

Multi-stakeholder dialogue space on farmer-led irrigation development in Ghana: an instrument driving systemic change with private sector initiatives

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Private sector actors bring expertise, resources, and new perspectives to agricultural development, but the tendency to short-term approaches and market-based orientation has been unable to drive a systemic change in the development agenda. We explore how multi-stakeholder dialogues can capitalize on and trickle systemic change through private sector involvement. Analysis from the farmer-led irrigation development multi-stakeholder dialogue space (FLI-MDS) in Ghana shows the need for a physical and institutional space to cater for and merge different stakeholder interests. For all stakeholders, the institutional space is a multi-level-playing institution which can trickle systemic change by leveraging the private sector's investments with multi-stakeholders' collaboration, interactive learning, and potential support for commercial scaling of FLI. For private sector actors, a physical space for collaboration is crucial. It enables them to envisage their commercial interests, opening up opportunities for collaboration and mobilization of resources. Ensuring long term sustainability of an FLI-MDS requires catering for the private sector needs for a physical dialogue space to trickle systemic change and accelerate commercialization in farmer-led irrigation development.

Keywords: private sector; farmer-led irrigation; agricultural development; multi-stakeholder dialogues; systemic change; Ghana

Introduction

Development partners and organizations, regional bodies and governments have increased recognition of the need for private sector investment toward achieving economic growth, environmental sustainability and poverty reduction in Sub Saharan Africa (SSA) (Naseem, Spielman & Omamo 2010; German, Cavane, Siteo & Braga 2016; Husmann & Kubik 2019). This reflects, in part, a response to the decline of public investments in much-needed, high-quality and evidence-based research to drive agricultural development outputs across SSA (Naseem, Spielman & Omamo 2010). At the same time, it reflects the rapid growth of private sector roles in agricultural production, value chain development, and research and innovation (Naseem, Spielman & Omamo 2010; Husmann & Kubik 2019).

Private sector, understood here as enterprises, companies or businesses, social enterprises, regardless of size, ownership and structure, has promoted new technology generation in plant biology, pesticides, fertilizers, machinery and irrigation. Often done in partnership with public investment, these new technologies have provided agricultural innovations that in turn increase productivity (Naseem, Spielman & Omamo 2010; Ragasa, Lambrecht & Kufoalor 2018). The private sector has also championed the commercialization of innovations in information, communications, business models, and micro-credit services that exhibit potential to address societal problems that constrain inclusive development (Baumüller, Husmann & Von Braun 2014). Moreover, public-private partnership (PPP) arrangements have been established in sectors where they strengthen complementarity of assets and overlapping interests between partners (Hall 2006). Whether through independent initiatives or through PPPs, the private sector invests resources and skills, and shares risk in business, research, extension, market and infrastructure development (Hall 2006; Ponnusamy 2013).

Private sector companies bring expertise, resources and new perspectives to agricultural innovation and development, but it would be unrealistic to expect that the private sector could do this widely and without other actors (Husmann & Kubik 2019). Private and publicly-supported innovations have been limited to scattered and localized pilots. Moreover, the common short-term, market-based orientation of many companies has been unable to drive a systemic change on the long-term development agenda. Solutions to global challenges require not only technological innovation, but linking technologies to broader national agriculture and innovation systems. Achieving systemic change, therefore, requires modalities that leverage innovations and also facilitate collaboration. One potential mechanism to facilitate collaboration between private sector companies and other actors across sectors is the creation of organizational and institutional spaces. Similar to other multi-stakeholder platforms and processes (Davies et al. 2018; Schut et al. 2019), these spaces bring together multi-stakeholders and provide them with a space for learning, action and change whilst stimulating private sector investments and partnerships.

Given this context, our research aims to understand how multi-stakeholder dialogues can capitalize on, and trickle systemic change through private sector investments¹. We use the case of the farmer-led irrigation development multi-stakeholder dialogue space (FLI-MDS) in Ghana. Farmer-led irrigation (FLI) is characterized by farmers' own investments and direct engagement with the market, which is considered a promising potential alternative to irrigation development approaches characterized by large public expenditure in high cost infrastructure and public sector management (de Fraiture & Giordano 2014). The shift from public to private investment, as well as the need for innovation to address inherent opportunities and risks, make this a suitable case study. In the next section, we lay out the methodological approach used in this study.

Action research facilitating the FLI-MDS formation in Ghana

Development and facilitation of a FLI-MDS towards systemic change requires an approach that is responsive to systemic barriers and engages relevant actors and stakeholdersⁱⁱ across sectors in the co-creation of the intended change. This implies the need for a trans-disciplinary research and facilitation team to kick start relevant research, development, and multi-stakeholder dialogue processes. An action-based research process (Elden & Chisholm 1993; Dickens & Watkins 1999) was used to co-create a FLI-MDS in Ghana. Figure 1 illustrates the steps embedded in an action-reflection modality: analyze, conceptualize, co-develop, and reflect.

The *analyze* step responds to the questions: What is the state-of-art of FLI development in Ghana? What are current relevant investments and initiatives from Ghana's private sector supporting FLI? What are the private sector-led innovations that directly target FLI development in Ghana? We implemented a qualitative study that combined a literature review with semi-structured interviews. The literature review analyzed systemic barriers and opportunities to FLI development in Ghana. Semi-structured interviews were conducted with 12 companies in Accra, Ghana's capital and main commercial city. Targeted companies were those involved in the importation, manufacturing and distribution of irrigation equipment and services to farmers. To map the irrigation supply chain and characterize private sector investment in FLI, the following data was collected: 1) general company information, 2) business and activities, 3) cooperation with other private and public actors, and 4) constraints, challenges and strategy for business development in FLI. In the *conceptualize* stage, we reviewed literature about multi-stakeholder platforms and processes as well as different cases of multi-stakeholder initiatives in Ghana to theorize the FLI-MDS.

A multi-stakeholder workshop was organized to kick-start the *stages of co-develop and reflect*. In particular, the FLI-MDS concept was introduced and experiences in multi-stakeholder processes, collaboration and innovation were shared amongst stakeholders. Knowledge, experiences and expertise in FLI development were exchanged across private, public and research sectors. Finally, stakeholders' interests and agreement to common goals and functioning of the FLI-MDS were established. Participatory approaches were used to encourage active engagement of stakeholders. For example, the breakout group discussions reflected and captured the existing culture of collaboration and innovation scaling among stakeholders, and visualized the potential and role of FLI-MDS. Stakeholders were asked to: 1) identify common interests and goals, 2) define the mode of operation, and 3) envision the success and failure of a dialogue space.

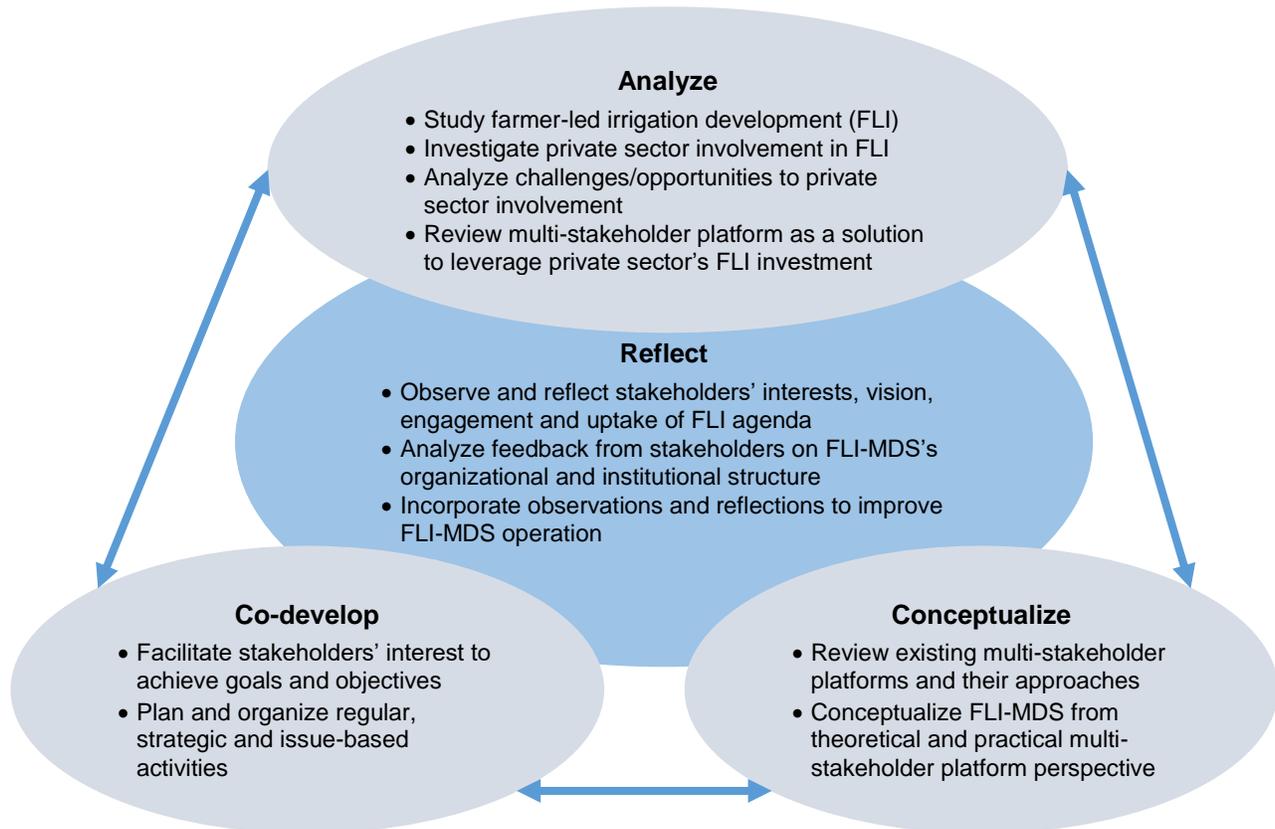


Figure 1. Process of developing FLI-MDS in Ghana

Farmer-led irrigation development in Ghana: potential and challenges

FLI development is defined as ‘...a process in which farmers, individual and/or group, drive the establishment, improvement, and expansion of irrigated agriculture, often in interaction with other actors’ (Veldwisch, Venot & Komakech 2019:2). In Ghana, farmer-led irrigation is often referred to as micro- or small-scale or sometimes informal, in contrast to communal schemes or publicly-funded irrigation infrastructure systems that target smallholder farmers (Woodhouse et al. 2017). FLI development is a process, characterized by smallholder farmers making decisions on how they organize irrigation, where to farm, what to produce, and managing their own sales (Mdee & Harrison 2019). Studies in Ghana show that FLI accounts for over 189,000 ha, and employs 45 times more people, covering 20 times more land area than large-scale public irrigation schemes and benefiting about 500,000 smallholder farmers (de Fraiture & Giordano 2014; Namara et al. 2014). FLI is expanding at a faster rate than large-scale public irrigation systems, in part because farmers are able to make their own investments in water lifting, conveyance and application.

Despite the potential, FLI is so far limited to less than 2% percent of Ghana's cultivated land (Mendes et al. 2014) due to diverse challenges at multiple levels. At the *system level*, Ghana's Irrigation Policy, Strategies, and Regulatory Measures (GIP-2010) indicates four constraints to successful and sustainable irrigation: 1) low agricultural productivity and slow rates of return, 2) unclear socio-economic engagement with land and water resources, 3) environmental degradation associated with irrigated production, and 4) lack of irrigation support services. The overall national framework for irrigation and the institutional capacity of irrigation authorities and supporting actors do not support or enhance opportunities for FLI development. For example, public sector interventions give less attention to inclusivity in all stages of design, dissemination, adoption, and use of technologies that might be appropriate in the FLI development process (Lefore et al. 2019). Appropriate approaches to ensure equitable access to land, credit and extension services for smallholder farmers, women, and other marginalized population are missing due to the limited understanding on what and how irrigation technologies are used by these groups and in different contexts (Namara et al 2014; Mensah & Ibrahim 2017; Ragasa, Lambrecht & Kufoalor 2018). The promotion of private sector investment in irrigation has prioritized land allocation to large scale farmers and public-private partnerships arrangements to manage large-scale irrigation schemes.

At the *value chain level*, under-developed irrigation supply chains constrain farmer access to appropriate technologiesⁱⁱⁱ, services and information. Various factors that currently stifle supply chain development, include a complex set of financial regulations and tax regimes, complicated bureaucracies for importation, manufacture, and distribution of equipment and poor market infrastructure. Moreover, irrigation equipment importers, manufacturers, and distributors are confronted with uneven application of existing regulations and standards, as well as a limited access to credit for developing markets. The suppliers perceive a low demand for irrigation equipment and therefore are not motivated to expand into high risk, frontier markets. Furthermore, value chain development is biased to rainfed staple crops (e.g. maize, rice, cassava) and foreign exchange earning cash crops (e.g. cacao, cashew). Weak links between actors in the irrigated value chains result in high transaction costs to access markets, particularly in the context of limited infrastructure. The gaps between actors may also contribute to perceptions about low effective demand. Lastly, business and financial constraints for entrepreneurs, in combination with the poor coordination in value chains, further impede agriculture sector development. The missing or weak linkages between irrigation equipment suppliers and credit institutions, as well as between irrigators and produce buyers, discourage the development of a robust market for equipment supply.

At the *household level*, farmer investments in irrigation remain low, despite farmer willingness to invest, evidence of profitability, and potential to decrease manual irrigation labor (Balana et al. 2020). One of the major challenges is the high upfront investment cost for irrigation equipment such as pumps, sprinklers, and kits as well as the high energy cost (Namara et al. 2014; de Fraiture & Giordano 2014; Balana et al. 2020). Other challenges include the lack of physical access to

technologies due to market distance, after-sales services, appropriate agricultural inputs, financial services, extension services for irrigated production, and linkages to profitable output markets (Dittoh et al. 2013; Namara et al. 2014; Mensah & Ibrahim 2017; Balana et al. 2020). In sum, the constraints at the household level reflect the limitations and gaps at the value chain level.

Private sector investments in FLI

Analysing private sector investments from a supply chain perspective reveals three categories of investments: importation, manufacturing, and retailing. Figure 2 illustrates the structure of the Ghanaian irrigation equipment and service supply chain (GIES supply chain). Under *importation*, almost all equipment and products used for conveyance and application of water in Ghana are imported by general importers and wholesalers, as well as distribution agents, as indicated in Figure 2. The value of imports has increased significantly, from USD 17 million in 2010 to USD 81 million in 2012 (Mendes et al. 2014). Semi-structured interviews with some major importers (e.g. Dizengoff, SunIn, and Hatoum) show that their imported irrigation products are part of a wider product portfolio catering for different market segments, including water technologies for mining or domestic use. The market for irrigation systems specifically, is geared towards a limited number of large-scale commercial farms. Targeting smallholder farmer market segments requires specific attention to both the equipment and the business viability; these would not be economically feasible for the private sector.

With *manufacturing*, local companies have invested in the production of storage and conveyance equipment (e.g. multi-purpose water storage tanks, and PVC pipes) and recently added drip and sprinkler kits to their production portfolio. Semi-structured interviews with local manufacturing companies and importers show that the manufacturing investment segment is a niche area, as local manufacturers take advantage of the Government of Ghana policies and programs for Free-Zone enterprises. These policies provide grant waivers as incentives for investment in industrial production, export and employment generation. Such investment is very limited due to the strong competition from the imported products as expressed by a company representative:

'Why they [irrigation equipment suppliers] should invest in the local manufacture when price of almost locally manufactured products is generally higher than that of the same type of imported products. We are one of few companies investing in local manufacturing because we have the long-term strategy to develop product for West African irrigation market. Few others are investing in the local production to get benefits from the government's programs'.

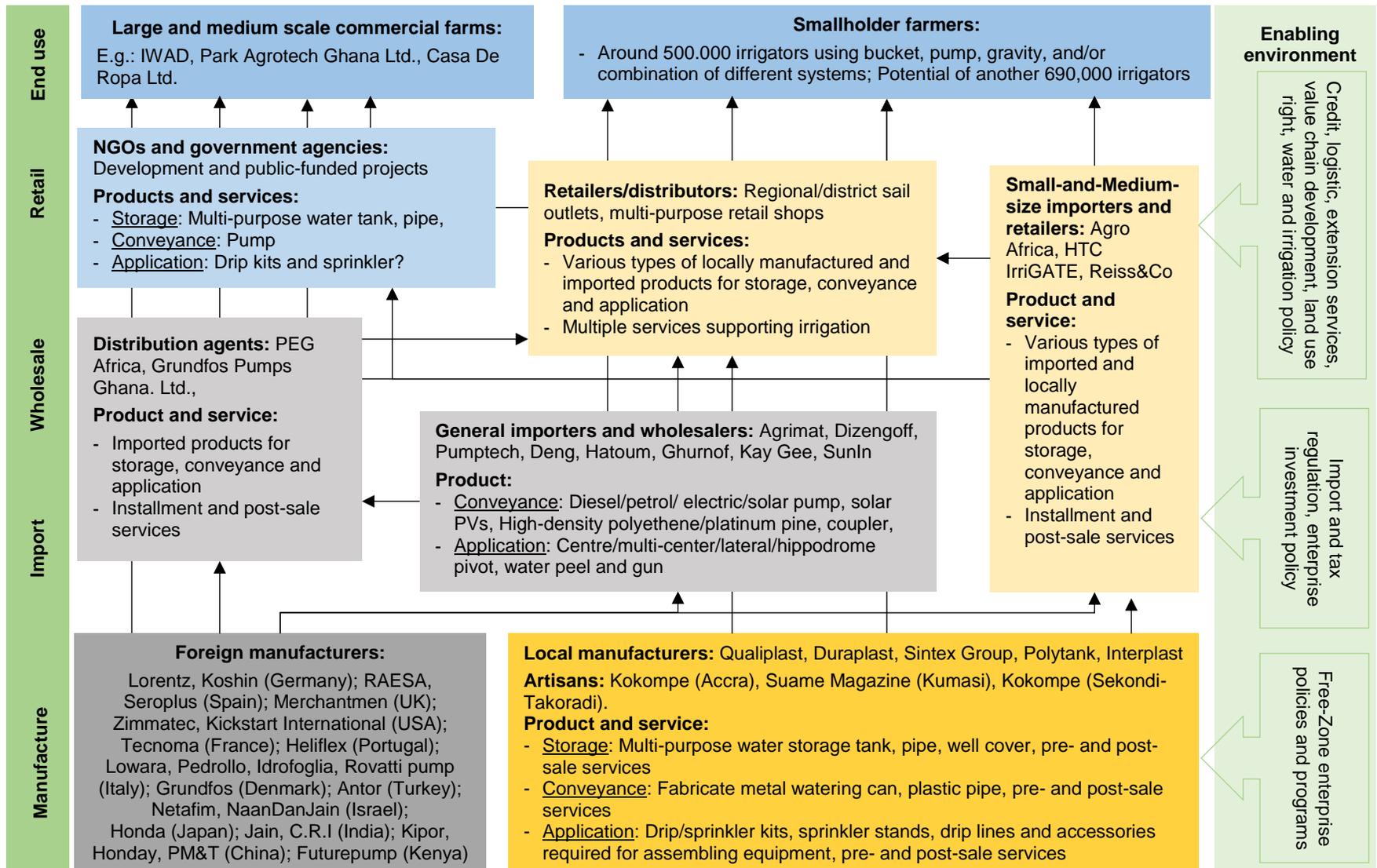


Figure 2. Irrigation equipment and services supply chain (Source: Authors)

A few artisans located in Accra, Kumasi and Sekondi-Takoradi are also involved in producing metal watering cans, basic foundry pumps, sprinkler stands, drip lines and various accessories. These small investments directly target FLI development, because costs are significantly lower than their imported counterparts and can be produced to meet individual demand of farmers. However, the types of equipment and scale of production are limited, and insufficient to stimulate irrigation development to the actual potential.

For investment into *retailing*, almost all the GIES supply chain's operators directly and/or indirectly distribute imported and locally manufactured equipment. The major importers distribute the products through a limited number of sales outlets and agents in Accra and regional capital cities. Some of these companies partner with development and government agencies to supply irrigation equipment to farmers through project-based operations as presented in Figure 2. At the district and community level, multi-purpose shops sell, in addition to agricultural inputs, irrigation equipment. These are mostly low capacity petrol, diesel, or manual pumps, and water storage tanks and PVC pipes, which are commonly used by households for storing and pumping water, as well as artisanal mining in some areas. Equipment installation and after-sales services are generally not included in sales. Rather, distributors may provide basic technical training on operation and maintenance of irrigation equipment to local service providers, such as mechanics, plumbers, and electrical technicians. Consequently, local technicians with insufficient training in the installation and repair of irrigation equipment are often the main technical and after-sale service providers to irrigators.

Although the estimated annual average of irrigation equipment sales was about USD 29 million around 2014 (Mendes et al. 2014), private sector investments mainly covered the supply of imported conveyance and application equipment. Aside from novel approaches noted by some of the interviewed SMEs, very few vendors offer customized packages of equipment and services. By focusing on the typical lifting-storage-conveyance-application chain, the weak linkages between credit and irrigation supply and between irrigators and producer markets continue to impede FLI development. Furthermore, government and development projects that offer incentives for private sector investment in agriculture and specific value chains tend to do so without integrating the irrigation equipment supply chain, thereby reinforcing the weak linkages throughout the system.

The interviews revealed that a growing number of small-and-medium size enterprises (SME) have recently invested in irrigation equipment retailing as demand by smallholder farmers increased. These SMEs import and distribute equipment to address smallholder irrigation needs, as expressed by a CEO of one SME:

We had come up with a new strategy since December 2017 to deal with small scale farmers who have from 1 acre to 10 hectares maximum. We have provided installation and after-sale

technical support, credit, and market linkages to farmers. This business has brought the best year for us in 2019’.

These SMEs provide more demand-driven packages consisting of water storage, conveyance and application equipment, as well as services such as pre-purchase survey and system design, installation, technical support, maintenance, credit, and market linkages. The innovative financing modalities show the potential to reduce high upfront costs, directly targeting the smallholder market segment that characterizes FLI development.

The case of the demand-driven SME business mentioned above suggests that business initiatives can be built around the smallholder market segment underpinning FLI development, i.e. the ‘irrigation package for one acre to ten hectares’. This business case provides a customized, bundled package of irrigation equipment and services, and credits to farmer groups to ensure 1) an efficient irrigation system, 2) a group guarantee that each farmer is able to pay back after the third harvest, and 3) farmers are capable of expanding their irrigated farming area within two to three irrigation seasons. These recent business initiatives could reduce the high upfront costs, and thereby increase technology access for smallholder farmers, but other challenges off-set the potential. To tackle the systemic barriers and promote the business models that target smallholder farmers, there is need to strengthen the enabling factors, as shown in the right side of Figure 2. Moreover, there is a need to generate and facilitate collaboration for innovation and interactive learning between the private sector, as market leaders, and the broader categories of actors and stakeholders. Addressing these needs can, in turn, help to identify pathways to scale, and reduce constraints for scaling, thereby generating irrigation supply and demand enablers.

Considering the foregoing, a functioning interactive multi-stakeholder platform can simultaneously support innovation, provide appropriate inputs into stakeholders’ plans, and inform relevant government policies and programs. In the following section, we conceptualize the farmer-led irrigation development multi-stakeholder dialogue space (FLI-MDS) as an interactive multi-stakeholder initiative to link the private sector’s FLI development, end-user-focused investments with broader development actors and stakeholders in the agricultural water management sector.

Conceptualizing the FLI-MDS

Learning from multi-stakeholder platforms and initiatives

Multi-stakeholder platforms and processes have been effectively used by governments, research, and development actors for achieving development outcomes in agricultural research for development projects and programs (Davies et al. 2018; Schut et al. 2019). Although the functions and forms of these platforms and processes vary widely, a number of common features can be

identified across such initiatives. For instance, stakeholders' interests are very diverse and stakes high, sometimes challenging the management and participation of less 'powerful' stakeholders (Cadilhon 2013). Achievement of tangible benefits from the multi-stakeholder processes, therefore depends on institutional and individual commitment of the diverse stakeholders (Schut et al. 2019). Stakeholders need to gather around tangible issues with the potential for specific knowledge benefits, engaging in a virtual learning cycle, and visualizing tangible and short- to medium-term benefits (Davies et al. 2018). These conditions allow stakeholders to jointly work on and derive benefits that sustain their commitment and ultimate rewards (Swaans et al 2013). Engagement, customized training activities and knowledge sharing are needed to strengthen capacity, trust and ownership of multi-stakeholder processes (Lefore 2015).

In Ghana, various multi-stakeholder processes, such as innovation platforms, multi-stakeholder dialogues, or learning alliances, existed or still exist, addressing different issues of sustainable water use. For instance, the *Multi-Stakeholder Process for Policy Formulation and Action Planning (MPAP)* was used to facilitate strategic partnerships, and (AWGUPA^{iv}) for an improved research-policy dialogue. These efforts resulted in the official recognition of the role and benefits of irrigated urban and peri-urban agriculture in Ghana (Drechsel et al. 2008). The platform aims to expand access to irrigation water for urban agriculture, to develop a sustainable urban farming system, and to contribute to urban poverty alleviation while enhancing urban food security and empowering the socially excluded. The *Ghana Dams Dialogue* brought together key stakeholders to share information, increase awareness about resettlement and dam related issues that affect local communities and provide guidelines and recommendation towards a policy framework, thereby contributing towards well-informed decision-making and sustainable planning and management of dams in Ghana. The innovation platforms, established by the *West African Agricultural Productivity Programme (WAAPP)* in collaboration with the International Centre for development oriented Research in Agriculture (ICRA), facilitate discussions around a particular commodity or cropping system with interest groups to disseminate technologies for widespread adoption.

Multiple lessons have been documented on leading and facilitating these and similar multi-stakeholder engagement processes. The multi-stakeholder processes are dynamic and tend to grow with time. Multi-stakeholder processes and dialogues that are established based on specific projects usually end at the close of the project (Amerasinghe et al. 2013). Their functionality is sustained when embedded in an established institutional and organizational arrangement and by considering a wider spectrum of agricultural water management issues rather than specific (and limited) project issues. Co-hosting of the platform by a group of core members with diverse organizational representation is key to creating shared ownership, maintaining institutional memory, and diversifying funding sources. Moreover, seed funding to address emerging issues as well as regular funding of the main activities, and joint sharing of costs are critical to strengthening multi-stakeholder processes' scope, management capacity, effectiveness, and sustainability.

Conceptualizing farmer-led irrigation multi-stakeholder dialogue space

FLI-MDS is needed in Ghana's irrigation sector for several reasons. *First*, whereas there is high potential for FLI development to change the agricultural landscape in Ghana, the associated challenges are too numerous to be achieved by individual actors. Individually, actors lack adequate resources and expertise to make the types of systemic changes required. *Second*, irrigation technologies are available, but adoption remains limited, partly due to low market integration, such as under-developed supply chains and output markets for irrigated products. *Third*, private sector companies often focus on profits with limited commitment or accountability towards smallholder farmers. Yet, government agencies, research organizations, and development actors are perceived to 'talk too much' with minimal relevant action on the ground. These mutual negative perceptions widen the gaps among irrigated agricultural value chain actors. Catalyzing collaboration can advance the development of the sub-sector. *Fourth*, actors within and across sectors must deal with systemic barriers and challenges in the irrigation sub-sector of a broader market system, about which there is little understanding. Each actor works toward narrow objectives with equally narrow approaches. This poor coordination hampers the identification of solutions or innovations. Synergistic opportunities exist amid the complementary needs and interests. Hence, the FLI-MDS aims to encourage collective thinking, collaboration, and action across multiple sectors and at multiple level to generate innovative ideas and solutions.

Based on the lessons learned from earlier multi-stakeholder platforms in country and available literature, we conceptualize FLI-MDS as a combination of a physical and institutional space where conversations among diverse stakeholders allow collective actions to evolve and deepen over time to actualize a shared vision on FLI development. The *physical space* is a place where the FLI-MDS stakeholders come together to meet naturally, communicate effectively, and interact comfortably to pursue shared objectives. A good physical space is a place that make the FLI-MDS stakeholders want to be there, to stay once they have arrived, and feel welcome, safe, and comfortable. The physical space becomes a common space when it is collectively owned by all stakeholders (Brouwer et al., 2013). Such spaces are therefore structured to enable communication and collaboration among stakeholders (Kilelu, Klerkx, Leeuwis & Hall, 2011; Kilelu, Klerkx & Leeuwis, 2013; Totin, Roncoli, Traoré, Somda & Zougmore, 2018).

Yet, such physical spaces do not automatically generate sustainable, inclusive, and equitable multi-stakeholder dialogues and processes (Brouwer et al. 2013) unless institutional spaces are established. Institutional spaces aim to deeply engage the FLI-MDS stakeholders into cooperative learning and action towards advancing FLI development. Thus, *an institutional space* is a conducive institutional environment (Schut et al. 2019) constructed through FLI-MDS stakeholders' engagement, dialogues, and collective action and co-learning. To reach the constructed institutional space, the FLI-MDS stakeholders work together in identifying needs, negotiating priorities,

developing solutions, mobilizing, and exchanging resources, reaching institutional commitment, and building institutional capacity and memories. Through their interaction and engagement, stakeholders become aware of their different but also common interests, fundamental interdependencies and the need for collective action and collaboration to pursue shared objectives (Schut et al. 2019). Accordingly, the institutional space provides a neutral sphere to increase transparency and trust-based relations that enable the empowered and active participation of all (Brouwer et al., 2013).

The FLI-MDS gathers different groups of stakeholders along the irrigated agricultural value chains such as private sector (irrigation production manufacturers and services, wholesalers and distributors and other actors along the agricultural value chains), farmers-based organizations (women's groups, youth's unions, farmer organizations, farmer cooperatives), international and national NGOs, national and international universities and research organizations), development partners, and government agencies and departments with mandates for agriculture and irrigation development. Figure 3 visualizes the FLI-MDS's stakeholders and core objectives developed by the participants in the initial multi-stakeholder workshop. The conceptualized FLI-MDS aims to:

- *Facilitate the scaling of FLI development* by identifying and testing sustainable scaling pathways in the partnering with private sector and engaging with relevant stakeholders
- *Raise awareness and interest in the scaling of FLI development* by providing and sharing scaling knowledge and experiences, and discussing potential positive and negative impacts.
- *Foster interactive learning to enhance inclusive scaling of FLI development* by inspiring specific entities to be inclusive in approaches to enhance benefits for participation of women, youth, and geographically marginalized through specific entry points within irrigation value.
- *Support irrigation policy and planning processes* through sharing experience and insights which includes evidence to improve planning of water and other natural resources, and to open dialogues on policy agenda and instruments
- *Capitalize FLI 'good practices' for resource mobilization* by integrating the actors and their practices into scaling proposals and promoting FLI development to relevant stakeholders
- *Drive innovation for inclusive scaling of FLI development* by employing 'do-reflect-adapt-do' loops to develop scaling ideas to feasible solutions.
- *Enhance FLI-related institutional capacity and memories* through stored FLI development knowledge within the organizations and transmission between organizational members, to strengthen the sustainability of the FLI scaling contributing towards sustainable agricultural water management.

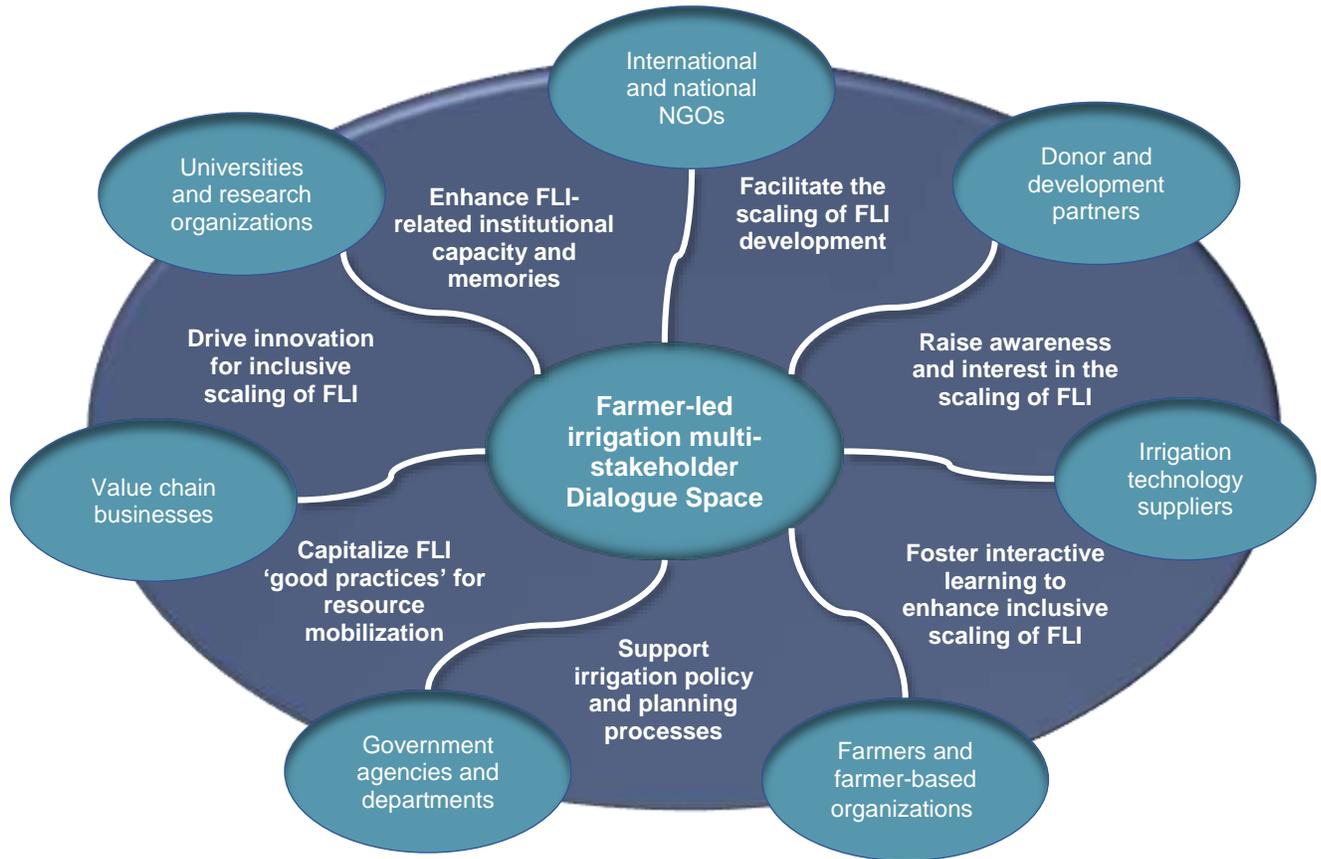


Figure 3. Conceptualized FLI-MDS Framework

Co-developing the FLI-MDS

The FLI-MDS is based on common interests and shared vision on enhancing inclusive and sustainable scaling of FLI development. This informs who chooses to be a member, the extent to which someone participates, and the activities undertaken within the platform. Intersecting interests allow collective actions to evolve and deepen over time toward achieving milestones toward the shared vision. Despite the diverse stakeholder mandates, the FLI-MDS participants identified a set of common interests:

- Increasing the adoption of FLI innovations and wider societal impacts on food security, livelihood, poverty, and gender inclusion by increasing market access, income and profits for FLI irrigators;
- Enhancing enabling environment by facilitating policy processes and infrastructure development towards sustainable water management;
- Enhancing agricultural water management capacity through learning opportunities, knowledge sharing, and skill development;
- Increasing access to FLI innovation and funding; and

- Fostering networking and business opportunities towards win-win collaboration by creating synergy, leveraging on the strengths and complementary and collective efforts. A successful FLI-MDS should be measured with Integrity, Governance, Action, Engagement, Collaboration, Learning, Growth, and Tangible impacts as presented in Box 1. Governing the FLI-MDS would entail six pillars covering the arrangement, structure, and processes: a physical space, institutional arrangement, distributed leadership, coordination and facilitation, community of interests, and planning and implementation.

The *physical space* where participants come together to engage in dialogue processes must be available. Depending on its evolvement, multiple physical spaces can be identified and provided to be aligned with its dynamic growth and members' interests. The *institutional arrangement* is established by forming a facilitation team consisting out of different actor representatives. The team members are voluntarily working to identify strategic directions and to organize the implementation of FLI-MDS activities. They also facilitate stakeholder's interaction and collaboration to enhance inclusive scaling pathways for FLI development. Throughout the co-development process, the institutional arrangement will evolve, involving more voluntary individual and organizational members with the relevant expertise and mandates in the facilitation team.

Distributed leadership needs to be developed as the culture and mechanism that guarantees the sustainability and integrity of the FLI-MDS. Such leadership is a process taking place among the members of the FLI-MDS through shared, collective, and extended leadership practices, which

Box 1. Successful indicators for the FLI-MDS

Integrity: Shared vision by and sustained interests of all stakeholders as well as complementary efforts and collective supports towards FLI development

Governance: Reliable and effective governance in place for running the FLI-MDS, building trust and commitment, and managing conflict of interests amongst stakeholders

Action: Having diverse and serious actions, including regular, strategic and issue-based activities in order to achieve the set of objectives

Engagement: Active participation and commitment of individual and organizational participants to the FLI-MDS

Collaboration: Having bilateral and multi-lateral partnership and collaboration among members towards promoting FLI development as well as sustainable agricultural water management

Learning: Adaptive learning to be able to learn from mistakes, reflect upon the weaknesses, leverage on others' strengths, and avoid walking in silos

Growth: Increasing participation and membership, expanding the scope towards a wider spectrum of agricultural water management, and institutionalizing the FLI-MDS by stakeholders

Tangible impacts: Increasing FLI productivity and production efficiency, mobilizing private sector's investments, and influencing government policies towards supporting FLI development

build the FLI-MDS's capability for growth and improvement. The *community of common interests* is established to fulfil the stakeholders' dynamic interests, their engagement, and potential contributions to the FLI-MDS's institutional and structural growth. Working and task-force groups can be formed ad-hoc by gathering a community of members who share a common interest to stimulate joined actions.

The *coordination and facilitation* is another core function of the FLI-MDS. At the beginning, actors requested that IWMI, together with a team of interested individuals of actors, further co-develop the FLI-MDS. Depending on an increase of activities and on an emergence of need, a coordinating and facilitating unit might be established with clear guidelines for planning, implementing, monitoring, and evaluating the FLI-MDS's activities and success. An individual and/or a group of lead coordinating and hosting organizations can be formed along the co-developing process to enhance the FLI-MDS's institutionalization and sustainability. The linkage between the institutional arrangement and the coordinating and facilitating bureau needs to be regulated to ensure the integrity.

The *planning and implementation* are other core functions of the FLI-MDS and these need to be done collectively, pro-actively, and strategically. The strategic planning needs to be done at the very beginning and along the co-developing process to identify, reflect, and adjust the strategic directions of the FLI-MDS. The pro-active planning and implementation need to be done periodically to develop and carry out a road map and financing strategy. These functions can be carried out based on three clusters of activities: 1) regular activities (e.g. regular meeting, exchange, and updates, annual planning, periodic events, and communication activities), 2) strategic activities (e.g. strategic planning, situational analysis and reflection, capacity development, strategic investment, and strategic events), and 3) issue-based activities (developing ideas into innovation, scaling partnership, and policy influence mission).

Private sector interest and engagement in FLI-MDS

Initiatives with significant private sector investment are shifting public perception on private sector engagement and the potential role to accelerate growth and agricultural development in SSA (Husmann & Kubik 2019). Climate change, unemployment, social inequality, and weak food systems all pose challenges to food security. Hence, many governments and international development organizations are looking to the private sector for business-for-development innovations that combine social value creation and profit maximization (Baumüller, Husmann & Von Braun 2014; German et al. 2016; Husmann & Kubik 2019), following earlier advocates, such as Elkington's Triple Bottom Line (Elkington 1998). However, private sector companies have largely been excluded from existing platforms in the irrigation sector.

In the FLI-MDS, private sector engagement is crucial for the result of dialogues and collective actions to trickle systemic changes. Notably, co-learning and evaluating business and financial modalities through knowledge exchange in FLI-MDS can create win-wins for the public and private sectors. The public sector can accelerate FLI development supporting agricultural economic growth, and food and nutrition security, whilst the private sector reaches more smallholder and resource poor farmers translating directly into business opportunities and economic profit. For example, the FLI-MDS provided a neutral physical and institutional space for private companies to outline the barriers associated with high taxes and transaction costs associated with (e.g. standard compliances and custom's authorities), supported by research-based evidence, to public agencies that participate in the dialogues. Easing policy barriers can in turn, enable the public sector institutions to achieve their larger development goals.

Furthermore, the FLI-MDS provides companies with opportunities for networking, identification of resources, and leveraging on available, limited opportunities. For example, the FLI-MDS created the space for networking between research and companies that led to a partnership between a research program^v and PEG Africa in Ghana to test and refine new Pay-As-You-Go financing options for smallholder farmers, develop distribution systems for solar-based irrigation pump systems, and refine business models to reach those currently underserved by the market. In this case, donor funds are being used to de-risk private sector costs related to testing new finance modalities. In turn, the lessons from this partnership are being shared with other private sector partners that participate in the FLI-MDS. This elevates the experiences of a single private sector company to a public good, through discussion of the challenges encountered in designing appropriate business models and sharing of methods and tools innovated.

Another way to enhance private sector engagement is to bring relevant private sector companies together to bridge their fragmented efforts in targeting smallholder farmer market segments and create opportunities for collaboration and co-learning to support the scaling of FLI. For example, private companies exploring the irrigation equipment supply market in Ghana, have been able to access information about water resources from research institutions and projects. Private companies note that water resource mapping, and linking those maps to market studies, is costly; most private companies are not able to invest individually to develop such information. By sharing research-based information at the FLI-MDS that is of interest but beyond the scope of individual companies, companies are incentivized to continue to participate. This type of information sharing is also an incentive for research institutes to engage, as feedback from companies enables targeted research and contextually-relevant innovation. At the same time, the enhanced access to and use of evidence moves the agriculture sector toward meeting the national development challenges.

Private sector manufacturers and distributors of irrigation equipment are expanding rapidly into ‘frontier’ markets whilst developing and utilizing innovations to overcome challenges in financing and in agricultural extension. Participation of the broader private sector in the FLI-MDS is the ‘lynch pin’ to jointly and systemically bridge earlier identified gaps in FLI development. It is anticipated that better integration of private sector actors into this market sub-sector will result in: 1) accessible, appropriate irrigation technology supply chains, 2) reduced high upfront costs to irrigators through contextually suitable finance products and services, and 3) improved agricultural value chain and reliable, profitable market development to support irrigation investment. Furthermore, the FLI-MDS could, through interactive learning and win-win collaboration, tackle challenges around sustainable and inclusive scaling of FLI development.

Conclusions

Throughout the process of co-developing and facilitating the FLI-MDS, stakeholders see the FLI-MDS as a combination of a physical and institutional space where they come together. The physical space reflects the need to come together, enabling all actors and stakeholders to translate their objectives and stakes into a common vision through an exchange of ideas, interactive learning and joint exploration of opportunities to promote, invest and enable FLI scaling for smallholder farmers. The institutional space reflects the need to sustain the FLI-MDS through enduring stakeholders’ co-learning, collective action, collaboration, and commitment towards the common vision. These spaces can be physically, virtually, and institutionally structured for communication and collaboration among stakeholders. These reflect the dynamic and flexible feature of the FLI-MDS to attract stakeholder engagement.

The FLI-MDS stakeholders fulfil different roles of the physical and institutional space. For private sector actors, the FLI-MDS is a space where business experiences are shared whilst providing a network to establish win-win collaborations between stakeholders that otherwise would not interact. This approach to the space reflects the private sector actors’ commercial approach to pursuing opportunities for potential investments, collaboration, and resource mobilization, which are critical to ensure the private sector’s continued engagement. For development partners, research organizations, and government, FLI-MDS is a space to accelerate scale and meet national targets on agricultural economic and sustainable development goals by sharing research-based knowledge and experiences. This includes discussing potential positive and negative impacts of scaling initiatives and progress, identify and test sustainable scaling pathways, capitalize on ‘good practices’ for resource mobilization, and develop feasible solutions to jointly identified challenges. So, matching short-term business expectations with advancing knowledge as a public good will be fundamental moving forward.

The FLI-MDS shifts a significant role onto the private sector, while also contributing to functions of government, irrigated agricultural value chain actors, and actors who seek to support smallholder farmers and marginalized populations. In this regard, it is also a multi-level platform with the potential to stimulate systemic change through different leverage points. These shifts in relationships, in turn, enhance private sector's engagement, trickling win-win collaborations towards systemic change. Crucial to the success of the FLI-MDS is ensuring long term capacity and memory among all stakeholders and actors to ensure continued business and development alignment going forward.

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ⁱⁱ In this context, actors are those who are directly and continuously involved in the development and implementation of FLI development initiatives and responses. Stakeholders are those who influence or are influenced by, the FLI-MDS, but are not directly engaged in the development and implementation of FLI initiatives and responses.

ⁱⁱⁱ Irrigation equipment includes manual and motorized water lifting, storage tanks, pipes and any other small scale equipment to store, lift and apply water.

^{iv} AWGUPA: Accra Working Group on Urban and Peri-Urban Agriculture existed between 2005 and 2013

^v Through ILSSI, the private sector investment catalyzes the expansion of irrigated, commercial production by smallholder farmers through a market systems development approach in Ghana and Ethiopia.