, 2019; Emerson and Nabatchi, 2015a). Frequent, intentional, and meaningful interaction between members has also been cited as critical (Jalba et al., 2014), where the collaboration process builds on existing interdependencies and relationships to develop a network of trust and respect (Bryson et al., 2015). Some literature claims that egalitarian structures are required to facilitate greater trust so that members do not feel like others are exercising undue influence over one another (Stout and Keast, 2021). However, we do not yet know how this factor interacts in combination with other factors.

2.4. Research questions and approach

Understanding how the above conditions work in combination is critical due to the complexity and dynamics of collaborative approaches. Current literature on collaborative approaches has relied almost exclusively on case studies to investigate these dynamics; in a recent review of over 1400 studies, fewer than 2% used experimental or mixed methods (Morçöl et al., 2021). As a result, scholars in the field have identified a need for greater "causal identification or statistical generalization" (Douglas et al., 2020, p. 496). We address this gap by using rigorous methods to identify how combinations of conditions work together in contributing to or inhibiting progress of collaborative approaches.

3. Methods

This study used fuzzy-set Qualitative Comparative Analysis (fsQCA) to investigate how different combinations of factors may play a role in either contributing to or inhibiting collaborative approaches in the WASH sector.[4] Housed between case-oriented and variable-oriented analytical methods, the fsQCA method uses case knowledge and set logic to infer causality while allowing for context sensitivity (Ragin, 1987). Due to these strengths, fsQCA has been increasingly applied in both program evaluation applications (e.g. Befani, 2013; Pattyn et al., 2019; Varone et al., 2006) and WASH sector applications (Davis et al., 2019; Kaminsky and Jordan, 2017; Marks et al., 2018; Olaerts et al., 2019; Peletz et al., 2018). Specifically, we answer the research question "What combinations of conditions contribute to progress of collaborative approaches in local water, sanitation, and hygiene systems in Eastern Africa?"

FsQCA (Fig. 1) involves selecting cases, outcomes, and conditions; collecting and synthesizing data; converting all qualitative data into set membership scores; analyzing scores using fuzzy logic; and interpreting results (Ragin, 1987). Set membership scores are defined using set theory to reflect the extent to which each case exhibits the conditions and the outcome relative to all other cases. Scores are iteratively 'calibrated,' meaning they are re-scaled to best represent the cases in the analysis, using different techniques for qualitative data ("indirect calibration") and quantitative data ("direct calibration"). Scores range between 0 and 1, where 0 is entirely out of the set, 1 is entirely in the set, and 0.5 is the 'cross-over point' or point of maximum ambiguity. We then used the computer software fsQCA (Ragin et al., 2017) to systematically quantify set relations between the outcome and all possible combinations of conditions. The results show which combinations ("pathways") were necessary and sufficient for progress.

For this work, each case represents one *collaborative*, a group of local stakeholders working together as members of the collaborative approach to achieve a specific outcome. *Program lead organizations* were the entities that received funding from *program funders* to convene a collaborative or strengthen an existing platform. The *research team* constitutes the authors of this study, including representatives from *program lead organizations* and *program funders* who were involved at various stages, from the study setup to the interpretation of the results.

The research protocol was reviewed by the University of Colorado Institutional Review Board under Protocol #19-0207.

3.1. Cases in context

We included eleven collaboratives that sought to strengthen water or sanitation service delivery systems in Eastern Africa (Table 1). Cases spanned administrative levels (national, sub-national[5]), urbanicity (rural, peri-urban, urban), countries of operation (Ethiopia, Kenya, and Uganda[6]), and specific topics within WASH (water, sanitation, or all of WASH). A map of all cases is provided in the Supplementary Information S1. All cases were implemented at the administrative level whose mandate or responsibility aligned with the technical objective; for example, the case in Kenya operated at the county level because Kenya county governments hold the mandate for water service provision. Most cases began designing their collaborative approaches in March

[4] The methodological approach followed established methods, none of the methods themselves were novel or adapted from current practice.

[5] Countries vary in their administrative divisions. The first sub-national administrative level in Ethiopia is a region while in Kenya it is a county, for example.

[6] Cases were not selected to serve as a sample of Eastern Africa. No countries were purposefully excluded.

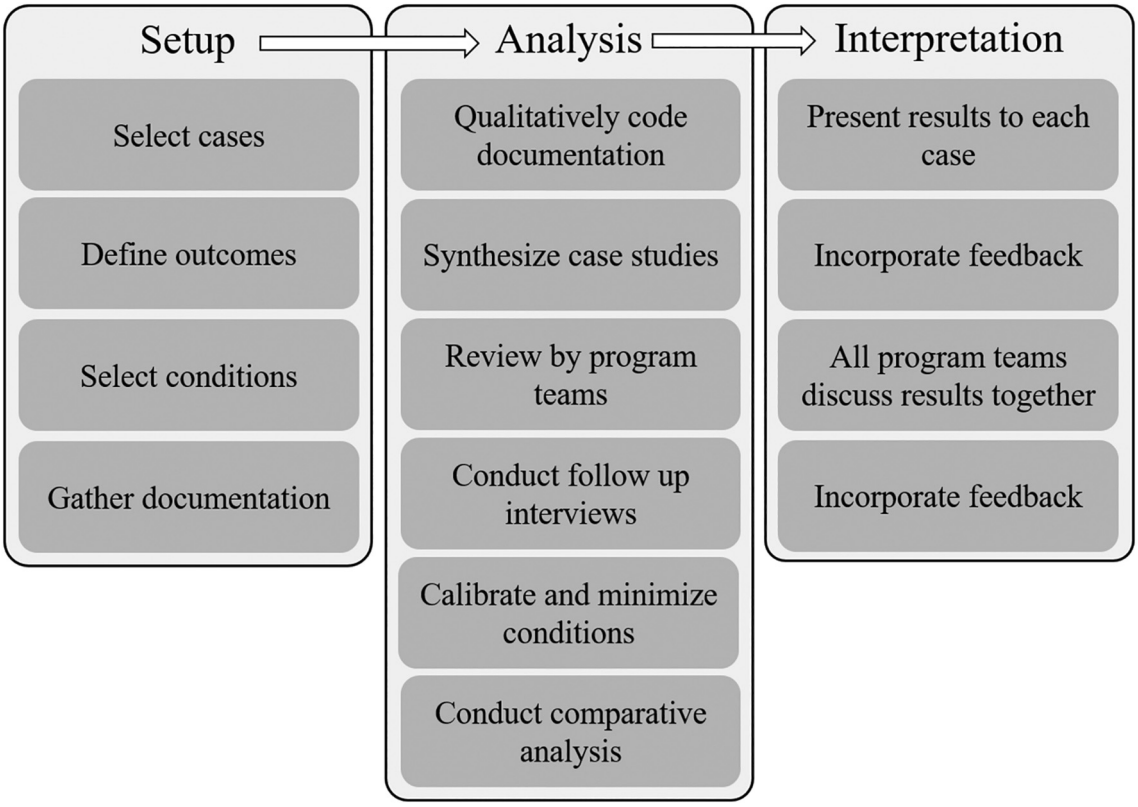


Fig. 1. Methodological steps followed for fuzzy-set Qualitative Comparative Analysis.

2017. Data was collected through September 2020 for most cases, but for the few cases that began later (KKT, EMW, USH), data collection was extended to either December 2020 or May 2021. Nine of the eleven cases were funded through the USAID Sustainable WASH Systems Learning Partnership (www.globalwaters.org/sws).

3.2. Selection of outcomes

We defined the outcome for this work as *Progress on Difficult Outcomes* through case knowledge and discussions with the program lead organizations and program funders. In each case, the collaborative agreed on a specific outcome they sought to achieve through a set of specific activities, for example, increasing water scheme functionality by setting up a monitoring system used by all stakeholders in a county. This study measured the outcome using standardized measures for (a) incremental progress made towards the implementation of these activities, as well as (b) the relative difficulty of these activities. Progress was indirectly calibrated (Basurto and Speer, 2012) through a six-point scale devised to most accurately reflect this set of cases and follow implementation literature and practice (e.g., Pinto and Slevin, 1988; United Nations, 2017). From fully out of the set (0, no progress made) to fully in the set (1, activity fully implemented), the measures included: the planning of the activity, gaining buy-in from the right stakeholders, mobilizing those stakeholders and resources, and finally, beginning and completing the implementation of the activity (Table 2 column 1).

Outcome *difficulty* was evaluated to give more weight to progress made on more arduous outcomes. A high-level review of project management and program evaluation literature, supplemented by case knowledge, resulted in seven difficulty measures (see Section 2.2). Thus, an outcome was considered more difficult if it (a) required widespread change throughout the sector, (b) required government policy or mandate changes, (c) depended on stakeholders distributed horizontally or (d) distributed vertically, or was (e) unfamiliar, (f) multifaceted, or (g) controversial (Table 2 column 2). A difficulty score was assigned based on how many measures applied to the case and were converted to a set membership score using direct calibration techniques (Ragin, 2008). Direct calibration finds a natural break in the data to define distinctive groups, then scales values to membership scores within the

Table 1
Cases included in the study, including their timelines and country, sector, the scale of operation, the date that program design began, and when data was cut off for this study.

#	Name (alias)	Country	Sector	Scale	Program design began	Data cutoff
1	Kitui WASH Forum (KKT)	Kenya	Rural WASH	County	8/2017	12/2020
2	South Omo Learning Alliance (ESO)	Ethiopia	Rural Water	Zone	3/2017	9/2020
3	Mille Learning Alliance (EML)	Ethiopia	Rural Water	District	3/2017	9/2020
4	Woliso Learning Alliance (EWO)	Ethiopia	Sanitation	Small town	3/2017	9/2020
5	Debre Birhan Learning Alliance (EDB)	Ethiopia	Sanitation	Small town	3/2017	9/2020
6	Kabarole District WASH Task Team (UKB)	Uganda	Rural WASH	District	3/2017	9/2020
7	Kumi District Area Service Provider Partnership (UKU)	Uganda	Rural Water	District	3/2017	9/2020
8	Kamuli District Area Service Provider Partnership (UKA)	Uganda	Rural Water	District	3/2017	9/2020
9	Nakaseke District Area Service Provider Partnership (UNK)	Uganda	Rural Water	District	3/2017	9/2020
10	Regional Program Team (EMW)	Ethiopia	Rural Water	Region	12/2017	12/2020
11	Sanitation for Health Steering Committee (USH)	Uganda	Sanitation	National	1/2018	5/2021

Table 2
Outcome measures were defined as a combination of the extent of progress made towards implementing an activity and the difficulty of that activity.

Progress measures Value assigned: Single value assigned, noted in parentheses	Difficulty measures Value assigned: Count of all that apply, re-scaled to membership curve using direct calibration techniques.
No progress made (0)	Requires widespread adoption of new practices or changes to existing practices, such as by the public or all stakeholders in a sector.
Planned: a plan has been formed (0.2)	Requires the government to change mandates or policies
Buy-in obtained: the right stakeholders support the idea (0.4)	Dependent on stakeholders that are distributed horizontally (across sectors)
Resources mobilized: resources and partners have been mobilized to support the action (0.6)	Dependent on stakeholders that are distributed vertically (with higher and lower administrative levels)
Implementation ongoing: implementation is ongoing and has not yet reached the point of being completed (0.8)	Unfamiliar: similar types of interventions have not been implemented before in the area of operation.
Implemented: the intervention has been implemented, and all activities have been completed (1)	Multifaceted: the activity spans three or more of the following disciplines: social, political, environmental, financial, institutional, or technical Controversial or politically sensitive

0.0 and 1.0 bounds using logarithmic functions. Direct calibration steps are outlined in Supplementary Information S2.

The two measures were combined by taking the minimum of the two scores (Schneider and Wagemann, 2012). To be considered 'in the set' of *Progress on Difficult Outcomes*, it would have to cross the 0.50 threshold for both Progress and Difficulty. For example, an outcome with at least three difficulty measures (0.68, see SI Table 3) that mobilized resources and partners (0.6) would receive a set membership score of 0.6 and thus would be considered to have made *Progress on Difficult Outcomes.* However, if that outcome never moved past the buy-in stage (0.4), it would receive a value of 0.4 and would not be considered to have made *Progress on Difficult Outcomes*. These benchmarks and combination techniques were defined to best fit this set of cases. As many cases sought to achieve multiple outcomes, for ease of comparison, we assigned outcome scores to each case based on their single top-scoring outcome (highest combined Progress and Difficulty scores).

While these measures were the most useful delineators for this set of cases, they were not fully representative of the significant broader impacts resulting from the outcomes themselves. For example, UNK's outcome was defined as "the formal establishment of a sole Area Service Provider for professionalized maintenance services," which excludes other aspects of the Area Service Provider's work such as national-level advocacy work and scheme maintenance for several hundred communities. This delineation also simplifies some of the parallel and synchronous activities required to sustain the outcome; in UNK's case, the regulation by formal government policies, endorsement and support from regional government water authorities, and tariff revenue payment from service recipients in compliance with legal agreements. This limited our ability to capture the full scope of some cases' accomplishments, particularly their ability to enable stakeholders' joint, collaborative action on multiple, mutually reinforcing activities.

3.3. Selection of conditions

Pugel et al. (2020) identified fifty-eight contextual conditions, design components, and intermediate results that influence the success of collaborative approaches for service delivery in development contexts from literature and an expert panel. The study first sourced and synthesized the conditions from well-established bodies of literature

Table 3
Causal conditions found to influence collaboratives making progress on difficult outcomes.

Causal condition	Definition of full "in set" membership	Definition of full "out of set" membership
Local government uptake	Relevant decision-making entities in the local government take up decisions or recommendations made by the collaborative, contribute financial or in-kind resources to their activities or expand annual government budgets related to the topic. Formal agreements or policies, directly influenced by the collaborative, are adopted.	Relevant entities may verbally support the idea of working together or the topic the collaborative seeks to work towards, i.e. WASH, but has not taken up any of their recommendations.
Hub with convening power	The entity that manages all logistics, facilitation, leadership, and administrative functions of the collaborative (the "hub") has significant convening power. Convening power is defined as "the influence and ability to bring people together for meetings and other activities" (Lasker et al., 2001). Significant convening power can come either from (a) a government entity that is respected, has decision making power, and holds a mandate related to the topic of the coalition or (b) a non-government entity that has a long history in the area before the coalition began, established working relationships, high respect and influence, social capital, and strong local knowledge.	The hub has limited convening power, and intentions for government to be involved in convening never fully manifested.
Collective problem identification	The collaborative is involved in identifying key problems, determining the broad solution areas to address those problems, planning detailed activities under those solution areas, and implementing those activities.	Predetermined problem scope: The problem scope was somewhat bounded before work began, either to align with program lead organization agendas or ideas, funder interests, or government priorities.
External funds for activities	Funding is available to the collaborative from external sources specifically for their outcomes, including databases, policy development, master planning, or infrastructure construction. This funding is available for at least three years.	External funding is available for convening meetings of the collaborative. External funding may be available for conducting some key confidence-building activities, data collection, or learning exchanges, but external funds were not available to members for implementation of activities specifically for their outcomes.
Continuity & accountability	Member organizations consistently send the right representatives and members feel accountable for actions.	Members either do not consistently send the right representatives or members do not feel accountable.

on collaboration based in high-income country contexts (e.g. Ansell, 2019; Ansell and Gash, 2007; Emerson et al., 2012; Margerum, 2011; Ostrom, 2000) and then used an expert panel to prioritize them for their application in international development contexts (Pugel et al., 2020). The present study bounded the analysis to understand how contextual conditions and design components led to progress on difficult outcomes. Thus, we excluded conditions categorized as intermediate results. Contextual conditions are factors that primarily lie outside of project implementers' control or can only be influenced over long periods of time, while design components, i.e., "the steps, elements, or processes that are included by design within a [collaborative's] functioning and activities" (Pugel et al., 2020, p. 6) are within a project implementer's manageable interest. Conditions were further reduced in two ways. First, we removed conditions that the experts from Pugel et al. (2020) rated as less than 4 out of a 5-point scale of importance. Second, conditions related to one another were combined; for example, two conditions related to the stability of the operating environment were combined into a single condition in which stability was 'in the set,' and instability was 'out of the set.' Case knowledge informed these steps, where conditions were added back into the analysis if deemed potentially important. For example, "low turnover of member staff" was of moderate importance by the expert panel in Pugel et al. (2020); however, program lead organizations identified it as a potential contributor to progress, so it was included in the analysis. This process left thirty-six conditions for which data was collected. Justifications for all excluded and combined conditions are listed in the Supplementary Information S3.

3.4. Gathering documentation

First, documentation was collected from all cases, amounting to over 300 pages of documentation per case. These included: program proposals, meeting reports, startup documents including signed memorandums of understanding or terms of references, technical assessments, quarterly program reporting, field visit reports, observations of meetings by the research team or program leads, facilitator diaries, interviews with members of the collaboratives by the program leads, and interviews with program leads by the research team in Summer of 2019. Due to COVID-19 travel and gathering restrictions, data collection shifted to fully remote in March 2020, though the program lead organizations remained on the ground. The impact from COVID-19 on the collaboratives themselves led to the postponing of one or two meetings and some planned activities being delayed by a few months.

3.5. Qualitative coding

The research team synthesized all documentation using deductive and inductive coding procedures in QSR NVivo version 12 (QSR, 2019). Deductive coding allowed information to be categorized into the thirty-six conditions derived from Pugel et al. (2020). Inductive coding allowed codes and definitions to be adapted, merged, and created to best represent this set of cases. An independent researcher checked internal validity by duplicating all coding for one of the eleven cases (MacPhail et al., 2016).

3.6. Synthesis of case studies

Detailed case studies were then compiled for each case, qualitatively synthesizing all evidence related to each condition and summarizing the extent to which each of the thirty-six conditions was present in each case. Case studies were then reviewed and validated by the research team representatives from program lead organizations, who provided detailed context and explanations for all conditions. Finally, comments were integrated into a near-final version of the case studies, and a 1- to 2- h virtual interview was conducted with the program lead organization to fill final gaps.

3.7. Condition calibration and minimization

All qualitative information was converted into a value from 0 to 1, representing the extent to which the case is 'in' or 'out' of the set of the condition, where 'in the set' meant the condition was fully present in the case. Increments on each conditions' scales were based initially on theory but then iteratively 'calibrated' so that the increments reveal meaningful differences among this specific set of cases (Basurto and Speer, 2012). For example, for the condition *Collective Problem Identification*, fully 'in set membership' included when the collaborative was involved in identifying key problems (membership score = 1). 'Out of set membership' included when the collaborative began with a predetermined problem scope, i.e. when the problem scope was somewhat defined before work began (either to align with program lead organization agendas, funder interests, or government priorities) but the collaborative was still heavily involved in identifying and implementing solutions within that problem area (membership score = 0). Partial set membership was defined for these cases as when comprehensive, detailed, system-wide analyses were conducted with stakeholder involvement. In some cases, the collaboratives used the results to inform their priorities (partially in the set, 0.66) but in others, discussions with stakeholders did not result in problems being identified and the program lead organization defined solution areas based on the analysis results (partially out of the set, 0.33).

The calibration of conditions also involved combining conditions found to create similar effects on the collaborative and removing constant conditions that did not vary across cases. Of the thirty-six conditions, eighteen conditions were combined or integrated into others. For example, the interpretation process revealed that political stability and key government officials' turnover rates both led to an inconsistent membership: whether predictably or unpredictably, half of the representatives could suddenly be brand new to their position with minimal institutional handover. Thus, the effects of Stability were covered by the condition *Continuity and Accountability of Members*, which already accounted for the extent to which the same representatives consistently showed up and could be counted on to carry out actions assigned to them. Likewise, the establishment of Shared Workplans or Agreed Measurement Systems contributed to the feeling of accountability, which was also covered by *Continuity and Accountability*. This extensive combination and minimization process was highly iterative, allowing for the merging, removal, or addition of conditions until the final results were obtained.

Thirteen of the original conditions did not vary across the cases and could not be investigated using QCA. However, these thirteen conditions must be recognized as they may be needed in combination. We refer to these as "constant conditions" (they are also known as domain conditions or trivial necessary conditions) and are discussed further in the results in Section 4.3.

Ultimately, five conditions were included in the final analysis (Table 3). The criteria for set membership scores for these five conditions are included in the Supplementary Information S4.

3.8. Comparative analysis

Next, we used Boolean algebra and fuzzy logic to systematically quantify the set relationship between all possible combinations of conditions and the outcome (Ragin, 2006). Each set relationship comparison investigates the extent to which each combination of conditions was present when *Progress on Difficult Outcomes* was also present. Cases that did not make sufficient *Progress on Difficult Outcomes* are also used in the comparison but are used as counterfactuals. These set relationship comparisons, aided by deep knowledge of case dynamics alongside set theory, allow the researchers to infer causal relationships.

Set relationship comparisons were systematically considered for all possible combinations of conditions with the aid of computer software fsQCA 3.0 (Ragin et al., 2017). To do so, a data matrix was compiled; rows comprise each case, and columns comprise condition and

outcomes set membership (See SI Table 12). Then, the data matrix was imported into the fsQCA software for conversion into a truth table. A truth table is a table with rows comprising all possible combinations of conditions, or 2^n where n is the number of conditions, in this case, $2^5 = 32$ rows, and columns indicating which conditions are present in each row.

The systematic consideration of conditions means this method retains and considers more dynamics than statistical methods (Byrne and Ragin, 2009). Similar to statistical analyses, the software allows for causal identification, quantified measures of validity, and replicability throughout the process. Similar to case-based methods, detailed case knowledge is required throughout the analytical process. Details about the process and decisions are provided in Supplementary Information S5.

Two analyses were run to investigate (1) the contributors, which looked at how conditions contributed to the presence of *Progress on Difficult Outcomes*, and (2) the inhibitors, which looked at how conditions contributed to the absence of *Progress on Difficult Outcomes*.

3.9. Validity and validation

Consistency and coverage values evaluate the validity of the configuration. Consistency refers to the extent to which the set of pathways consistently produces the outcome. Coverage refers to the extent to which the outcome is explained by this configuration of pathways. Both are used throughout the comparative process to quantify set relations between individual conditions, combinations of conditions, configurations of pathways, and the outcome. Generally, values above 0.8 are considered to be strong (Ragin, 2006).

Upon completion of analysis in March 2021, final 1-h validation interviews were conducted by video conference with each program lead organization to get feedback on the results. In April 2021, a final interpretation workshop convened representatives from most program lead organizations to confirm the pathways and discuss implications of the results in detail.

4. Results

Eight of the eleven cases made *Progress on Difficult Outcomes* in the study timeframe, while three did not. All eleven were investigated for what contributed to and inhibited progress.

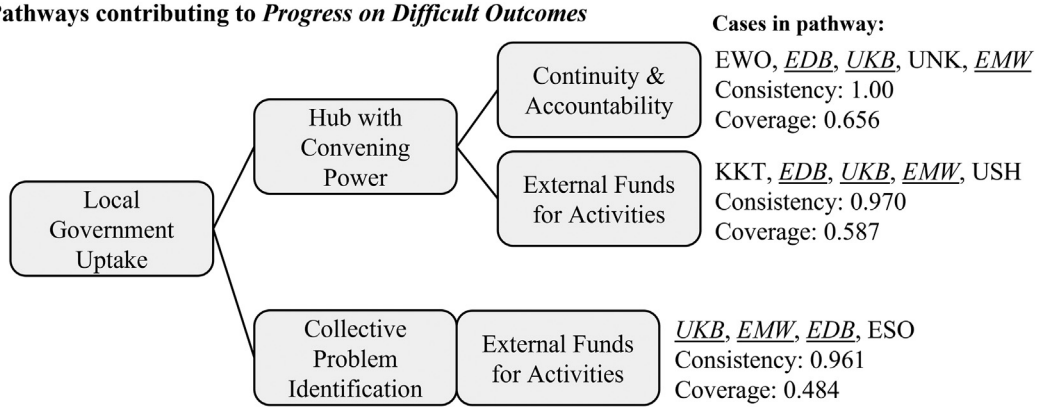
4.1. Pathways contributing to Progress on difficult outcomes

Three pathways explained the eight cases that made progress on difficult outcomes (Fig. 2), referred to as "pathways to progress" in this study. Pathways are not chronological but instead are shown based upon "common denominators" shared by multiple pathways. Branches, indicated by lines, split to show the variety of pathways that cases followed. For example, the first and topmost pathway is read as: *Local Government Uptake* AND *Hub with Convening Power* AND *Continuity and Accountability* is sufficient for *Progress on Difficult Outcomes*. The first condition listed, *Local Government Uptake,* is first only because it was present in all three pathways, not because it occurred first.

This configuration's consistency value of 0.958 indicates that in nearly all of the instances where one of these pathways was followed, progress was made on difficult outcomes, meaning these pathways are reliable. The high coverage value of 0.870 achieved means most instances where *Progress on Difficult Outcomes* was observed, one of these pathways was followed.

All three pathways to progress relied on getting sufficient *Local Government Uptake* of their recommendations, including the local government taking up decisions or recommendations made by the collaborative, financially contributing to the collaborative's activities, or expanding annual government budgets related to the topic. This reinforces sentiment by key players in the international development sector who have cited the importance of working through government systems and gaining their buy-in (Winpenny et al., 2016; USAID, 2019b, 2014). Which government entities were considered "relevant" depended on the country, administrative level of operation, outcome being sought, and sub-sector of operation: for example, for rural sanitation service delivery in Uganda, relevant government entities at the district level are the Chief Administrative Officer, the District Health and Water Officers, and District Councilors, but the relevant government entity at the national level is the Ministry of Health.

Notably, *Collective Problem Identification* was not identified in the first two pathways as necessary to make progress (Cases EWO, UKB, UNK, KKT, EDB, USH). While some cases in the first two pathways identified problems collectively, others applied an existing concept or solution. Instead, cases in these pathways required the presence of a *Hub with Convening Power* which was able to rally stakeholders around the effort effectively. The hub was then able to move progress forward via

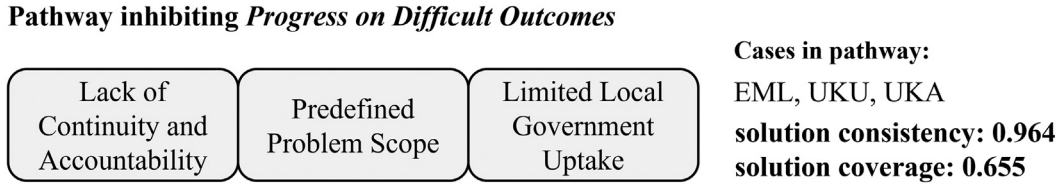


Condition	Necessity	Sufficiency
Local Government Uptake	0.959	0.861
Hub with Convening Power	0.832	0.819
External Funds for Activities	0.705	0.872
Continuity & Accountability	0.656	1.000
Collective Problem Identification	0.559	0.849

solution consistency: 0.958
solution coverage: 0.870

Underlined case names indicate cases that followed multiple pathways

Fig. 2. QCA pathways of conditions contributing to the progress of collaborative approaches. From left to right, conditions are ordered by the presence in pathways (i.e., Local Government Uptake was in all three pathways). Case names are shown next to the pathways they followed, and underlined names show cases that followed multiple pathways.



Condition	Necessity	Sufficiency
Lack of Continuity and Accountability	1.00	0.664
Pre-defined Problem Scope	0.854	0.569
Limited Local Government Uptake	0.772	0.928

Fig. 3. Conditions contributing to stalled progress. Conditions are ordered from highest to lowest necessity, with the leftmost condition having the highest necessity.

two methods. In cases that benefited from relatively stable political environments and manageable government turnover, the hub strengthened the *Continuity and Accountability of Members,* which ensured members followed up on the action items that they were assigned. These cases (EWO, UKB, UNK) all used some form of progress tracking, either impact-based or activity-based measurement, to do so. In other cases (KKT, EDB, UKB, USH), the hub secured *External Funds for Activities,* which provided a collective incentive and enabled members to carry out action items assigned to them.

The cases that fell into the third pathway (UKB, EMW, EDB, ESO) explicitly sought to define problems collaboratively. Progress was possible whether or not the hub entity had convening power because it capitalized on its capacity to facilitate - bringing people together for *Collective Problem Identification* and having *External Funds for Activities*. These three conditions, when combined, were sufficient for making *Progress on Difficult Outcomes.*

4.2. Pathway inhibiting progress on difficult outcomes

A single pathway, comprised of the interplay of three conditions, was found to be sufficient for stalled, or *lack* of, *Progress on Difficult Outcomes* (Fig. 3). These three conditions are highly interlinked. The *Lack of Continuity and Accountability* in all three cases was due to a political environment plagued by disruptive political dynamics, unpredictable shifting priorities, and unmanageable turnover, which we refer to as *instability* throughout this work (EML, UKU, UKA). This instability can also inhibit *Local Government Uptake* because emergencies can dominate the attention of decision-makers, for example: "the unusually high summer rainfall in the country caused flooding in the [region], necessitating a substantial emergency response. This became the priority for the regional and national governments, which made it challenging to find leadership for regular activities" (EML, 2020). A *Predefined Problem Scope* further challenged uptake by the government because the government was less involved in selecting the problem. Though one of these cases initially attempted to foster *Collective Problem Identification,* the shifting priorities brought about by the emergency context limited the ability for problems to be collectively identified, ultimately requiring the hub to select problem areas for the collaborative (EML).

This single pathway inhibiting progress had a high consistency (0.964), indicating that in nearly all instances in which these conditions were present, progress was stalled. This pathway will reliably lead to stalled progress. The slightly low coverage (0.655) means that this is not the only explanation for why progress may stall in a case.

4.3. Constant conditions as context drivers

All eleven of the cases in this comparison, regardless of whether or not they made *Progress on Difficult Outcomes* in the 3–3.5 years of their operation, had thirteen conditions in common (Table 4). In all collaborative approaches, members were autonomous stakeholders, each of whom played a role in water or sanitation service provision. Because of this, their roles depended on one another to some degree. Members voluntarily showed up to meetings and felt decent external or internal motivations to be a member. Power differences existed, but members generally did not explicitly leverage them to influence decisions or discussions. In every case, both technical and decision-making[7] government entities were either members or were highly engaged in the collaborative. Facilitated transparently by a hub entity with strong capacity, the members reached a shared vision, frequently interacted in and between meetings, and attained small achievements early in the process. While not included as a condition, it is also worth recognizing that all cases were implemented at an appropriate administrative level, meaning they operated at the scale where the government's mandates aligned with the technical objective. While these conditions did not vary across cases, meaning their role in driving progress could not be formally investigated using fsQCA, they are contextual drivers that set up the conditions that drove or inhibited progress.

5. Discussion

5.1. Gaining and maintaining local government uptake

Development practitioners know that government action and policies are critical to well-functioning public service delivery systems (Winpenny et al., 2016). Government support is more than just verbal statements supporting the collaborative's topic or broadly noting the value of collaboration, as is posited by existing literature (Lasker et al., 2001). Meaningful support occurs when government entities act based on, or take up, recommendations of the collaborative. The program lead organization for UKB described an example of this: "The district council is the highest decision-making structure of the district local government. All stakeholders interviewed felt that the adoption of a council resolution to pass and officially launch the [activity] was evidence of Local Government ownership of the [activity]. The ownership is critical to drive the next steps from launch to actual implementation" (UKB, 2019a, 2019b).

Interestingly, the engagement of government entities (both technical officials and decision-makers) was a constant condition in this analysis, meaning that all eleven cases significantly involved both technical and political government actors in the collaborative process. Despite this significant *involvement*, only eight were able to attain sufficient government *uptake*. Alone, involving technical and political government actors in the collaborative process does not prescribe their uptake of recommendations. Therefore, literature only citing the importance of involvement (Ansell and Gash, 2007) is missing this critical bridge between involvement and uptake.

[7] Typically decision makers were either elected or politically appointed positions, which varied by context.

Table 4
Constant conditions, defined as conditions that did not vary across our eleven cases of collaborative approaches.

Constant condition	Definition
Interaction between members	Time is set aside in meetings for back-and-forth discussions, and in between meetings, there is either moderate or strong interaction.
Interdependence of members	Most or all members' jobs rely on one another to get their jobs done.
Voluntary participation	Membership is voluntary; no one is mandated or required to show up.
Transparency of processes	Fundamental processes are known to most members, including decisions, discussions, and funding shifts.
Engagement of technical officials	Technical government officials are substantively engaged in the collaborative process. They are updated regularly, highly involved in meetings, discussions, and decisions.
Engagement of decision-makers	The relevant decision-makers or high-level government officials are updated regularly and are highly involved in meetings, discussions, and decisions of the collaborative.
Member autonomy	All members remain autonomous entities, though the collaborative or individual members may slightly influence some members.
Power differences between members	Some power differences existed between members.
Reflection and adaptation	The collaborative has moderate to high flexibility for their plans and processes.
Incentives or motivations to engage	Members have moderate or strong motivations to engage in the collaborative, either through internal or external motivators.
Common vision established	A visioning process was followed, which resulted in a vision statement that a majority of members agreed to.
Hub with capacity	The entity that manages all logistics, facilitation, leadership, and administrative functions of the collaborative (the "hub") is an entity with a high capacity to perform those roles.
Early wins	Small wins or achievements were attained early on in the process.

The fact that collaborative approaches in WASH are applied to strengthen service delivery systems means that, by definition, they are working within weak systems or limited-governance environments (e.g. K'Akumu, 2007). In the words of one program lead organization representative, "Instead of dealing with a system, we deal with individuals because there are no systems in place to create continuity" (UNK Validation call, 3/24/2021). This creates an environment where the collaborative approach is heavily reliant on personal relationships and commitments; thus, significant instances of political instability and turnover can dissolve buy-in and commitments that have been obtained. These can be unpredictable or predictable. As an example of an unpredictable event, in one case, the Zone Water Department Head was actively scaling lessons from the collaborative but then was suddenly replaced by another political appointee, and all discussions about scaling up ceased (ESO). Predictable events also affect buy-in. For example, the election season in Uganda typically causes politically motivated withdrawals of support for collaboratives seeking to professionalize maintenance services, as political attention focuses on the election rather than WASH and some politicians promise free water services in exchange for votes. Government uptake and support is thus not something that is gained once nor guaranteed by a signed contract or memorandum of understanding. Implementers must continually maintain and regain government support over the long lifetime of a collaborative approach, especially in contexts affected by political dynamics, shifting priorities, and turnover.

Cases facilitated government uptake in different ways. Demonstrating "urgency for change," or evidence that the topic of the collaborative should be a priority, was noted by several program lead organizations as an influential contributor to uptake. This has been accomplished through comprehensive data collection and analysis that clearly showed the urgency of a problem, for example, demonstrating that a large portion of water infrastructure is nonfunctional (ESO, KKT, EMW) or that many of a town's latrines are leaking into the groundwater and existing fecal sludge disposal practices are illegal (EDB, EWO). For a hub working within a predetermined problem scope, additional convincing may be necessary to show a "proof of concept" that the topic area is important and the specific problem is an effective leverage point (UNK, USH).

5.2. Ways to gain hub convening power

Literature has described how hubs "tend to have dense professional and social networks, tend to be known to key individuals, and tend to be seen as sufficiently credible and trustworthy" (Emerson and Nabatchi, 2015a, p. 47). Our work shows that in some contexts, this is a critical contributor to progress.

Program lead organizations initiating a collaborative approach within an area they have been working for a long time may have the advantage of significant convening power (UKB, EMW). If the program lead organization serves as the hub, this can allow for some independence from government processes, providing consistency amidst high turnover or keeping progress moving amidst low capacity. Independence from the government may also be a well-suited hub structure for sectors where the government may be antagonistic to the aims of the collaborative, such as human rights sectors (e.g., Foot, 2016). However, a critical risk of an independent hub structure is that it may create dependencies on the program lead organization or the project, which are not sustainable in the case of indefinitely delivering public goods such as WASH services.

Limited convening power is a challenge faced by many program lead organizations who gain funding to support the collaborative strengthening of systems but are new entrants to the area where they set up the collaborative. A large presence of other organizations competing for the attention of government entities can also limit an organizations' convening power (UKA). Lead organizations with limited convening power can proceed in a few different ways. One option is to follow a different pathway: the hub can foster collective problem identification and secure external funding for the collaborative (third pathway). Another option is to bring other entities (i.e., government or highly respected individuals in the sector) into the hub role or transfer the hub role entirely (USH). Fully handing hub roles over to the government could follow different steps. One case expanded the mandate of an existing government official (UNK). Another followed a series of steps: first, informally establishing a secretariat comprised of government officials to illustrate a governance structure and value addition to the collaborative, then progressively influencing its long-term role, and finally formalizing resources through local sector policy change processes

(KKT). Institutionalizing hub roles into government processes and systems over time can translate to a consistent and reliable convening structure that can withstand the effects of turnover (KKT, UNK). Considering the critical role of local government uptake, a considerable benefit of this approach is the legitimacy it adds to the process (Ansell and Torfing, 2016), allowing for a higher potential of commitment and uptake from that hosting agency.

However, in some situations, the government may not have the immediate time, staff, and resource availability to serve as the hub alone (Owusu and Ohemeng, 2012), especially amidst political dynamics and turnover. Elections or political reform can cause established relationships to disappear nearly overnight, for example. Thus, program lead organizations seeking to leverage government convening power for the hub may wish to continue to fill the time-intensive and administrative functions of the hub while supporting the government entity to lead and convene (EWO, EDB). This approach effectively shares two hub functions across two entities: the government brings the convening power while the program lead organization brings dedicated staff with greater time availability. Bringing other entities into key hub roles early on is more than just involving them as members, as some literature suggests (e.g. Gray, 1989). It means substantively handing over responsibilities, such as meeting facilitation or action item follow-up, updating key decision-makers, or advocating for funding. This aligns with literature on collaborative governance that advises the government to lead the approach but does not include guidance on transitioning roles to government over time (Ansell and Gash, 2007).

To hand over these roles effectively, some teams conducted extensive planning, facilitation, and problem-solving training for these individuals and coached them as co-facilitators before transferring roles fully (EWO, EDB). Based on the findings of this study, if seeking to leverage hub convening power to make progress, the hub will need to gain *Local Government Uptake* and either foster *Continuity and Accountability* of members or secure *External Funds for Activities* to make progress.

5.3. Ways to identify problems

All collaboratives were formed under the auspices of improving sustainable WASH services. The specific problems within WASH that the collaboratives focused on were either identified problems through the collaboration process, which required great flexibility from both program funders and the government entities, or were predetermined by the program funder, program lead organization, or the government. While most literature on collaborative approaches recommends open-ended problem scopes, recent streams have recognized other forms of problem identification, such as predetermined scopes (Meek, 2021; Nabatchi and Emerson, 2021).

5.3.1. Predetermined scope

Many cases made progress on predetermined outcomes, though the reasons why the outcomes or scopes were predetermined varied. Some cases had pre-existing boundaries because the program lead organizations had been a part of the local system for many years and already had ideas about how to strengthen the systems but needed buy-in and action from other local actors. For example, UNK was convened by a professional maintenance service provider who initiated the partnership meetings to establish the government as a service authority to oversee professionalized maintenance service providers in the district.

In other contexts, predetermined scopes are non-negotiable. Funders and partner governments may impose boundaries because they need to know what work will be done before it starts. In some government jurisdictions, for example, program lead organizations were required to concretize their planned activities and expected outputs within Memorandums of Understanding with the government before any work could begin (ESO, EML, EMW, EDB, EWO). Thus, beyond greater certainty for funders and governments, an added benefit of predetermined scopes is that they can help ensure that activities align with local government priorities and mandates. Regardless of context and intent, it is always critical to consider the ethics of who is involved in predefining scopes and goals.

Recent scholarship has posited that it may be "more straightforward" to implement collaborative approaches when "tasks and goals [are] externally determined" (Nabatchi and Emerson, 2021, p. 403), assuming it is nothing more than skipping over a time-intensive step in the problem identification process. While this is an intuitive assumption, our work reveals that this is far more nuanced in practice: in some cases, it was straightforward to obtain buy-in on a predefined scope, while in other cases, it was not. Further, "externally determined" goals may be better or worse depending on which external body is setting the goals.

Thus, our work provides an evidence base for literature exploring alternate forms of problem identification (Meek, 2021; Nambisan, 2009). Our results show that collaboratives operating within predetermined scopes can make progress on difficult outcomes if they follow the first or second pathway, when: *Local Government Uptake* is gained for those predetermined scopes, the *Hub has Convening Power*, and either *Continuity and Accountability* is fostered or *External Funding for Activities* are secured.

5.3.2. Collective problem identification

Many lead organizations operating with greater scope flexibility were working in contexts with limited data about the key weaknesses in the local WASH system. They needed to conduct comprehensive analyses of the system before the collective problem identification processes began; the pre-existing lack of data meant these analyses heavily informed the problem-identification processes and priorities of the collaborative (Adanke et al., 2019; Henry and Annis, 2018). Only one case had complete flexibility: the collaborative team members were tasked with strengthening WASH services in their district and defined problem areas without significant steering by the program lead organization (UKB). Collective problem identification was only possible due to the flexibility of the program funder and the leadership from the district government. Another case used a hybrid approach. They started with a 1.5-year "Bridge" program that had flexibility from the donor, allowing the program lead organization to use the bridge time to conduct the systems analyses and then collectively identify challenges and root causes in collaboration with relevant stakeholders before longer-term funding began (EMW). The hybrid approach created greater scope certainty for the government and the program funder while helping to build a shared vision across stakeholders.

These results provide evidence for literature that cites the importance of collective problem identification (Ansell, 2019; Nabatchi and Emerson, 2021) and provides some important caveats. Our analysis also revealed that an approach that facilitates *Collective Problem Identification* also must secure *External Funding for Activities*. Thus, to fully reap the benefits from collective problem identification, it is necessary to have reliable access to external funding for activities. In all cases in this study, funding was available for at least three years and came from external entities or donors rather than being contributed by the members of the collaboratives themselves.

5.4. External funding for activities for at least three years

Two pathways were reliant on *External Funding for Activities* for at least the first three years to make progress. This is a notable distinction for collaborative approaches in development contexts: funding is often needed not only for the hub roles and convening meetings but also to fund the broader activities of the collaborative. As noted in a meeting report from UKB, "Members were not able to commit themselves to some responsibilities [in the annual workplan]… without a clear implementation budget" (UKB, 2019a, 2019b). A program lead organization representative explained why this budget is important: "that carrot is needed. In terms of something they can work towards, it might not be today. It might not be tomorrow. It might not be next year, but… there's

a reason to work to pursue this and work towards that" (EDB, 2019). Existing literature has suggested this is not the case and instead assumes that the collaborative will be "self-organizing," where members will contribute some of their organization's funding to work towards the goals of the collaborative (Stout and Keast, 2021). The Collective Impact framework, which is more widely applied in the development sector, has a "precondition" that twelve months of funding are available for hub or "backbone" activities (Hanleybrown, 2015). However, our analysis suggests that, at least in WASH development contexts where funding is often scarce, external funding for collaborative activities may be an important motivating factor that encourages participation and helps to align objectives for the first three years of a collaborative approach. That being said, this research did not look at the impacts of longer-term funding past three years. Longer-term external funding may create dependencies and, over time, may undermine sustained engagement and weaken government roles (Elbadawi, 1999). Programs reliant on external funding may seek to encourage internal funding and create more locally-sourced funding options over time.

5.5. Ways to avoid inhibited progress in a collaborative approach

Recent literature has called for more investigation into collaborative approaches that do not make progress (Koschmann, 2016) and the barriers that impede progress (Gray and Purdy, 2018). The pathway inhibiting progress provides a word of caution to implementers trying to scale or apply an existing solution in an unstable or unpredictable context without sufficient or consistent government buy-in and uptake. Implementers could use one of two routes to translate stalled progress into significant progress. As stability is not something that can be changed readily, the first pathway to progress would likely be unattainable as it requires *Continuity and Accountability* of members. Thus, the implementer should seek to secure *External Funds for Activities* and then either (a) facilitate *Collective Problem Identification* or (b) establish a *Hub with Convening Power* – then they can work towards gaining *Local Government Uptake*. The benefits gained from facilitating *Collective Problem Identification* may be lost if instability leads to the turnover of those involved in identifying the problems. A *Hub with Convening Power* may still be an avenue to provide consistency amidst instability. Bringing an entity or individual with strong convening power on board to be seen as the 'face' of the collaborative from the start allowed two of our cases (USH, KKT) to obtain *Local Government Uptake* on a predefined problem scope without the benefit of consistent membership. However, convening power is still vulnerable to instability as turnover can disrupt existing relationships that create the convening power. Thus, critical conditions in all three pathways are vulnerable to instability to some degree, though there may be other factors that can withstand instability that this and other research have not yet investigated.

The most reliable route to avoid inhibited progress as understood by this research may be to avoid highly unstable contexts, even though some academic literature claims that "uncertainty" or "turbulence" can be a potential driver or impetus for collaboration (Bryson et al., 2015). As funders and organizations are often in the position of choosing where to work, selecting contexts with less disruptive political dynamics, more predictable priority shifts, or more manageable turnover in the relevant government entities may mitigate many of the root causes inhibiting progress. If instability is unavoidable, implementers should be realistic from the outset about what they may be able to achieve. Planning for continued operation over longer periods of time may also be a method for rolling beyond the time scale of disruptions.

6. Future work and limitations

This study was limited to a timeline of 3.5 years to measure progress in achieving difficult outcomes related to WASH service delivery. In addition, we were only able to look at one outcome of each case and cannot comment further on the thirteen constant conditions that did not vary across cases. Future work should investigate (a) the constant conditions that did not vary across our cases and (b) the causes of stalled progress. These should be investigated over more extended periods of time, considering multiple interlinked outcomes, and in contexts outside of Eastern Africa and WASH. We also believe it would be fruitful for future research to study two specific conditions in greater detail given their nuance: instability and predefined problem scopes.

7. Conclusion

Collaborative approaches are often seen as a solution to solve some of our world's greatest challenges because they allow solutions to build on the best skillsets of multiple diverse entities to make a stronger combined whole. For this reason, they are increasingly being applied to strengthen WASH service delivery systems in low- and middle-income countries. This study investigated what drove or stalled progress of eleven collaborative approaches that sought to strengthen water or sanitation service delivery systems in Eastern Africa. We narrowed thirty-six conditions down to thirteen context drivers and five key influencing conditions that work together in different ways depending on the context.

The first and foremost takeaway from this work is that collaborative approaches in WASH contexts require flexibility of the project as well as the involvement and uptake by relevant government entities to make progress. Second, we revealed that while collective problem identification can be well-suited for some contexts, in other contexts, predetermined scopes defined by program funders or government interests can also lead to successful outcomes. Finally, this research showed the importance of convening power for the hub and laid out options for how different hub structures can attain convening power.

Even when political dynamics, shifting priorities, and turnover were constantly undermining collaborative efforts, collaborative approaches were still able to make progress when program funders provided funds for activities of the collaborative (i.e., beyond only funding the hub) and implementers either facilitated collective problem identification or established a hub with convening power. Nevertheless, even these tactics are vulnerable to instability; thus in highly unstable contexts, stakeholders should be realistic from the outset about what they may be able to achieve. By looking at these conditions in combination, this study revealed multiple pathways for collaborative approaches to make progress, allowing stakeholders and funders to adjust designs to fit different contexts.

CRediT authorship contribution statement

Kimberly Pugel: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Visualization, Writing – original draft. **Amy Javernick-Will:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Writing – review & editing. **Shawn Peabody:** Conceptualization, Data curation, Investigation, Supervision, Writing – review & editing. **Cliff Nyaga:** Data curation, Investigation, Validation, Writing – review & editing. **Muhammed Mussa:** Data curation, Investigation, Validation, Writing – review & editing. **Lemessa Mekonta:** Data curation, Investigation, Validation, Writing – review & editing. **Desta Dimtse:** Data curation, Investigation, Validation, Writing – review & editing. **Martin Watsisi:** Data curation, Investigation, Validation, Writing – review & editing. **Elizabeth Buhungiro:** Data curation, Investigation, Validation, Writing – review & editing. **Tedla Mulatu:** Data curation, Investigation, Validation, Writing – review & editing. **Jonathan Annis:** Data curation, Investigation, Validation, Writing – review & editing. **Elizabeth Jordan:** Investigation, Methodology, Project administration, Supervision, Writing – review & editing. **Eleanor Sandifer:** Data curation, Investigation, Software, Writing – review & editing. **Karl Linden:** Conceptualization, Funding acquisition, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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