Hyvärinen, Anne M.J.; Keskinen, Marko; Levänen, Jarkko

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Intermediaries as drivers of innovation development in resource-constrained environments: Insights from the Kenyan water sector

Anne M.J. Hyvärinen [a,*], Marko Keskinen [a], Jarkko Levänen [b]

[a] Water and Development Research Group, Department of Built Environment, School of Engineering, Aalto University, P.O. Box 15200, FI-00076, Aalto, Finland
[b] Sustainability Change Research Group, Department of Sustainability Science, School of Energy Systems, LUT University, FI-15140, Lahti, Finland

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ABSTRACT

Innovations as a solution for sustainability and development challenges are increasingly attracting the attention of academia and practitioners, and collaboration between different actors is seen as a requirement for successful innovation development. In this article, we study innovation intermediaries in resource-constrained environments through a case study of the Kenyan water sector. To understand how intermediaries operate in these environments, we developed an analytical framework to identify the key functions offered by intermediaries at different stages of the innovation process. We identified three intermediary dimensions, recognising that most of the studied intermediaries provide support for the commercialisation of innovations, while far fewer focus on the earlier stages of the process, which hinders the systematic tackling of constraints. However, due to the intermediaries' past involvement with institutional development, capacity building and overall regional development, they can efficiently mitigate the prevailing constraints and institutional voids. Further, we found that the intermediaries function as hybrid organisations as they adopt new roles and combine different operational logics to support innovators in addition to their more traditional roles in the development sector. Innovation intermediaries thus play a significant role in enabling innovation and sustainable development in resource-constrained environments.

1. Introduction

Innovations are increasingly gaining attention as ways of tackling both existing and emerging development and sustainability challenges (Leach et al., 2012; Levänen et al., 2022a; Pansera and Owen, 2015; Seebode et al., 2012). At the same time, the global development sector is undergoing a transition with calls for closer engagement of the private sector, increased productivity and effectiveness and shared responsibility (United Nations, 2015a, 2015b). Development and sustainability challenges are particularly dire in the resource-constrained environments of developing regions, which are typically characterised by resource scarcity, market constraints and institutional complexities and voids (Bhatti and Ventresca, 2013; Khanna and Palepu, 2010; Mair and Marti, 2009). In such environments, institutional stability, the availability of raw materials, financial opportunities, production resources and a skilled workforce are all typically limited, many customers are poor, and infrastructure is underdeveloped (Hyvärinen et al., 2016; Mair et al., 2012; Zeschky et al., 2011). These constraints have direct implications for innovation development activities (Atiase et al., 2018; Barasa et al., 2017; Silvestre, 2014; Zoogah et al., 2014).

Solving constraint-born challenges requires collaborative approaches and partnerships (Chakravarty, 2022; Lim et al., 2013), as single innovation developers may lack the capabilities and resources to comprehensively address complex sustainability issues (Hart et al., 2016; Hart and Christensen, 2002; Lim et al., 2013; Zeschky et al., 2011). At the same time, while innovators are required to tap into new types of knowledge, resources and capabilities, the whole development sector is undergoing transition from public-driven efforts to a model where companies are increasingly engaging in solving sustainability challenges by developing innovative business and service delivery models and novel technologies (Annala et al., 2018; Gebauer and Saul, 2014; Sousa-Zomer and Cauchick Miguel, 2018; Wehn and Montalvo, 2018a). This development underlines the need to better understand how traditional development actors work with companies' innovation processes and bridge the constraints prevalent in these environments. This is particularly important in the field of natural resources management, where private and public sector actors have traditionally had different yet complementary roles.

* Corresponding author.
E-mail address: anne.hyvarinen@aalto.fi (A.M.J. Hyvärinen).

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When a plethora of actors are engaging with innovation, recognising the potential roles of different organisations and support functions needed in innovation processes is increasingly important. Intermediation is a concept that describes how different organisations can facilitate collaborative innovation processes by operating between other organisations (Howells, 2006). Previous research on innovation intermediaries has largely focused on two aspects: 1) the general functions of innovation intermediaries (Danse et al., 2017; Littlewood and Kiyumbu, 2018; Stadtler and Probst, 2012) and 2) the specific functions of innovation intermediaries at certain stages of the innovation process, such as commercialisation (Boon et al., 2011; Goodman et al., 2017; Katzy et al., 2013). The dynamics of intermediation during the entire innovation process remains an understudied phenomenon, especially in resource-constrained environments with a wide diversity of actors engaging in both innovation development and intermediation activities (Levänen et al., 2022b; Osabutey and Croucher, 2018). Amongst the complexities of resource-constrained environments, the role of intermediaries is underlined throughout the variety of services they can provide (Kilelu et al., 2011; Littlewood and Kiyumbu, 2018; Mvulirwenande and Wehn, 2020; Stadtler and Probst, 2012).

In this article, we focus on the role of innovation intermediaries in the Kenyan water sector (urban and rural water supply and sanitation services), where intermediation is urgently needed to support new innovations and to cope with the prevailing operational constraints. We contribute to the ongoing discussion on innovation intermediaries in resource-constrained environments in three main ways. First, we establish an analytical framework to study the key functions of the intermediaries along the innovation process, providing a possibility to visualise their role simultaneously in terms of intermediary function and the key stages of the innovation process. We test the framework with a case study of intermediary organisations to identify where innovation intermediaries have an active role and where intermediation gaps exist. Second, based on our observations, we suggest that successful innovation intermediaries seem to operate as hybrid organisations capable of combining different operational logics in their work. Third, we discuss the results from our case study against institutional complexities prevalent in the operational environment. We argue that intermediary organisations have the potential to mitigate operational constraints while increasing the sustainability and inclusivity of innovation activities in resource-constrained environments.

The article is structured as follows: the general context of our research is presented in this section, followed by a more thorough section on the research context, which forms the theoretical foundation for our research. The third section describes the research methodology, our case study and the analytical framework. Key findings on how intermediaries work with companies in terms of innovation are presented in the fourth section, while the fifth section discusses the implications of our key findingsin regard to current changes in the development and water sectors in resource-constrained environments. The final section concludes and highlights the novelty of our study.

2. Innovation and policy context

In the changing operational environment, the roles of public and private sector organisations are constantly evolving. In such situations, some actors can also take intermediary roles that enable them to take part in the facilitation of wider-scale transitions. In this section, we describe the key context of our research based on an extensive review of the literature, including both academic publications and policy documents focusing on the innovation process and the role of innovation intermediaries in that process.

2.1. Innovation intermediaries and the innovation process

Innovation intermediaries are defined as 'organisations that act in any aspect of the innovation process between two or more parties' (Howells, 2006, p. 720) and perform a variety of roles and functions to create value for the involved parties (Colombo et al., 2015; De Silva et al., 2018; Goodman et al., 2017; Stadtler and Probst, 2012) as well as enhance companies' innovative performance (Lin et al., 2016). A large variety of intermediary organisations exists, including research institutions and universities, private firms, business and industry associations, membership organisations, innovation centres and cluster organisations, governmental and semi-governmental agencies, international development organisations, financial institutions, technology transfer offices and NGOs (Boon et al., 2011; Danse et al., 2017; Littlewood and Kiyumbu, 2018; Stadtler and Probst, 2012). Understandably, these organisations come with their own motivations, funding sources, scopes of action and recipients (Danse et al., 2017; Littlewood and Kiyumbu, 2018; Mignon and Kanda, 2018; Mvulirwenande and Wehn, 2020), making the field of intermediaries exceptionally diverse.

Intermediaries are studied from a range of perspectives in different streams of literature, such as innovation management and innovation systems (Kivimaa et al., 2019; Klerkx and Leeuwis, 2009; Osabutey and Croucher, 2018; Watkins et al., 2015). In these streams, intermediary research draws on different theories. Dutt et al. (2016) have distinguished financial intermediaries, innovation intermediaries and institutional intermediaries (e.g. Armanios et al. (2017), Dutt et al. (2016), Howells (2006), Mair et al. (2012), and Parmigiani and Rivera-Santos (2015)). Regardless of the theoretical foundation, research on intermediaries aims to understand how these organisations establish or improve links between different actors to bridge gaps in connections, procedures, knowledge, capabilities and competencies in innovation development, diffusion and adoption (Colombo et al., 2015; De Silva et al., 2018; Klerkx and Leeuwis, 2008). This is how intermediaries contribute towards the relational, managerial and intelligence capability development of the involved parties (Edler and Yeow, 2016).

Intermediaries are commonly defined and differentiated through the roles and functions they hold. Their identified roles include those of convener, broker, mediator, learning catalyst, co-creator, concept refiner, stimulator, legitimator, educator, context enabler, impact extender, context expert, performer and trainer (Goodman et al., 2017; Howells, 2006; Stadtler and Probst, 2012). In terms of functions, intermediaries enable, build and facilitate networks, relationships and partnerships; scan, generate, manage, process and transfer knowledge; articulate demands; provide legitimacy; engage in institutional development, policy formulation and capacity building; provide support for innovation management; and participate as co-developers (Boon et al., 2011; Klerkx and Leeuwis, 2009; Stadtler and Probst, 2012). The range of roles and functions illustrates the diversity of organisations acting as intermediaries, the range of areas intermediaries engage in and the varying needs of intermediaries' clients.

In addition to identifying the general roles and functions of intermediary organisations, some studies have observed intermediation in a specific stage of the innovation process (Goodman et al., 2017; Mvulirwenande and Wehn, 2020; Tran et al., 2011). For instance, intermediaries can provide support in the commercialisation and evaluation of outcomes (Aarikka-Stenroos et al., 2014; Goodman et al., 2017). In sustainability-oriented innovation processes, intermediation is recognised to fit particularly well with certain process stages, such as an educator at the commercialisation stage and stimulator at the ideation stage (Goodman et al., 2017). While intermediaries can be involved in the innovation process from both the demand and supply side (or between these) (Boon et al., 2011; Edler and Yeow, 2016; Klerkx and Leeuwis, 2008) and contribute to the coordination, collaboration and operational management at different stages (Katzy et al., 2013), understanding of the role of intermediation during the entire innovation process is still limited. In resource-constrained environments, where innovation processes are typically very time-consuming (Wierenga, 2020) and innovation capabilities are required and accumulated through collaboration throughout the process (Lim et al., 2013), the importance of understanding intermediation along the whole process

becomes underlined.

2.2. Innovation intermediaries in resource-constrained environments

A lack of intermediation between different actors remains a challenge for the development of operational environments in many developing regions (Dutt et al., 2016; Parmigiani and Rivera-Santos, 2015). Also many of the most critical innovation system functions (entrepreneurial activities, knowledge development, search guidance, market formation, resource mobilisation and legitimation creation) and coordination between actors can be absent, insufficient or underdeveloped (van Welie et al., 2019, 2020). At the same time, we can see many new activities in this area, as many public and private organisations are leveraging innovation centres, agencies, financial institutions, technology transfer offices and user organisations that increasingly take diverse intermediary roles and functions in developing regions (Chakravarty, 2022; Danse et al., 2017; Kilelu et al., 2011; Littlewood and Kiyumbu, 2018; Watkins et al., 2015).

It is important to note that previous research on innovation intermediaries has focused mainly on organisations operating in affluent environments, which are fundamentally different from resource-constrained environments located in developing regions. In affluent environments, institutions, markets and customers typically exist already, and intermediation is needed to facilitate their interaction. In resource-constrained environments, the operational environment is not as mature, which poses very different requirements for intermediation as well. In these environments, institutional voids are commonly prevalent and intermediaries may hold potential in addressing these voids, for instance, by creating market infrastructure and strengthening business capabilities (Dutt et al., 2016) as well as by bridging entrepreneurs and public funding (Armanios et al., 2017).

As discussed above, institutional intermediaries, innovation intermediaries, and financial intermediaries can be distinguished from each other based on what they do. In affluent environments these different intermediaries typically operate in a dynamic relationship with each other, but in resource-constrained environments innovation development is commonly dependent on, and limited by, institutional and market constraints and resource scarcities. Therefore, the capacities and capabilities of different intermediaries may be required from single organisations. As the intermediary space in these environments is not clearly defined, it is possible that an intermediary functions across all three intermediary categories. From this starting point, research on intermediaries operating in resource-constrained environments can provide fresh insights for the discussion on innovation intermediaries. In this context, two aspects of intermediaries become emphasised: 1) their capacity to operate as hybrid organisations that can take different roles and functions at the same time and hold diverse missions depending on the situation and 2) their capacity to mitigate the strength of institutional voids, amongst other constraints, that hamper the operational environment in different ways (Dutt et al., 2016; Kilelu et al., 2011; Littlewood and Kiyumbu, 2018; Mair et al., 2012).

In terms of hybridity, previous research has stressed the pursuit of multiple targets as the logic of organisations that operate between other organisations operating with multiple operational logics (Jay, 2013). For example, social enterprises operate with hybrid logics when they combine economic sustainability with societal objectives (Doherty et al., 2014). In Kenya, intermediaries such as hub organisations have been observed as characterised by multiple forms of hybridity manifested through their varying purposes, operational logics, business models, funding sources and whom they work with (Littlewood and Kiyumbu, 2018) as well as organisational culture (Marchant, 2017). In the development sector, many established development aid organisations that have traditionally operated with non-commercial logic have lately begun to engage more closely with the private sector's for-profit logic, while at the same time companies have adopted social missions (Lee and Jay, 2015). Commonly these organisations also continue to operate through their traditional logics (e.g., donor grant-based community projects for societal impact). The pursuit of societal development with unfamiliar operational logics calls for new capabilities, even though these actors typically have a good understanding of the limitations and opportunities brought about by the operational context (van Welie and Romijn, 2018; Wieczorek, 2018).

In terms of work on bridging institutional voids (i.e. absent/underdeveloped institutions that enable and support market activities and transactions (Khanna and Palepu, 2010);), intermediaries can have different strategies. Institutional voids function in complex ways and therefore addressing them requires very different capacities and capabilities depending on the situation (Nason and Bothello, 2023). Evidently, however, intermediaries, such as international and local governmental and non-governmental aid organisations, companies and donors, can provide such assets and services to other organisations that eventually mitigate institutional voids (Dahan et al., 2010; Littlewood and Kiyumbu, 2018). For instance, non-business partners can bring information, know-how, local access, networks and social capital, while business partners can provide more tangible resources and capabilities, such as funding, production services, marketing expertise and organisational development (Hahn and Gold, 2014). To bridge institutional voids in the Kenyan context, intermediaries have been discovered as serving, for example, in terms of market infrastructure provision, network and relationship facilitation and the capability enhancement of entrepreneurs (Kilelu et al., 2011; Littlewood and Kiyumbu, 2018).

Clearly, different organisations can hold valuable intermediary roles in the development of operational environments in developing regions (Dahan et al., 2010; Hahn and Gold, 2014; Hietapuro and Halme, 2015; Hyvärinen et al., 2020; van Welie and Romijn, 2018). Besides fostering interaction among innovation network actors (Kilelu et al., 2011; Mvulirwenande and Wehn, 2020), intermediaries are serving as conveners, mediators and learning catalysts (Stadtler and Probst, 2012), participating in regulatory policy development (Kingiri and Hall, 2012) and redefining market architecture and legitimation of new market actors (Mair et al., 2012). It is notable, however, that even though intermediaries are vital in these environments, their activities can also create new dependencies, promote external interests and fail to realise sustainable outcomes (Nygaard and Bolwig, 2018; Sixt et al., 2018; Vallejo et al., 2019; van Welie and Romijn, 2018). Further, the hybridity of ways of operating may sometimes blur the boundaries of what the different types of intermediaries do (Littlewood and Kiyumbu, 2018).

3. Research methodology and materials

3.1. Water sector innovation in Kenya

Kenya and its water sector provide a particularly apt case to study the emerging role of innovation intermediaries for four main reasons: 1) the general characteristics of the water sector, 2) the specific dynamics between key actors in the study context, 3) ongoing water sector reform and 4) the overall development policy transition.

In Kenya, a water and sanitation service provision gap pertains, as only 62% of the population has access to at least basic water services and a mere 33% to at least basic sanitation services (WHO UNICEF, 2023). The water service sector is traditionally characterised by strong involvement of the public sector in the governance, implementation and delivery of water-related services, while the private sector is seen mainly as the provider of technologies and innovations. In resource-constrained environments, development sector organisations, donors and NGOs have had a large role in water project implementation, service delivery and financing, which has created interdependencies. The variety of actors, their overlapping agendas and lack of coordination, amongst other reasons, have resulted in numerous sustainability challenges within the water sector (Jiménez and Pérez-Foguet, 2010; Spaling et al., 2014; UNESCO World Water Assessment Programme, 2019).

Interrelated social, technological, economic, environmental and

political challenges that characterise the water sector have implications for actors engaging in the sector, achieved service levels and innovation (Kiparsky et al., 2013; van Welie et al., 2019; Wehn and Montalvo, 2018b). Like some other public services, the water sector also suffers from an innovation deficit compared to private or market-based services. In overcoming this, technological innovation as well as transformation/innovation in the context and value chains, including, for example, institutions, organisations, governance modes and social systems, are required (Kiparsky et al., 2013; van Welie et al., 2019).

Kenya's water sector, including water supply and sanitation services and water resources management, is currently undergoing a major transition that aims to address the sector's challenges through a range of reforms, devolution of power and differentiation of the roles of actors (World Bank, 2015). Through the reforms, policy formulation, regulation and service provisioning are separated, and responsibilities decentralised, with an envisioned result of improved service delivery and increased investment attracted to the sector. This has also resulted in an increasing interest in innovation, with companies and other actors such as United Nations agencies, NGOs and governmental agencies engaging in and advocating innovation. Innovation hubs, programmes, competitions and conferences are emerging, and private sector engagement is promoted by development agencies and even NGOs (Littlewood and Kiyumbu, 2018). In this emerging new context, several traditional development sector organisations and entirely new actors have taken dual roles and become innovation intermediaries, bridging the gap between private sector-driven innovation processes and public sector-driven planning and governance processes.

Globally, millions still lack access to safe water services, and for the water-related Sustainable Development Goals (SDGs) to be achieved by 2030, drastic changes, including innovation, are required in the sector. Reform in Kenya and wider transition of the development sector imply changes to the common mode of operation in a sector commonly regarded as less dynamic and innovative than other sectors, while the reform and transition are contributing towards a more favourable environment for innovation. A range of non-conventional actors (development sector organisations, NGOs, donors, Civil Society Organisations (CSOs), etc.) are being seen to take intermediary roles and work in a hybrid manner to enable innovation and navigation of voids and constraints in resource-constrained environments. These characteristics make the water sector a particularly relevant and interesting arena for studying innovation and intermediaries. Understanding how intermediaries are supporting innovation in resource-constrained environments in a transforming sector providing life-saving services is focal, as it can contribute towards filling the prevailing service gaps and enhancing understanding of how constraints and institutional voids are mitigated.

3.2. Research methodology

We utilised a qualitative case study methodology to explore a number of innovation intermediaries and companies involved in resource-constrained innovation in the Kenyan water sector (Yin, 2014). Qualitative methods enable examination of complex and multifaceted topics and inclusion of underlying cause-effect relationships (Chikweche and Fletcher, 2012; Pansera and Owen, 2015; Sánchez et al., 2006). We utilised a grounded theory approach (Strauss and Corbin, 1994) to inductively research the functions of innovation intermediaries and how they work with companies in terms of innovation.

Using multiple cases of different intermediaries allows for cross-case comparison and identification of similarities and differences in the scope of their activities. The cases also include companies with whom the intermediaries collaborate, enabling us to construct a multifaceted view of the connections, ways and aims of collaboration between the intermediaries and the companies. Throughout the research process, the existing literature (presented in Section 2) was utilised to provide the context and the basis for reflection and part of the methodology in developing the analytical framework.

3.3. Data sources, collection and analysis

Altogether, 12 organisations acting as innovation intermediaries in the Kenyan water services sector were included as cases in our study. The authors identified selected organisations through previous research activities, engagements in Kenyan water sector events and on-site observations of the sector in Kenya during 2016–2018. To ensure wide representation, some intermediary organisations were also identified during the first interviews. The selected intermediary organisations demonstrated interest and/or were involved in activities concerning water sector innovation and private sector engagement, and they represent different types of organisations engaged in intermediary activities in the Kenyan water sector (Table 1).

It is important to note that practically none of the 12 organisations studied were originally set up as intermediaries but have started to take intermediary roles, as the role of private sector-driven innovation has become increasingly important in Kenya and in the development sector more broadly. Also, the reform of the Kenyan water sector and the devolution of responsibilities has enabled more actors to have a role in the sector and encouraged innovation. Many of these organisations are also funded by donor governments and other development funders, which have begun to include requirements regarding private sector engagement and innovation for the organisations/programmes they fund. Several of the studied intermediary organisations also work on a variety of other themes beyond water and hold other roles and functions beyond intermediation and private sector engagement. Such roles are not, however, within the scope of this article and were therefore omitted from our analysis.

The intermediary organisations are anonymised, characterised and categorised in Table 1 in three groups to demonstrate their diversity and divergence: Group A consists of international organisations (e.g. civil society and research actors and development and humanitarian organisations) that also operate in countries other than Kenya. Group B includes organisations other than governmental organisations operating in Kenya alone, including private, civil society and research organisations. Group C covers Kenyan public (i.e. government-related) organisations, such as state corporations operating under different Kenyan ministries. In the following section, we describe how these different intermediaries work with companies in terms of innovation.

In addition to the intermediaries, our study also looked at and analysed the companies engaged in the actual innovation processes in the water sector. All nine companies collaborated with the studied intermediaries and were identified through the intermediaries, other networks and previous research activities in the Kenyan water sector.

The main empirical research data for our study were collected through an extensive set of semi-structured interviews of key informants. The interviews were conducted with both the intermediary organisations and the companies responsible for actual innovations, allowing us to capture the views of both on intermediation along the innovation process. Altogether, 24 interviews were carried out between October 2017 and October 2018, including 12 intermediaries and 9 companies. Some intermediary organisations were interviewed twice or thrice. The interviews were conducted face-to-face in Kenya (except for one interview that was conducted remotely), and they lasted between 30 min and 1 h 20 min: all the interviews were recorded and transcribed. The key themes covered in the interviews included organisational aspects, thematic focus areas and the value of collaboration in innovation, selection of collaboration partners, participation in capacity building and institutional development, as well as general views of the Kenyan water sector and innovation processes.

Secondary material, including annual reports, project documents, reports and fact sheets, articles, organisations' websites, news and informal discussions were collected, studied and utilised to complement and triangulate the information collected through the interviews. In

Table 1
Key characteristics of the studied intermediary organisations.

Abbreviation	Type of organisation	Sectoral focus, key activities	Financing sources
INTERNATIONAL ORGANISATIONS (working also elsewhere than in Kenya)			
A1	International development organisation	Multi-sectoral development partner: project implementation through collaboration and partnerships in agriculture, energy, water, sanitation and hygiene.	Governments, private donors/ foundations
A2	IGO (development and humanitarian organisation)	Multi-sectoral social welfare organisation: programs implemented with governments with focus on children's rights, health, water.	Governments, private donors/ foundations
A3	NGO, humanitarian organisation (religious non-profit organisation)	Multi-sectoral relief and development organisation project implementation in children's rights, health, water, sanitation, hygiene, peacebuilding.	Governments, private donors
A4	Non-profit expert organisation	Programme supporting solutions to solve water problems.	Governments
A5	Non-profit expert organisation	Programme implementation through partnerships to improve access to water and sanitation.	Water companies (publicly owned), private donors
NATIONAL ORGANISATIONS (working primarily in Kenya)			
Other than governmental organisations			
B1	Business incubation centre (limited company, non-profit)	Business and innovation support services to ventures in renewable energy, agribusiness, water management (incubation and acceleration).	World Bank, governments
B2	NGO, public-private development programme	Development program with public and private institutions to implement projects to increase access to water and sanitation and improved land management.	Governments
B3	NGO/social enterprise	Rights-based agency promoting and implementing eco-innovations, access to water, sanitation, hygiene and environment services.	Governments, private donors/ foundations, corporations
B4	Investment fund (foundation & fund management company)	Water project co-developer and investment partner and investment catalyser promoting climate resilience in water supply, agricultural water and water for energy.	Governments, private donors (investors)
B5	Private company	Provision of clean technologies, water and energy solutions.	Generated profits
Government-related organisations			
C1	State corporation	Mechanisms for financing the provision of water and sanitation, services.	Governments, donors
C2	State corporation	Mobilisation of resources for environmental management, research and capacity building.	Governments, donors

addition, a participatory innovation intermediary workshop was organised by the first author in November 2018 in Nairobi, Kenya for the studied organisations: altogether, 15 representatives from the studied organisations (9 from the intermediaries and 6 from the companies) as well as 3 participants from other organisations were present. The workshop allowed us to discuss and further validate the data and analysis and receive complementary views and feedback from the participating organisations. In addition, our analytical framework (Section 3.3) was presented, discussed and further developed in the workshop, with the participants mapping their activities with the help of the framework and adding new categories if necessary. Our initial analysis of each intermediary was also presented and later shared in writing with the intermediaries to receive feedback and validate our understanding of the intermediaries' functions and engagements along the innovation process.

The first round of data analysis followed an open coding technique (Gioia et al., 2013) to recognise the activities intermediaries engage with and the stages of involvement in the innovation process – these concepts and categories were defined based on the data (transcribed interviews). Motivations, resources and the challenges of different actors involved in the innovation process were also recognised in the analysis. During the coding process, some codes were merged and modified as the focus of the research (guided by the data) and intermediary activities were clarified.

After the first coding round, we utilised an iterative abductive approach, moving between theory and empirical data to categorise the function codes generated from the data. The first-order codes (concepts) were grouped into aggregate activity categories (themes) by identifying relationships between and amongst the first-order codes and assembling them into second-order functions; that is, functions describing the intermediaries (Gioia et al., 2013). The first-order codes (concepts) and aggregated activity categories (themes) were then compared to existing research findings on innovation intermediaries' functions, and further adjustment of the grouping of the first-order codes (concepts) and second-order functions (themes) was performed. Besides categories (functions of intermediaries) found in the literature, additional function categories were created to illustrate the functions intermediaries have in the selected context based on our data. Finally, the functions were further grouped into three aggregate dimensions (Gioia et al., 2013). Fig. 1 visualizes the linkages between the first-order codes (not a comprehensive list), second-order functions, aggregate dimensions and our data.

Further interpretation of the data was conducted for each intermediary to construct a temporal process-based depiction of functions. The process stages were extracted from the literature (Cooper and Sommer, 2016; Goodman et al., 2017; Hyvärinen et al., 2020; Wheelwright and Clark, 1992) and complemented with more specific sub-stages arising from the data (i.e. stages mentioned by the interviewed organisations when describing their activities).

3.4. Analytical framework

To guide our analysis and synthesise our results, we developed an

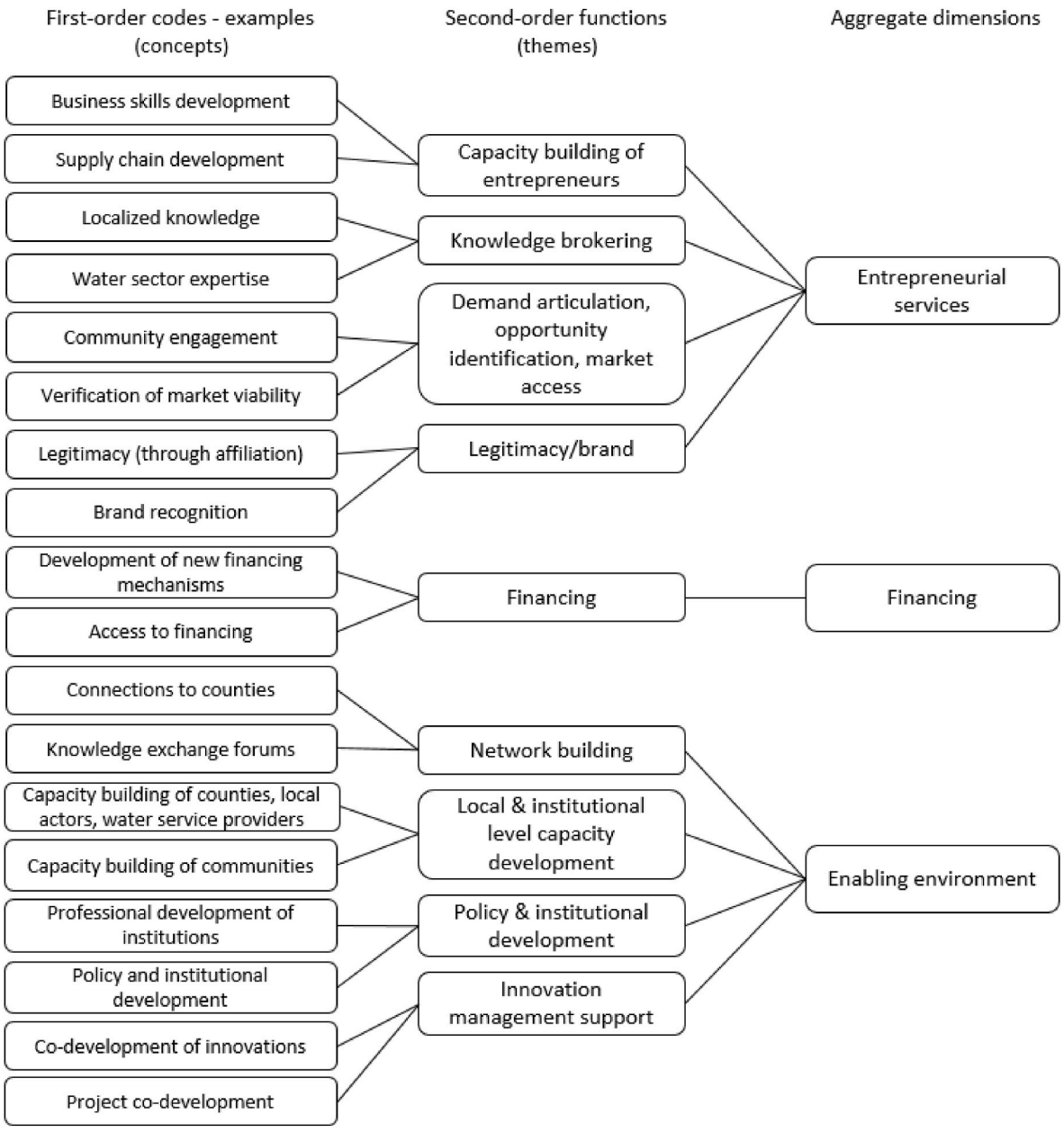

Fig. 1. Data coding process with examples of first-order codes (recognised based on the analysis of the data), second-order functions (functions describing intermediaries) and aggregate dimensions.

analytical framework that combines the key **functions** of innovation intermediaries in resource-constrained environments with the **innovation process stages**. The framework constitutes a matrix where intermediary functions are on the vertical axis and process stages (i.e. time) are on the horizontal axis. This allows for a visually powerful synthesis of the studied intermediary organisations through the functions they offer at different stages of the innovation process. We used the framework to look simultaneously at all 12 studied intermediary organisations, providing the possibility for both synthesis and comparison.

To keep the framework as simple and visually engaging as possible, we used simplified categories for both the intermediary functions and the innovation stages (see Fig. 2 in Section 4); the categories were derived from the literature as well as our interviews and the workshop. Altogether, the framework includes nine functions that we further categorised under three main dimensions: entrepreneurial services, financing and enabling environment. These dimensions and functions are described in more detail in Appendix A.

For the temporal dimension of our analytical framework, we utilised ***innovation process stages***. Traditional innovation process models consist of a rather linear set of activities, from idea generation to idea selection, development and launch/commercialisation (Cooper, 1990, 2008; Cooper and Sommer, 2016; Rothwell, 1994; Utterback, 1971; Wheelwright and Clark, 1992). We divided our analytical framework into three main steps: 1) ideation and conceptualisation, 2) product and business development and 3) commercialisation. All the steps then included a set of more detailed innovation process stages that were recognised as part of our analysis. The stages in the first step included ideation and discovery, idea screening and concept development. The second step consisted of four stages: prototyping, business development, product development, piloting and field testing. The third step then included two commercialisation stages (i.e. the first sales and larger scaling-up of the innovation). While innovation development processes typically also include iterations and feedback loops between process stages, we consider that the three steps adequately capture the key

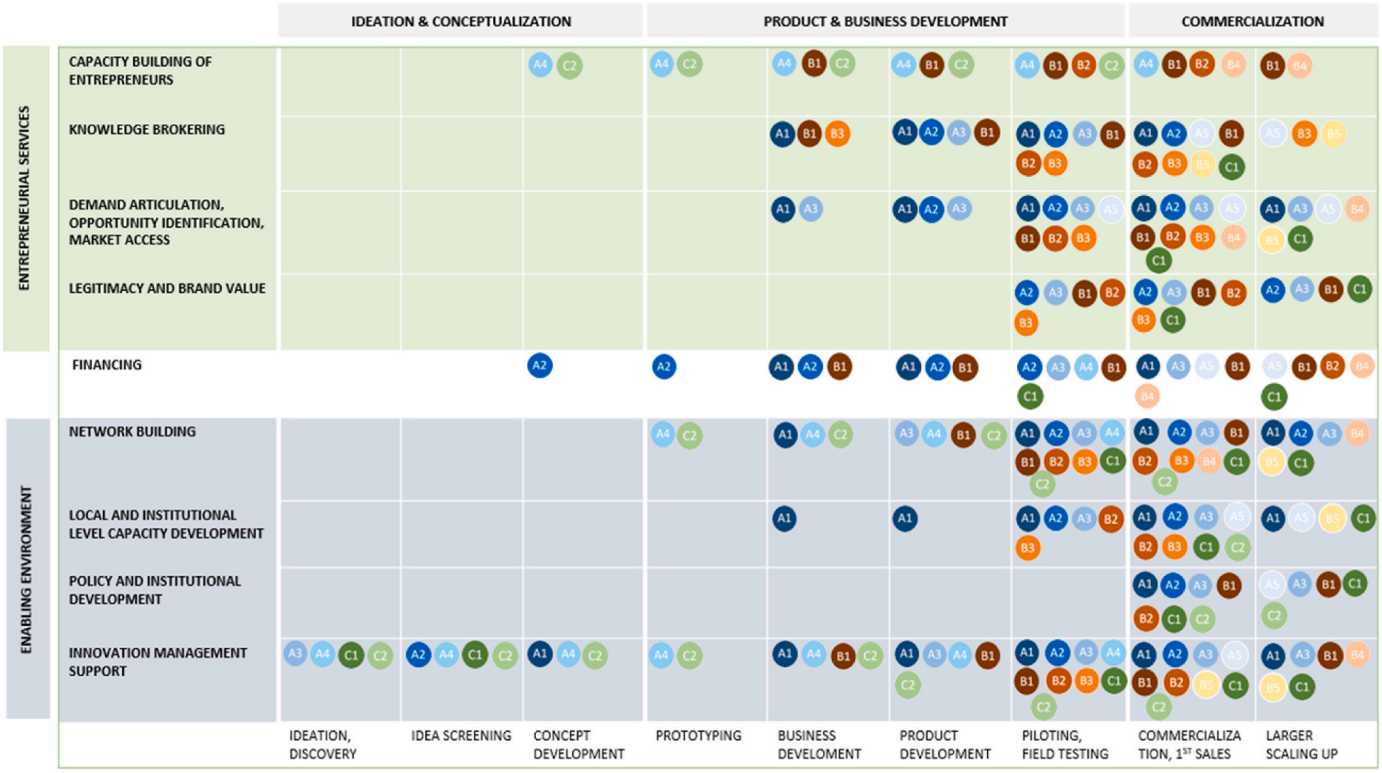

Fig. 2. The analytical framework developed for this study shows a visual summary of the key functions of innovation intermediaries (vertical axis) along the different stages of the innovation process (horizontal axis) in the Kenyan water service sector. Each circle refers to one intermediary organisation, with the letters and related colours (A/hues of blue, B/hues of red/yellow, C/hues of green) referring to the three intermediary groupings presented in Table 1.

characteristics of the studied processes.

4. Results: how do intermediaries work with companies in terms of innovation?

The analytical framework we developed recognises the key functions that innovation intermediaries offer to companies at different stages of the innovation process, and it has been tested in the context of resource-constrained innovation in the Kenyan water sector. For this analysis, we grouped the studied intermediaries into three categories based on their operational scale (national or international) and the type of organisation (public, private or civil society, research/other organisation). This led to three so-called intermediary groups presented in Table 1. To broaden the understanding of how intermediaries function, we also identified hybridity in terms of the approaches, roles, missions/objectives and backgrounds of the studied organisations, which extends the current conceptualisation and understanding of hybridity (Section 5).

4.1. Functions provided by intermediaries in innovation process management

The key findings of our research are presented in Fig. 2, which is structured according to the analytical framework presented above. It includes information on all 12 studied innovation intermediaries visible as circles coloured according to the three intermediary groups (Table 1). In this section, we discuss intermediaries' functions along these dimensions, while Section 4.2 then discusses the key implications for the innovation process.

4.1.1. Entrepreneurial services

The intermediary functions under the entrepreneurial services dimension cover practical activities targeted towards companies, building their capacity in developing and operating their businesses and developing innovations in the resource-constrained context. Most of the studied intermediaries serve companies in terms of knowledge brokering and demand articulation, opportunity identification and market access. These functions are followed by capacity building of entrepreneurs, which many intermediaries take part in. Some intermediaries also provide legitimacy for companies based on leveraging the intermediary's reputation and history. In terms of the structure and professionalism of entrepreneurial services, there is a difference between intermediaries with programmes specifically set up for such activities and hybrid intermediaries, which also engage in other areas and promote more traditional development agendas (e.g. A1, A2 and A3 are operating with hybrid logic where traditional development sector organisations have moved towards increased private sector engagement and innovation and thus support profit-oriented objectives in addition to societal impact, and A4 and A5 were established with provision of entrepreneurial services as their core function while also promoting societal impact creation).

Certain intermediaries focus mainly as ***capacity building of entrepreneurs.*** Such activity consists typically of building business skills and offering related services, such as technology development, legal advice, standardisation support and infrastructure. These activities aim to enable entrepreneurs to establish, develop and operate their businesses and develop successful innovations. Commonly, these intermediaries focus on sustainability and impact creation, such as addressing climate change, solving water problems, environmental management and driving wider positive changes. The studied innovation intermediaries in the Kenyan water sector are mainly working with local entrepreneurs, but occasionally, some intermediaries also provide support for international start-ups and companies operating in Kenya. It is worth noting that not all intermediaries are engaging on this front (e.g. A1–A3, which represent more traditional international development organisations with strong societal development objectives in the water sector), while others focus more on capacity-building activities while also promoting

societal impact (e.g. A4, A5 and B1).

Most of the studied intermediaries serve as knowledge brokers. ***Knowledge brokering*** illustrates the importance of intermediaries as holders of expertise and a source of knowledge on aspects such as the local environment, traditions and peculiarities, sector-specific characteristics and even on suitable business models. To be competitive, knowledge and capabilities play a significant role in all environments, but the required knowledge and capabilities and their accumulation can vary significantly in resource-constrained contexts compared to more developed markets (Lim et al., 2013; Silvestre, 2014; Zeschky et al., 2011). Due to a long history in the area, water sector expertise and/or business experience, intermediaries may hold valuable knowledge on a range of topics and are able to absorb, process and deliver that knowledge to the companies. Intermediary A3, for instance, takes companies to the field during their product and business development, as well as pilot innovations, thus enabling companies to increase their knowledge of the suitability of their innovations. Another example is intermediary B3, a rights-based organisation/social enterprise, which conducts community surveys to gather relevant information for companies developing innovations in addition to its key objective of increasing access to water and sanitation through community-led approaches.

In ***demand articulation, opportunity identification, and market access,*** intermediaries play a significant role. These aspects are closely linked to the experience and relationships the intermediaries have developed with the communities, counties, national authorities and other parties, which enable them to recognise needs and opportunities in the water sector. Awareness of the challenges and accumulated experience enables the intermediaries to articulate water-related needs and opportunities and enable buy-in to the markets. As an example, intermediary A2 serves as a gateway for introducing innovative service models to county governments, which are the target customers of a company providing such a model. The intermediaries themselves can have these capabilities or hold connections to relevant parties that are able to deliver the required functions.

The established and acknowledged nature of the organisations acting as intermediaries enables them to provide the associated companies and innovations with ***legitimacy and brand value*** in the markets. Operating with the intermediaries gives credibility to the entrepreneurs in the eyes of the communities where innovations are implemented and can further build trust between communities and companies. Innovations associated with certain intermediaries also bring legitimacy in terms of authorities and institutions, and in general the companies find that people are willing to listen to them as they are associated with an established intermediary. The credibility and referrals brought by intermediaries can also enable companies to find new partners and even investors and take their activities to the next stages.

4.1.2. Financing

The second intermediary dimension focuses solely on direct and indirect ***financing*** for companies and innovators, and it does not include sub-categories; thus, financing can also be seen as one key intermediary function. Most of the studied intermediaries engage in financing activities in one way or another, although none are commercial or investment banks, and only B4 is an investment fund. Some intermediaries finance programmes for entrepreneurs, some provide financing for piloting and some purchase innovations to test or implement them in the field. Intermediaries also implement programmes, giving companies an opportunity to test or sell their innovations through programme funding. Intermediary A1, for instance, can provide financial structuring to enable water service providers to adopt innovations.

Several intermediaries also plan to establish investment funds to enable them to invest in selected companies or provide guarantees for entrepreneurs to access external, often commercial, financing. Intermediaries' knowledge of and connections to other financiers and investors are valuable to the companies, and some intermediaries are very organised in terms of presenting potential companies to investors both inside and outside Kenya. Furthermore, the knowledge some intermediaries hold in terms of potential investors and at what stage to approach them is an added value to the companies.

4.1.3. Enabling environment

The third dimension consists of functions related to the broader category of an enabling environment for innovation. It can be understood as a favourable operational environment in which companies thrive and develop innovations, and it includes multiple levels – from institutional aspects to functioning markets and an innovation-positive atmosphere, and thus links to the discussion on institutional voids. Overall, our analysis indicates that the studied intermediaries play an important role in creating such enabling environments.

Several of the studied intermediaries take part in ***network building***, serving as a gateway to stakeholders, other relevant organisations and communities, as well as authorities – which is of key importance and a common intermediary function. The history and established role of intermediaries in this context means they are well connected and thus able to connect and direct companies towards other stakeholders and potential partners. Some intermediaries enable companies to attend conferences and workshops where network building is integral. Overall, the studied intermediaries have well-established connections to the public sector, which is a major asset and even a necessity in the public sector-regulated water sector.

Local and institutional level capacity building refers to the intermediaries' role in developing capacities in the relevant environment to enable and foster innovation development, implementation and/or scaling. A prerequisite for the success of innovations is adoption by users, which in resource-constrained environments often requires awareness raising and capacity development at both local and institutional levels. As this is not commonly a core competency of the companies developing innovations, intermediaries are taking the lead, partly, it seems, because many of the studied intermediaries have already been involved in capacity-building activities at local and/or institutional levels. Intermediaries are, for instance, communicating about new water technologies and services to county officials, providing professional development to institutions, improving the skills of water operators and committees and raising awareness in communities. For example, as part of its agenda, intermediary C1 is focusing on building the capacity of water operators in rural areas, while intermediary A4 focuses more on urban water operators.

Individual companies rarely have the possibility to influence ***policy and institutional development***, but organisations operating with a broader, multi-perspective and common-interest agenda have more leverage on this front and thus can bridge the prevailing institutional voids. While this function may not be typical for innovation intermediaries in general, it was prevalent among the studied intermediaries and presents a characteristic that distinguishes intermediaries operating in resource-constrained environments from those operating in more affluent environments. This is most likely because most of the studied intermediaries have backgrounds in the development sector and/or linkages to development funding, with donor organisations often having influence on broader policy development. Combined with good connections to institutions, intermediaries are able to engage with policymakers and provide insights and advice for policies, creating a more favourable environment for the private sector to operate and develop innovations. Intermediaries are also able to present various organisations at once, which is more efficient and effective compared to individual companies getting their voices heard in institutions, which are often hierarchical. One thematic working area of intermediary B1 is to work with relevant stakeholders and lobby governments to create a favourable policy environment in which companies can operate and innovate.

Innovation management support occurs in various ways, including innovation stimulation through competitions, co-creation activities, developing concepts and business models for the private sector to test,

establishing piloting and commercialisation opportunities to engage the private sector and offering general support along the innovation process (i.e. more informal support than, for example, in incubation programmes). This function covers a range of more loosely defined, indirect and informal activities that support companies' innovation activities. However, this support is often very important for companies, especially when the threshold for requesting advice or support is low and rather casual. The activities of intermediary A4 extend throughout ideation and conceptualisation and product and business development, as they support companies in sharpening their early concepts and innovation proposals, as well as prototype development.

4.2. Process perspective on innovation intermediary functions

The horizontal axis of the analytical framework in Fig. 2 provides the possibility of analysing the intermediaries' role along the different stages of the innovation process. The figure indicates that the activities of the studied intermediaries focus heavily on the last stages of product and business development (piloting and field testing) as well as early commercialisation activities. A range of intermediaries engages in the broader scaling-up of innovations and selected business and product developments. Depending on the geographical focus areas of the intermediaries, the scaling-up activities can extend from regional and national to international levels.

Only a few intermediaries can be found to engage in earlier innovation stages, focusing mainly on innovation management support. For example, the activities of A4 and C2 mainly focus on the stages before commercialisation, which is explained by their role as accelerators/incubators, although C2 also has a strong policy development agenda, and A4 aims to generate information for future development aid agenda through the innovations it engages with. Many of the studied intermediaries have certain criteria for the companies and stages of innovations with which they engage, such as prototypes or innovations ready to be field tested, which seems to limit their engagement. This presents a clear gap in intermediation from the process perspective and shows that continuous and comprehensive support for innovation is missing in the studied context.

In terms of the innovation process stages, the gaps in the intermediaries' support are more distinct compared to the functions. A well-visible lack of intermediaries is evident in the early stages of the innovation process from ideation and conceptualisation compared to the last stages of business and product development. Some intermediaries offer entrepreneurial services in the final stretch of product and business development, but engagement in earlier stages is missing. This can partly be explained by a results-oriented approach that most intermediaries have: the high failure rate of innovations and challenges in measuring impacts in the early innovation process stages are likely to limit intermediaries' eagerness to engage in these stages – hence, the hybrid objectives of the intermediaries may hinder provision of intermediation along the process. Furthermore, piloting and commercialisation are more tangible stages with more clearly definable outcomes, which many development sector organisations are used to. While several intermediaries are involved in commercialisation and scaling up, this support can be limited to the national level. While internationally operating intermediaries have potential for scaling up the innovation in other regions or internationally, the support might be limited to pilots instead of commercially scaling up the businesses to operate independently in global markets. It is worth noting that the only for-profit private company (B5) in the sample is only engaged in commercialisation and first sales, similarly to B4, which represents an investment fund.

Although many intermediaries engage in policy and institutional development, the focus is on the stage at which innovations are on the market or programmes are implemented. Activities focusing on policy development regarding innovation activities prior to commercialisation were not observed. Only in terms of more informal support, which is characterised by the innovation management support function, can activities be distinguished throughout the innovation process. However, it should be noted that some intermediaries that offer this support in the very early stages are not coherently offering support throughout the process.

The process-based analysis also enables differentiation between intermediaries, using the three intermediary groups (A, B and C) presented in Table 1. To facilitate comparison between the groups, Appendix B also includes visualisations separately for the three groups, complementing Fig. 2. Together, the results indicate that the offerings of different intermediary groups tend to be more tied to specific process stages than to the functions they offer, with all intermediary groups having their own ways of working. In terms of functional focus areas, all the groups emphasise engagement with early commercialisation activities, followed by piloting for groups A and B and scaling-up for group C. Along the innovation process, international civil society and other organisations (group A) seem to offer services to companies to a greater extent than national private, civil society and other organisations (group B), which focus mainly on piloting and commercialisation. Both groups have a similar emphasis on scaling up, although the offered functions differ slightly, as seen in Fig. 2. The state corporations (group C) have a stronger emphasis on the commercialisation side, although they are also engaged in certain aspects of earlier innovation process stages through the innovation programmes they run. Generally, it seems that organisations operating at the policy–research interface are more capable of supporting companies in the early stages of the innovation process, whereas well-established development sector organisations are stronger in supporting the later stages of the process.

5. Discussion

We discuss our results in relation to two previously emphasised aspects regarding intermediaries' capacity to 1) operate as hybrid organisations that combine different operational logics and 2) mitigate institutional voids (cf. Section 2.2).

5.1. Innovation intermediaries as hybrid organisations

Our results concerning entrepreneurial services highlight the changing roles of the studied intermediary organisations and their capacities to interact between public, private and third-sector actors as well as the end users of innovations. Further, our results suggest that the notion of hybridity not only covers a dual objective of the organisation itself, such as with social enterprises (Doherty et al., 2014), but also situations where organisations (intermediaries) operating with a societal/development agenda and commonly funded by development donors have begun to engage with innovations and private sector actors who operate on differing – for example, profit-generating – logic. Regarding hybridity, it is critically important to note that many of the studied intermediaries were not originally set up as innovation intermediaries, but they have served for much longer as conventional development aid, humanitarian and non-governmental organisations or as state corporations promoting development, and are not commercial/for-profit organisations as intermediaries usually.

In the literature, a diverse range of organisations have been identified to act as intermediaries and no encompassing concept of intermediary exists (Howells and Thomas, 2022). In general, however, the organisations studied in this article match the characteristics commonly used for intermediaries as they 'act in any aspect of the innovation process between two or more parties' (Howells, 2006, p. 720), create value for the involved parties through a variety of roles and functions they perform (Colombo et al., 2015; De Silva et al., 2018; Stadtler and Probst, 2012) and promote innovation and a wider positive social change (Littlewood and Kiyumbu, 2018). We have shown how the studied organisations offer skills and resources to companies and entrepreneurs through their hybrid roles. To carry out these activities, close relationships with authorities and other local actors are critical,

and the studied intermediaries typically have good capacities to facilitate such relationships (Dahan et al., 2010; Hahn and Gold, 2014; Hietapuro and Halme, 2015; Webb et al., 2010). This is also demonstrated through the intermediary functions we identified under the enabling environment.

The range of functions the studied intermediaries take (Fig. 2) shows that it is typical for intermediaries to take different roles in multiple fronts. While creating enabling environment, providing entrepreneurial services or financing, studied organisations combine the logics of what different types of intermediaries are described to do and engage in (Dutt et al., 2016; Howells, 2006; Littlewood and Kiyumbu, 2018; Mair et al., 2012). This further underlines the hybrid characteristic of intermediaries in resource-constrained environments, where it is not sufficient to only focus on supporting entrepreneurs with innovation development but also with navigating institutional and financial constraints at the same time.

Our findings contribute to existing literature on roles and functions of intermediaries by pointing out how successful intermediaries are able to compose a hybrid of innovation, institutional and financial logics, which have been commonly distinguished from each other in the previous research (Armanios et al., 2017; Dutt et al., 2016; Howells, 2006; Littlewood and Kiyumbu, 2018; Mair and Marti, 2009). This notion concerning intermediation in resource-constrained environments indicates a linkage between the different streams of literature, which has not been identified earlier. Therefore, it also creates an arena for more detailed research on this phenomenon. Although the studied intermediaries are typically familiar and experienced with the services they now offer to the innovators, for many such proximity to innovators and private sector organisations is something new. The transition of the development sector, as well as reform of the Kenyan water sector, nourishes one of the key characteristics of hybridity, as actors are proactively taking new roles. When traditional development aid organisations (and/or their donors) take different intermediary roles, the situation may sometimes result in potentially challenging dual roles, as these organisations also retain their original roles beyond private-sector engagement and innovation. In addition, their organisational structures and ways of working may not be optimal from the perspective of intermediation, leading easily to a limited understanding of and/or suboptimal support along the innovation processes.

The studied intermediaries' motivations to act as hybrid organisations seem to be closely related to their background and objectives – and linked to the broader transition in the development sector and donor requirements. Such motivations became visible in the intermediary organisations' own documents and interviews concerning their aims, such as a willingness to increase communities' access to basic services or simply to solve water problems. This means that the intermediaries are interested in leveraging private sector knowledge to ensure that their activities contribute towards broader societal impact. Even the intermediaries that aim to serve private entrepreneurs and promote innovation have a strong hybrid agenda in promoting inclusive and sustainable development instead of purely profit-oriented perspectives. In resource-constrained environments, the presence of such intermediaries in companies' innovation activities has the potential to increase inclusivity and the consideration of vulnerabilities, social practices and local habits – which at times raise concerns in such environments (Arnold and Valentin, 2013; Pansera and Owen, 2015).

Most of the studied intermediaries are primarily financed by public funds related to development cooperation, either through international donor organisations and international NGOs or through bilateral development funds. This, in turn, influences both the objectives and operations of the intermediary organisations (Mignon and Kanda, 2018). Although these actors recognise the need for new ways of working through hybrid logic, the structures to comprehensively accomplish this might not be fully in place (Nygaard and Bolwig, 2018; Sixt et al., 2018; van Welie and Romijn, 2018). For example, funding provided by intermediaries may come with certain fixed requirements for both results and reporting, which may not be fully compatible with often lengthy innovation processes and their impacts. High risks are typically included in innovation investments, which may also hinder the transition from traditional development support towards innovations.

Overall, the legacy of old practices and the lack of a profound understanding of entrepreneurial processes can partly explain the intermediary gaps observed in this study. It seems that innovation funding is easily directed to activities (e.g. piloting or innovation competitions) that are well known and can have a measurable output, leaving other innovation process stages with both less funding and less visibility (Fig. 2). On the other hand, and in comparison, with profit-oriented or commercial intermediaries, these emerging intermediaries are able to navigate institutional complexity and support entrepreneurs to cope with problems originating from different institutional voids.

5.2. *Innovation intermediaries mitigating institutional voids*

The reform of the Kenyan water sector (including devolution of policy formulation, regulation and provisioning of services) has allowed new private sector actors, such as innovators and investors, to strengthen their engagement in the sector. It has also encouraged the conventional development actors to facilitate both innovation activities and addressing of various institutional voids through the skills, capabilities and resources built in the past. This development can be seen as an example of broader development sector transformation, where we see that the overall innovation process consists in many situations of not only innovation development activities but importantly also of institutional factors. From this it follows that diverse roles and functions are required also from the involved intermediaries, and that they concurrently function in multiple fronts to enable innovation.

A lack of critical resources, such as a skilled workforce, materials and infrastructure, as well as immature institutions are typical in developing regions and also a limiting factor for innovation (De Massis et al., 2018; Dutt et al., 2016; Khanna and Palepu, 2010). Therefore, it is an arena where intermediaries can have a big impact with functional utilisation of their existing experience at the local scale and the dynamics related to affordability and institutional constraints. Indeed, it seems that most intermediaries operating in resource-constrained settings have a clear understanding of the local functioning of institutional voids and are equipped with a capacity to mitigate such challenges in innovative ways.

Our results concerning the enabling environment indicate that the studied intermediaries have the potential to mitigate the strength of institutional voids that hamper the development of operational environments in developing regions (Barasa et al., 2017; Dutt et al., 2016; Winterhalter et al., 2017). Both local and international companies have to address these voids when operating and innovating in resource-constrained environments. Intermediaries can help companies do that by engaging in institutional development in collaboration with other actors (Levänen et al., 2022b). The background of many of the intermediaries we studied is in the development sector, and they have a history of influencing broader policy development, which explains their engagement and strength on this front as intermediaries. Also, profit-oriented intermediaries in Kenya have been observed to contribute towards bridging institutional voids and providing networks and capacity building for entrepreneurs, with the potential of enabling wider positive social change and development (Littlewood and Kiyumbu, 2018). However, through our process-based analysis, we also identified a gap in institutional support during the earlier innovation process stages.

A lack of financial opportunities to carry out pursued activities can be a very significant institutional void. Improved access to financing and different financing models can help companies overcome problems driven by market affordability. Given the strong role of the public sector in the provision of water services, market affordability links to our study not only through individual end users, such as households, but also – and even predominantly – to the variety of organisations providing water

services. Such organisations may be privately or publicly owned and/or operated, and their size varies greatly depending on the water service context (e.g., urban/rural and population of the area). Offering innovative financing structures for innovation and connections to investors in addition to financial and business knowledge are of key importance for successful innovation in resource-constrained environments.

6. Conclusions

Solving the prevailing development and sustainability challenges in resource-constrained environments requires diverse actors to engage and collaborate in terms of innovation. This study investigated the role of innovation intermediaries as enablers of innovation and as broader facilitators of sustainable development in resource-constrained environments. We observe that in resource-constrained environments, many intermediaries that were not originally set up to serve as intermediaries take up hybrid roles as the development sector transforms. As a result, the objectives, interests and financing arrangements of these intermediaries define how they operate and support innovators in resource-constrained environments, with many emphasising development-oriented objectives over profit-oriented goals.

The main contribution of this study to the discussion on the role of innovation intermediaries in resource-constrained environments is three-fold. First, we developed an analytical framework combining key intermediary functions and innovation process stages, which was tested through a case study on a set of intermediaries operating in Kenyan water sector. This opens new perspectives on the research of intermediation, both as a phenomenon and as an enabler of innovation. Our results indicate that intermediaries tend to concurrently support innovation through three main dimensions related to entrepreneurial services, financing and an enabling environment, which also underpins the hybrid characteristic of intermediaries. The process-based analysis, however, showed gaps in the intermediaries' support, with the intermediaries providing services only at specific process stages. Most intermediaries provide support in the later stages of innovation development, specifically in the final product and business development, piloting and early commercialisation; meanwhile, fewer activities are observed in the early stages. We argue that this gap can be problematic, particularly in resource-constrained environments, as it may impede systematic tackling of the key constraints, namely resource scarcities, market affordability and institutional complexities.

Second, we identified that many innovation intermediaries in resource-constrained environments were not originally set up as intermediaries but have actively begun to take such roles in addition to their traditional roles as conventional development aid, humanitarian and non-governmental organisations or as state corporations. As hybrid organisations, they offer their skills, capabilities and resources to companies in multiple fronts and enable innovation in these environments. Regarding hybridity, it is worth noting that these intermediaries do not necessarily themselves have profit-oriented objectives (in addition to societal/development-related objectives), although have nevertheless begun to support innovators operating with such logics. Interestingly, we also observe that the intermediaries are simultaneously leveraging companies and innovations in terms of their complementary skills, resources and capabilities to reach their own organisational objectives.

Third, we have provided insights into the linkages between intermediation and the prevailing constraints and voids in these environments. As most of the studied intermediaries have, in the past, engaged with institutional development, capacity building and overall development of regions, they can efficiently mitigate the constraints and institutional voids innovators are faced with during the innovation process. Through their prior experiences and accumulated knowledge, the intermediaries are able to transfer relevant skills, resources and capabilities, including connections, to other actors in the innovation space while also providing legitimacy to these new actors through the established role the intermediaries hold. Specifically in the water sector, where the public sector is commonly strongly involved, the intermediaries' background and prior engagement in sectoral development activities enables them to not only provide relevant support for innovators but also bridge the prevailing institutional voids and complexities in resource-constrained environments.

To conclude, we argue that intermediary organisations operating with hybrid logics have a significant role in enabling innovation in resource-constrained environments, as they support innovators on multiple fronts while mitigating the prevailing constraints and institutional voids innovators are faced with. At the same time, the intermediaries and companies can collectively contribute towards sustainable development and inclusion by offering tailored products and services in these environments.

Our study has also some limitations that are worth noting. One limitation relates to the differences in the sample size of the studied intermediary groups (A, B and C), which could affect the comparability of the groups. As many of the studied organisations were not originally set up as intermediaries, there are also some overlaps between their specific intermediary functions and more generic innovation management and development activities, which could potentially lead to differing interpretations. Further, to understand the focal role intermediaries have in terms of financing, more in-depth studies are required. Finally, from a theoretical point of view this study does not exhaustively (beyond hybridity) research how non-commercial innovation intermediaries differ from commercial or business intermediaries. All these aspects merit future research specifically from a theoretical perspective to further strengthen the theoretical foundations and connections between theories and practical literature related to innovation intermediaries in resource-constrained environments.

CRediT authorship contribution statement

Anne M.J. Hyvärinen: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Marko Keskinen:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. **Jarkko Levänen:** Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare no conflicts of interest.

Data availability

The authors do not have permission to share data.

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Appendices.

Appendix A

This Appendix elaborates the three intermediary dimensions and related nine intermediary functions of the analytical framework developed and applied in this article (see Sections 3.4 and 4).

Dimension 1: Entrepreneurial services consist of four intermediary functions that directly target the companies and their capacity. **Capacity building of entrepreneurs** covers the development of business skills, including managerial, organisational and administrative aspects, support for technological development and provision of infrastructure for entrepreneurs/companies. Acceleration and incubation programmes also come under this function. **Knowledge brokering** refers to the role of intermediaries as sources and articulators of knowledge. The knowledge can be on a variety of topics, such as the local environment, communities, traditions, ways of working, business and service development and financial management. **Demand articulation, opportunity identification and market access** describe the role intermediaries hold towards markets and communicating these to companies. Innovation promotion, feedback provision for innovation development and matching local needs with available innovations are also included in this function. **Legitimacy and brand value** refer to the established nature of intermediaries, which can be reflected towards the companies as legitimate actors.

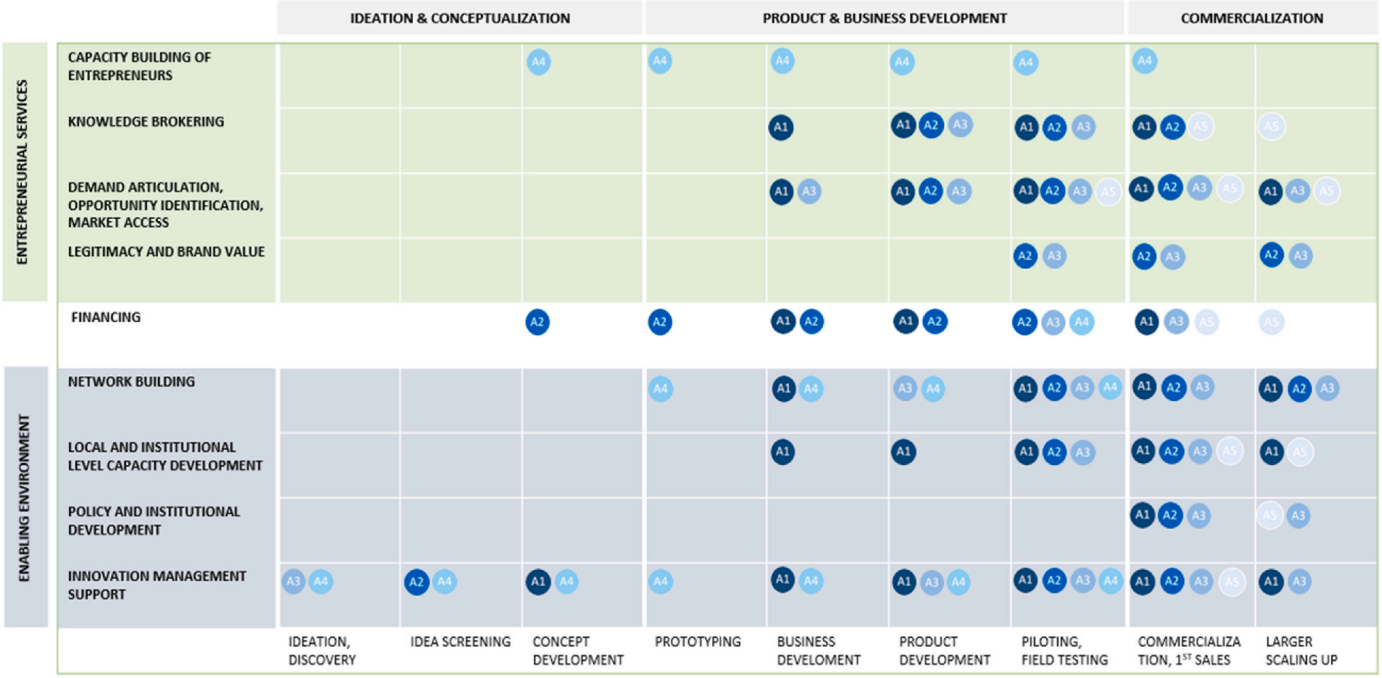
Dimension 2: Financing includes various direct and indirect financing methods with no sub-categories. Financing can be direct financing from intermediaries for different innovation stages, such as business development, project development and implementation. Enabling access to further financing and the development of new financing mechanisms for companies are also covered by this function.

Dimension 3: Enabling environment refers to four different types of functions that the intermediaries hold in terms of creating a favourable operational environment for companies. **Network building** refers to the function intermediaries hold in connecting and introducing entrepreneurs/companies to different organisations and stakeholders and enabling access to ministries, counties and other officials as well as end users. **Local and institutional level capacity development** aims to strengthen the general operational environment through a variety of capacity-building activities (e.g. to end users, communities, service providers and institutions) as well as community engagement and provision of technical and financial assistance to actors such as end users, operators and/or customers. **Policy and institutional development** refers to intermediaries' actions to support the creation of a favourable policy and institutional environment for private sector actors and innovation development through, for instance, lobbying and advocacy work. **Innovation management** support describes the general support intermediaries provide via their knowledge and experiences, but it is not so concrete that it would directly fit under the other functions. The activities related to this function include, for instance, the support intermediaries provide in terms of stimulating innovation development, scoping innovations and even participating to some extent in the actual innovation process as co-developers. In the specific context of our study, this dimension and related functions thus also have a close link to the broader activities related to development and sustainability that many of the studied intermediary organisations have already done prior to assuming a role as intermediaries.

Appendix B

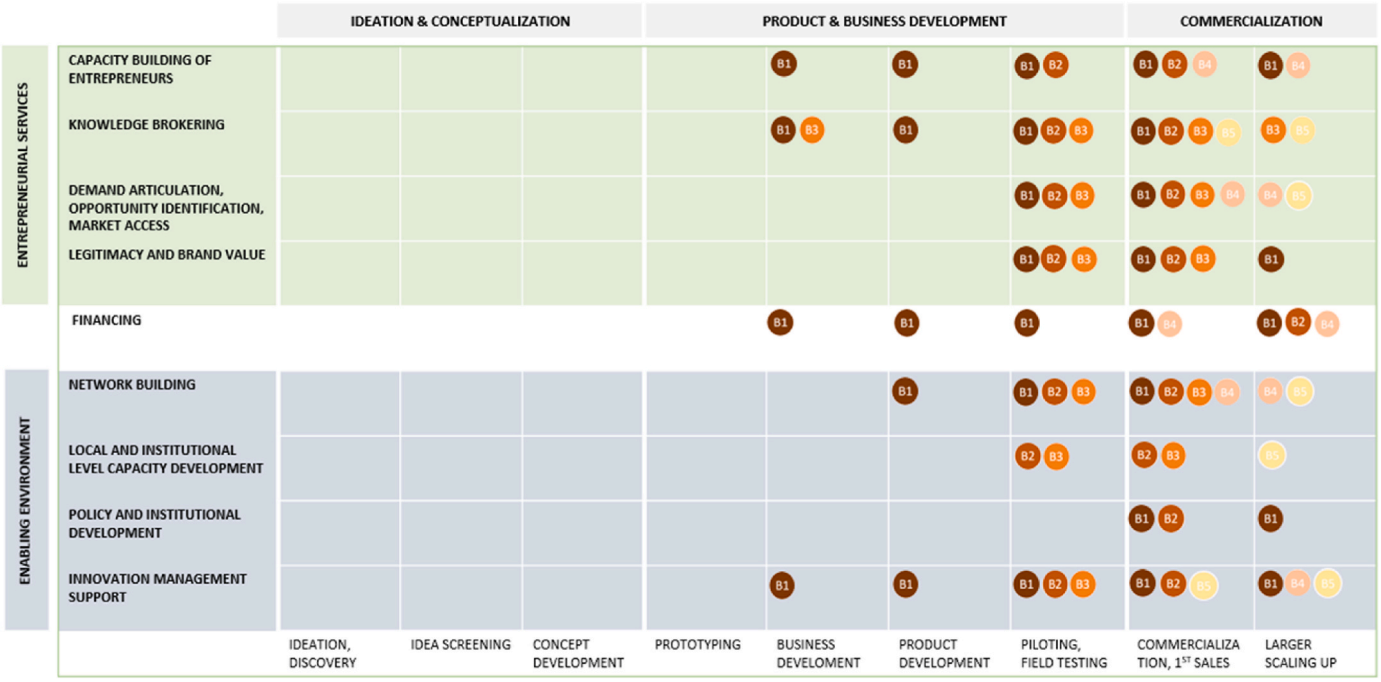
This Appendix shows through three separate visualisations the intermediary functions of the three intermediary groups recognised in our study along the innovation process (see Table 1).

Group A – International organisations (e.g. civil society and research actors as well as development and humanitarian organisations) that also operate elsewhere than in Kenya.

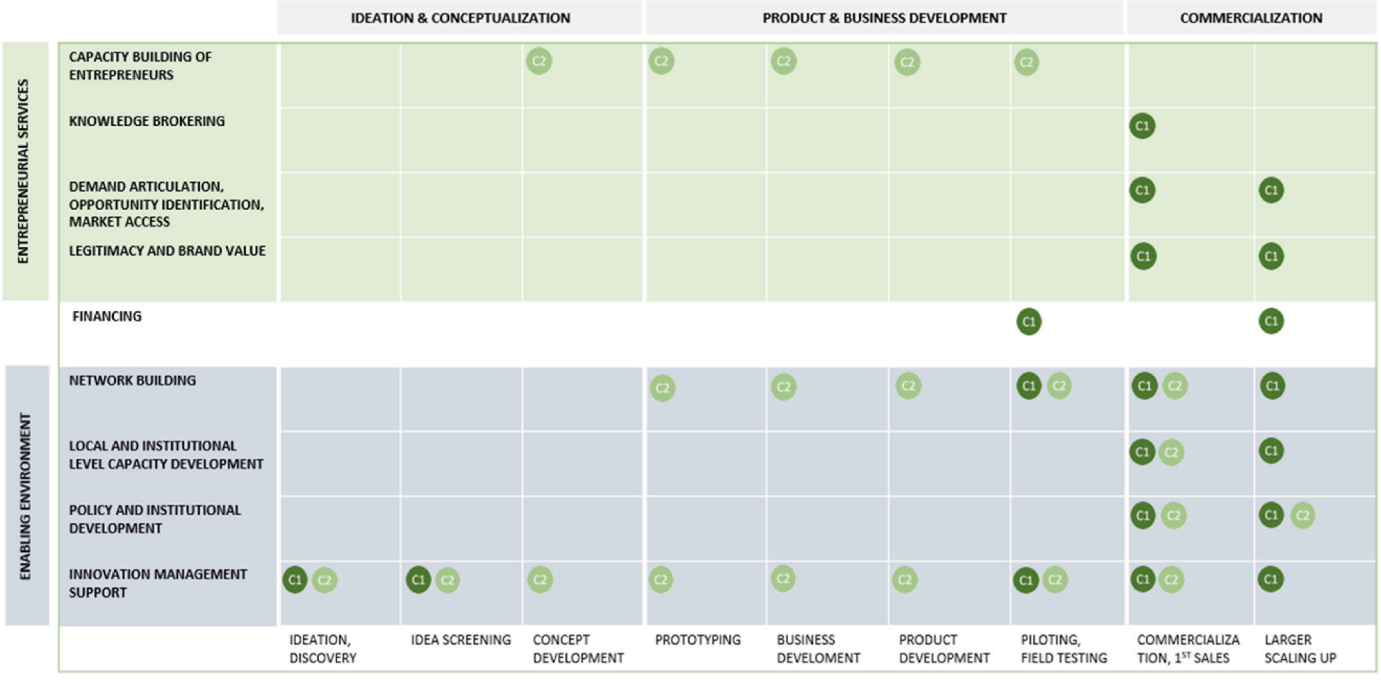


Group B – Other than governmental organisations operating mainly

in Kenya, including private, civil society and research organisations.



Group C – Kenyan public (i.e. government-related) organisations, such as state corporations operating under different Kenyan ministries.



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