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Power Dynamics and Scaling Potential of the Proposed Ghana Fertilizer Platform

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ESAFE

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ABBREVIATIONS

AFAP	African Fertilizer and Agribusiness Partnership
AGRA	Alliance for a Green Revolution in Africa
ASAT	Agricultural Scalability Assessment Tool
CAADP	Comprehensive Africa Agriculture Development Program
CIMMYT	International Maize and Wheat Improvement Center
COCOBOD	Ghana Cocoa Board
CSD	Crop Services Directorate
ECOWAP	ECOWAS Agricultural Policy
ECOWAS	Economic Community of West African States
EPA	Environmental Protection Agency
ERP	Economic Reform Program
FASDEP	Food and Agricultural Sector Development
FERARI	Fertilizer Research and Responsible Implementation
FPG	Fertilizer Platform Ghana
GFEP	Ghana Fertilizer Expansion Programme
GoG	Government of Ghana
GSGDA	Ghana Shared Growth and Development Agenda
IFDC	International Fertilizer Development Center
IITA	International Institute of Tropical Agriculture
IMF	International Monetary Fund
METASIP	Medium-Term Agricultural Sector Investment Plan
MoFA	Ministry of Food and Agriculture
MSP	Multi-Stakeholder Platform
MTADP	Medium-Term Agricultural Development Program
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
PFJ	Planting for Food and Jobs
PPP	Public Private Partnership
PPRSD	Plant Protection and Regulatory Services Directorate
SA	Scaling Analysis
SDG	Sustainable Development Goal
SPA	Stakeholder Power Analysis
USAID	United States Agency for International Development
WUR	Wageningen University & Research

SUMMARY

The fertilizer sector plays a major role in crop production. The organization and structuring of the sector is vital to sustaining food systems and shrinking the level of food insecurity. To tackle challenges in the fertilizer value chain, the Government of Ghana aims to establish a Fertilizer Platform Ghana (FPG). This study was conducted to anticipate potential issues arising from power relations and dominance, which will be critical for the sustainability and effectiveness of the platform at scale. Data from 20 key stakeholders were gathered through interviews. Scaling analysis and stakeholder power analysis were done to generate insights from these data. The scaling analysis was used to determine the scaling potential of the FPG and the fertilizer value chain, while the stakeholder power analysis helped identify stakeholders' decision-making power and its basis.

The findings revealed that the platform is scalable, but its efficiency and sustainability could be constrained by insecure funding, data credibility, value chain disorganization, lack of collaboration, and leadership. Scaling the fertilizer value chain through the FPG will highly depend on the platform's fit in the local context, private sector critical stakeholders' adoption rate, knowledge institutions' contribution to building a science-based platform, and support from the public sector and its agencies. The pace of development of the fertilizer sector is under command of the public sector, mainly due to its high influence over data and information sources and its total control of the subsidy program, which drives the fertilizer market.

The study concluded that the fertilizer value chain could be scaled through the FPG by taking the pathway of a public-private partnership, empowering less powerful actors, and creating a level playing field for all stakeholders within the platform to ensure representativeness and catalyze the development of the fertilizer sector.

CHAPTER 1: INTRODUCTION

1.1 Background

In developing countries like Ghana, where agriculture plays an important role in the economy, organizing and structuring the fertilizer sector is crucial for agri-food system improvement, poverty reduction, and food security achievement. In 2019, 29.8% of the labor force in Ghana was employed in agriculture (World Bank, 2021a), with a total contribution of 18.5% to the Gross Domestic Product (GDP; Ghana Statistical Service, 2019). To boost agriculture productivity and its role in socioeconomic development of the country, successive governments of Ghana have launched various programs and policies. For instance, the Food and Agriculture Sector Development Policy (FASDEP) was developed in 2002, complemented by a strategic framework on how to modernize the agriculture sector in Ghana.

One aspect that remains critical for transforming Ghana's agriculture sector is the fertilizer sector. This has resulted in the government's desire for a national fertilizer platform assigned to the Ghana Fertilizer Expansion Programme (GFEP) and a study on fertilizer value chain optimization (International Fertilizer Development Center, IFDC, 2019a), acknowledges the priority given to the fertilizer sector. The study revealed a list of inefficiencies in the fertilizer value chain (IFDC, 2019a). These findings form the basis for IFDC, through its Fertilizer Research and Responsible Implementation (FERARI) program, to support the development of the Ghanaian fertilizer value chain. FERARI is supporting the implementation of a Fertilizer Platform Ghana (FPG) by organizing all the actors along the fertilizer value chain. In 2020, research conducted by Aremu et al. (2020), under the FERARI program, on stakeholders' views about the design of the fertilizer platform outlined that such a platform could indeed offer an opportunity to address issues in the sector, allowing optimal development of the fertilizer value chain in Ghana as a means to facilitating food and nutrition security. However, Aremu et al. (2020) revealed some concerns about the functioning of the platform. For instance, who should host the platform? Some suggest the public sector, while others recommend the private sector, public and private sector co-hosting, or development partners. Although this is not conclusively addressed in the study, the power level of actors and their power relations must be considered properly in determining the host and other essential components of the platform for its effective functioning. Also, while there is consensus about the need for a fertilizer platform, some fundamental differences in concepts for its design, mode of operation, funding, and sustainability need specific attention for its optimal functioning. As the ultimate objective of initiating a platform is to reach impact at scale, it is important to understand how power is conceptually positioned in the discourse around scaling and how it will play out in the platform.

1.2 Problem Statement

Power relations is an important component for the sustainability of every establishment. Warner (2007) described two characteristics of a "process through which interdependent stakeholders with different interests but linked issues are empowered in interactive learning and collaborative governance to tackle common challenges" (Woodhill and van Vugt, 2011). The Multi-Stakeholder Platform (MSP) is an approach in which change happens through cooperative learning and one in which change only occurs by adjusting actors' power balance. The imbalances of power distribution in MSPs can be reinforced by the differences in expertise, resources, and access to

information. Failure to recognize power dynamics can result in some stakeholders dominating others. Hiemstra et al. (2012) argued that actors with resources often have more power and that it is difficult for less powerful actors to influence what is going on in the platform. Thus, without careful attention, the outcomes of the MSP, contrary to its goals, will unintentionally benefit the interests and needs of the most powerful stakeholders (Brouwer et al., 2012). Therefore, a deep understanding of FPG power dynamics is needed.

Proper understanding of the power relation dynamics through different tools and processes is important to assess strengths and weaknesses of the platform, to monitor it, and to establish a problem-solving plan for predicted consequences. It is also important to enable less powerful stakeholders to make conscious decisions and for powerful stakeholders to realize actors' interdependencies in addressing issues (Brouwer et al., 2013). Recent efforts toward the establishment of the FPG have not specifically considered nor given much attention to issues surrounding power relations within the platform. Therefore, this study is designed to provide empirical evidence and information on the issues surrounding power relations as related to the FPG. Importantly, this will help improve the design, operations, effectiveness, and sustainability of the platform.

1.3 Research Questions

This research answers the following questions:

1. What are the strengths and weaknesses of scaling FPG?
2. What are the power differences and relationships among stakeholders? How would these affect decisions along the fertilizer value chain or in the fertilizer platform?
3. Will large private sector companies dominate proceedings and decision-making to the detriment of small enterprises, and will that skew participation and representation?
4. Will the use of the public sector regulatory/policymaking power adversely affect the private sector scaling decisions, resulting in unsustainability of the platform?

1.4 Objectives

The main objective of this research is to improve technical and economic performance of the fertilizer value chain through the assessment of stakeholders' power and facilitate equitable collaboration. The specific objectives are to:

1. Assess the strengths and weaknesses of scaling in the fertilizer sector.
2. Identify the forms and sources of power among groups of actors in the fertilizer value chain.
3. Analyze actors' power and their influence on decisions in the fertilizer sector.
4. Describe how power relations and the dynamics affect the distribution of benefits or disadvantages of scaling along the value chain, and recommend ways to improve power equity and efficiency and to anticipate resistance of change.

1.5 Justification for the Study

Being competitive is key for any business or organization to continue to exist in the market, creating value and jobs for the community, especially since they do not operate alone in the value chain. Thus, interactions between actors established de facto power relationships (Ahmeti, 2019). The interdependency between less powerful actors and more powerful actors suggests that the less

powerful could also prevent or delay gains by the more powerful. Therefore, regulatory interventions are needed in balancing power relations among stakeholders for competitiveness.

Given the commitment of the Government of Ghana (GoG) in setting up a FPG to improve fertilizer value chain efficiencies, it is essential to understand the potential challenges that the platform could face, such as funding and actors' power behavior, for decision-makers to be able to design an adequate, effective, and sustainable platform. Literature reveals that this type of information is not commonly available for the fertilizer sector in Africa. Hence, the outcomes of this research will both help identify the areas where stakeholders need to be empowered and predict the dynamic of the fertilizer sector and its impacts on the value chain.

CHAPTER 2: LITERATURE REVIEW

2.1 Conceptual Issues

2.1.1 Science of Scaling

The term "scaling" is popular in public research and international development. Its popularity has soared during the last 20 years. The number of reports discussing scaling is continually increasing, and developmental organizations such as World Bank, the International Fund for Agricultural Development, and the United Nations Development Program are the greatest promoters of scaling (Wigboldus and Leeuwis, 2013). There are different meanings associated with scaling up or scaling out of technologies and innovations, since these are applied by several disciplines (Ajayi et al., 2018; Wigboldus and Leeuwis, 2013). However, there are two commonly used definitions of scaling. First is the notion of broad reach: more people, geographical space, political institutions, or commodity output (Shilomboleni and De Plaen, 2019). This refers to technology adoption. The second is complementary to the first and considers the aspect of adaptation, uptake, and use of innovations (Eastwood et al., 2017). This refers to innovations, which usually necessitates more strategic, holistic, and refined approaches (Wigboldus et al., 2016). Adoption, diffusion, and extension were also used to characterize processes of expansion and the achievement of development outcomes through research and innovation before the wide use of the term scaling (Rogers, 2010). In development research, scaling is associated with positive change, which explains why it is usually perceived to secure public heath, sustain food availability, and promote equality and opportunity (Schut et al., 2020).

The U.S. Agency for International Development (USAID, 2014), in Ajayi et al. (2018), defined scaling as a process that eases the transferability and sharing of a technology into a wider geographic area. The International Institute of Rural Reconstruction (IIRR, 2000) presented scaling up as process or action that carries a solution with quality benefits to people over a wide geographical area in a short period of time while taking into consideration equity and sustainability. To World Bank (2005), scaling is a way to reach several people over time through expansion and adaptation of successful policies, programs, or projects from one place to another. It involves actions that use tested and proven technology on a given challenge to increase impacts and to foster policy and development (Simmons et al., 2007). The debate on scaling is not new (Hartmann and Linn, 2008). In the 1970s, World Bank interventions aiming to reach the urban poor at scale took into consideration replicability, affordability, and financial sustainability of solutions. In the 1980s, non-governmental organizations (NGOs) showed interest in ways to scale up their interventions. At the research level, Korten (1980) and Myers (1984) undertook their seminal analytical work on "going to scale."

Today, scaling is considered a set of interdependent activities, including labor organization, service delivery, regulatory frameworks, policies, or cultural meanings, as it requires both a recognition and an understanding of the multidimensional character of innovation and societal transformation processes driving the change (Schut et al., 2020). Wigboldus et al. (2016) identified downscaling, upscaling, and outscaling as different processes of scaling. Outscaling is the spreading of innovation within the same sphere, while upscaling aims to create favorable conditions and policies for scaling at high levels (Hermans et al., 2013). Scaling also has multiple levels of interacting characteristics (e.g., field, region, country, continent), and these contribute to facilitate

multi-stakeholder networking, decision-making, collective action, and conflict and power play that are inherent to scaling (Hermans et al., 2017; Wigboldus et al., 2016; Leeuwis and Aarts, 2008). Scaling is driven by planned intervention and self-organizing dynamic processes or systems that are controllable to a certain extent (Leeuwis and Aarts, 2011; Gladwell, 2000; Schut et al., 2020).

2.1.2 Power and Relations

The term power is difficult to define, and it is applicable to different levels: individuals, groups, organizations, and countries. Often, it is restricted to domination and/or a win-or-lose situation. This view of a "game of winners or losers" (Krasner, 1991), or supremacy, is often linked to international politics (Lewis and Wilson, 1877) and perhaps intuitiveness (Dahl, 1957). Power is exercised not only in coercing but it can also be activated for the effectiveness of a collective action (Parsons, 1963).

Although several definitions of power can be found in literature, it is often related to terms such as influence, authority, control, persuasion, and coercion. The concept of power has previously been considered by Plato, Aristotle, Machiavelli, Hobbes, Pareto, and Webber. This increased after World War II and publication of the book *Power and Society* by Lasswell and Kaplan (1950). In 1957, Dahl released his well-known seminal article *Concept of Power*, in which he defined power as an interaction between A and B, where A could influence B to do something that was unintended by B. Despite the numerous contributions to and study of power within different disciplines, there has been no agreement on the definition of the concept (Dahl and Stinebrickner, 2002). However, the purpose of this research is in line with Lasswell and Kaplan (1950), Simon (1954), and Dahl (1957), who agreed on the concept of power being causal and relational, instead of a property concept, and having multidimensional levels with varied bases without permanent hierarchy (Baldwin, 2016). They defined power relations as multi-dimensional, including scope, domain, base, weight, means, cost, time, and place. Power can decrease in one dimension while increase in another (Baldwin, 2016). Baldwin (2016) identified 12 problems/controversies in power analysis. This study will focus on factors that are relevant in clarifying this research.

Theories about power analysis admit the existence of "interaction" as an inalienable characteristic of exercising power. The ability to influence people or control events for desired outcomes is qualified as "power over." For self-confidence, it is called "power within." However, there are also "power with" and "power to"; these refer to cooperation and creation ability, respectively (Hiemstra et al., 2012). Thus, the concept of power is applicable to more than one person, team, group, or organization involved in relation (Hellriegel et al., 1998). Power in interpersonal relationships within an organization represent five bases (French and Raven, 1959):

- *Reward power* refers to influencing others through rewarding.
- *Coercive power* refers to influencing others through punishment or withdrawal of a reward.
- *Legitimate power* refers to influence by virtue of one's position or hierarchy accepted by others.
- *Referent power* refers to influence because of the admiration from others.
- *Expert power* refers to the power attributed due to the possession of specialized skills, knowledge, and talents.

Hellriegel et al. (1998) has also admitted the plurality of power sources:

- *Knowledge as power* represents the intellectual capital and information possessed and that can be used for influencing others' behavior.
- *Resources as power* involves possessing the capital, labor, and equipment that can serve to make the rules.
- *Network as power* implies the degree of relations and affiliations obtained to the extent that it can be a source of influence.
- *Decision-making as power* refers to power used to affect the process of decision-making.

Depending on the form of decision-making, power can also take different forms (Oxfam, 2014; VeneKlasen and Miller, 2002; Hellriegel et al., 1998):

- *Visible power* indicates when decision-making is easy to perceive and understand.
- *Hidden power* refers to decision-making not easily detectable because it is happening behind the scenes.
- *Invisible power* involves subtle unseen influences that sustain the decision-making process.

According to Elwyn and Miron-Shatz (2010), there are two phases of decision-making. Deliberation is the first phase and involves gathering information and knowledge about a given situation. Determination is the second phase and integrates the deliberation of inputs prior to enacting a decision. Three aspects of decision-making are important to consider (Pfeffer, 1992). First, it is important to note that the decision itself is unable to change things; second, when making a decision, its consequences (good or bad) can only be known later; and third, the time it takes to make a decision is always shorter than the time the decision has an effect. These three aspects demonstrate the complexity and uncertainty in making decisions. Cooper et al. (2018) identify certainty, risk, and uncertainty as the conditions under which decisions are made. Their main differences are based on the quantity or quality of information available and the extent to which predictions are valid. Cooper et al. (2018) also recognize power attachment to political decision-making, and this happens when goals, interests and values are different. Lukes (2005) presents a three-dimensional view of power – decision-making, control over agenda setting, and preference shaping. Regardless of the elements considered in power estimation, uncertainties will always remain (Baldwin, 2016).

2.2 Empirical Issues

2.2.1 Ghana: Agriculture and the Fertilizer Sector

2.2.1.1 Agriculture in Ghana

Ghana has the second largest population in West Africa. In 2019, the population was estimated at 30.4 million and the GDP was U.S. $66.98 billion. Agriculture accounts for one-fifth of the GDP and almost half of the labor force; it is the major contributor in sustaining livelihoods of the poorest households (World Bank, 2021b, 2018).

The agricultural land area of the country is 136,000 km^2, which represents 57% of the country's landmass. However, only 24% of this arable land is under cultivation, and only 3.18% of this is irrigated (Ali et al., 2021; Namara et al., 2011). Agriculture in Ghana has been categorized as crops, livestock, fisheries, and forestry. The various crops cultivated under the tropical climate of

Ghana and dispersed in the five main agroecological zones could be grouped under cereals, legumes, root and tubers, and fruits and vegetables. Farming activities are mainly localized in rural areas and dominated by smallholder producers (less than 2 hectares) who provide 80% of the nation's food needs (Appiah-Twumasi, 2019; MoFA SRID, 2019). This makes smallholder farmers vital in Ghana and justifies the need for agriculture transformation and development.

The vulnerability of smallholders to water scarcity, land degradation, nutrient depletion, and climate change, which negatively affect food production systems, is also a precursor to poverty and hunger (Oyo et al., 2018). In addition, population growth challenges accompanied by a high increase in job and food demand have not spared Ghanaian agriculture, which has a central role in feeding the population as well as creating jobs (Kyei-Baffour and Ofori, 2006).

Successive post-independence GoG have implemented various national programs and policies. These are mostly aligned with ratified regional and global initiatives aiming to overcome barriers to agricultural development. Such ratified policies include the global Millennium Development Goals (MDGs), now replaced by the Sustainable Development Goals (SDGs), and the sub-regional Comprehensive Africa Agriculture Development Program (CAADP) of the New Partnership for Africa's Development (NEPAD). From the early 1960s to the mid-1980s, Ghana's agriculture was collapsing due to some non-adapted reforms, economic crises (inflations and devaluations), and other external factors. The problems in the agriculture sector, particularly in the crops sub-sector, had led to inappropriate input supply, as well as inadequate research and extension services. In 1983, Ghana received support from the International Monetary Fund (IMF) and World Bank, through the Economic Reform Program (ERP), to improve the performance of the agriculture sector. The "Ghana Agricultural Policy – Actions Plans and Strategies" program was the agricultural component of the ERP, and it aimed to reach rice and maize self-sufficiency and price stability for cereals. However, the third phase that began in 1989 on liberalization and the removal of subsidies on inputs (fertilizer, insecticides, equipment) was detrimental to agricultural growth and worsened farmers' livelihoods (Appiah-Twumasi, 2019; Seini, 2002).

Narrowing the shortcomings of the Medium-Term Agricultural Development Program (MTADP) and based on the Ghana Vision 2020 program launched in 1995 and the Accelerated Agricultural Growth and Development Strategies elaborated in 1996, the GoG developed a new strategic framework called Food and Agricultural Sector Development (FASDEP) in 2002. FASDEP aimed at modernizing the agriculture sector and promoting agricultural value chain linkages, but it failed to attain expected impacts on poverty due to misconceptions about the farmer category and some problems with implementation. This led to the revision into FASDEP II in 2008. FASDEP II was more focused on farmers' subsistence, sustainable use of resources, improvement of productivity, and market growth. The implementation of FASDEP II favored the introduction of the Medium-Term Agriculture Sector Investment Plan (METASIP) to stimulate private sector investment in the agriculture sector.

Consistent with the Economic Community of West African States (ECOWAS) Agricultural Policy (ECOWAP) and CAADP that target rural development and food security in Africa, METASIP (2011-2015) was developed to reduce poverty by half and raise annual agricultural GDP growth by at least by 6%. Following the signature of the Malabo Declaration in 2014, METASIP II (2014-2017) was designed based on Ghana Shared Growth and Development Agenda (GSGDA) II guidelines. The adoption of METASIP II was important for two reasons: for aiming to motivate

the Government of Ghana to allocate 10% of the national budget to the agriculture sector and for compensating for the poor performance of METASIP I in declining post-harvest losses or boosting yield (Appiah-Twumasi, 2019; Mabe et al., 2018).

While these programs achieved some impacts in Ghanaian agriculture, they did not sufficiently address all the challenges of the sector. For instance, less than 11% of farmers used improved seeds and less than 20% used fertilizers, the marketing infrastructure was inadequate, and crop yields were below their potential (MoFA, 2020). As a result, and coupled with a new government, a new program called Planting for Food and Jobs (PFJ) was launched in 2017. The PFJ, with a vision of a "modernised agriculture culminating in a structurally transformed economy and evident in food security, employment opportunities and reduced poverty" (MoFA, 2018), is built on five implementation pillars: provision of seeds, supply of fertilizers, dedicated extension services, marketing, and e-agriculture. The Fertilizer Subsidy Program initiated under the PFJ seeks to encourage the use of fertilizers by farmers in order to increase food production and cope with low soil fertility (MoFA, 2020).

2.2.1.2 Fertilizer Sector

Ghana does not produce mineral fertilizer; hence, fertilizers that are used in the country are imported in the form of raw materials or compounded and then processed by local private companies. During 2018, 15 importers, more than six blending plants, about 90 wholesale distributors, and 3,500 agro-input retailers were active in the country (GFEP [2019] cited in Aremu et al., 2020). Besides running the most expensive Fertilizer Subsidy Program in West Africa, there are no port duties or value added taxes on fertilizer imports except NPK compound duties charged at 5% and other inputs (micronutrients, bags) in which standard duties and value added taxes applied (Annequin, 2019). The fertilizer business in Ghana is very dynamic. For instance, fertilizer imports have increased by 44% from 2019 to 2020 (FTWG.GH, 2021).

Fertilizer quantity of imports and exports in Ghana, as well as use by crop, has varied over the years. The 2020 fertilizer imports of 693,844 metric tons (mt) superseded the 2019 record of imported quantities of solid organic and inorganic fertilizers combined. The country's apparent solid fertilizer consumption during 2020 without adding enhancers was also estimated at 608,844 mt compared to the 422,447 mt of 2019, an increase of 44%. A limited quantity of fertilizers, mostly solid, is exported from Ghana to some neighboring countries. For instance, total fertilizer export for 2020 stood at 4,696 mt (FTWG.GH, 2021).

Ghana's fertilizer imports are highly dependent on the subsidy (FTWG.GH, 2020). The Fertilizer Subsidy Program and the PFJ (food crops module) capture 60% of the fertilizer consumption while the Ghana Cocoa Board (COCOBOD) captures the remaining 20% for cocoa production of the total of 80% of the fertilizer market that is subsidized (IFDC, 2019a). The reintroduction of fertilizer subsidies in 2008 with a targeted voucher system for smallholder farmers differs from the preceding blanket subsidy program (IFDC, 2012). This reintroduction was motivated by both the 2008 economy crisis that caused a 10% decrease in fertilizer imports (Odionye et al., 2020) and the desire to achieve food security (Mabe et al., 2018). After no fertilizer subsidy in 2014, a change was initiated in the Fertilizer Subsidy Program, and the introduction of the PFJ program in 2017 has reconfigured Ghanaian fertilizer consumption.

Under the PFJ, fertilizers are subsidized at 50% for farmers on selected crops (maize, rice, soybean, onion, pepper, tomato). In four years of the PFJ, the quantity of blended NPKs, urea, and organic fertilizers sold increased from 121,000 mt in 2017 to 417,996 mt in 2020. During this period, the cultivated area, fertilizer usage, and national food production all increased. For instance, 150,000 mt of food was exported in 2018 to neighboring countries. The subsidy program was profitable under maize production; for every cedi spent, GHS 2.40, GHS 3.53, and GHS 5.16 were generated in 2017, 2018, and 2019, respectively (MoFA, 2020). In Ghana, agribusinesses and distributors represent 10% each of the fertilizer market; therefore, 80% of fertilizers are purchased through subsidies.

In line with its objectives, GoG launched its U.S. $2.2 billion GFEP to implement a five-year plan (2019-2023). This plan seeks to stimulate agribusiness development and industrial growth, friendly environmental management, and poverty reduction based on the integration of various fertilizer initiatives. GFEP seeks to achieve 800,000 mt fertilizer consumption and reach 3.5 million fertilizer users by 2023 by establishing an integrated fertilizer market and value chain, developing the industry, and increasing demand. Therefore, GFEP would create a National Fertilizer Council, Ghana Fertilizer Advisory Commission, a limited liability Ghana National Fertilizer Company, and the National Fertilizer Stakeholder Platform (GFEP, 2019, cited in Aremu et al., 2020). The study conducted by Aremu et al. (2020) on the Ghana fertilizer value chain and the role a fertilizer platform could play in addressing the cross-cutting issues of the fertilizer sector has also unveiled some challenges that could affect the effectiveness and sustainability of the platform. The stakeholders interviewed raised concerns and fears about funding of the platform, information confidentiality, effective decision-making, trust building, and equal distribution of power (Iddrisu, 2021).

2.2.2 Ghana Fertilizer Platform: Scaling and Power Relations

2.2.2.1 Scaling through an MSP

Scaling up and scaling out are popular terms within activities to address global challenges such as food security, water scarcity, and environmental issues. Scaling as embodied in the SDGs has the reputation of tackling real problems and is consequently associated with benefits such as reaching a large number of people with high efficiency per person and operationalizing a sustainable change (PPPLab Food & Water, 2017). Scaling has a large domain of actions. Even though the focus is often on a specific technical solution, history has shown that scaling is a combination of multiple arrangements. Prior to PPPLab Food & Water's (2017) work, Uvin (1995) identified four interrelated dimensions of scaling up – quantitative, organizational, political, and functional.

Based on the findings of NewForesight (2013) and Wigboldus and Leeuwis (2013), PPPLab Food & Water (2017) summarized two approaches on how to scale up: a horizontal approach, which is seen as the number of new actors and geographies involved (quantitative and functional scaling up), and a vertical approach, which alters institutional and organizational systems (political and organizational scaling up). According to PPPLab Food & Water (2016), the vertical dimension is often oriented toward policy regulations and strengthening enabling conditions, knowledge, and governance, while the horizontal dimension pertains to business cases, cutting-edge technology, and value chain development.

Most agricultural initiatives now involve value chain development, and some are oriented toward the fertilizer sector. Reflecting on the need for scaling up is necessary because a deep understanding of the optimal size of a program is required. Such reflections help to dispute the notion that interventions should be perpetual and that resources will be wasted and the program will fail if it is scaled without a pilot or evidence of the beneficial impact and the potential to scale up (Hartmann and Linn, 2008). As noted in Aremu et al. (2020), the establishment of the Ghana Fertilizer Platform will bring positive changes. Hartmann (2012) outlined the existence of two concepts on how to scale up in a chain. One deals with the development of an integrated chain and the other with whether the value chain is taken to a larger scale. Hartmann (2012) also indicated the multiplicity of actors imposes numerous interactions between stakeholders with different interests in a platform. So, different upgrading strategies could be adopted within the value chain; four such strategies include increasing added value, improving market accessibility, better governing the chain, and forming partnerships (Trienekens and van Dijk, 2012).

Partnerships enhance the combination of vertical approaches known to be the favorite field of public actors and NGOs and the horizontal approaches that are the chosen field of private businesses. The mix of both dimensions in the form of a public-private partnerships (PPP) is critical for tackling issues in agriculture, as vertical scaling is necessary for getting and sustaining the impact from horizontal scaling (PPPLab Food & Water, 2016). Other approaches for scaling are also presented in literature. For instance, Hartmann & Linn (2008) identified relational, replication, and expansion as pathways to scaling up. They recommend the use of relational pathways if the goal is to promote a participatory approach. For replication and expansion pathways, the context is essential and needs particular attention. Based on Hartmann and Linn (2008), the GFP could adopt a relational approach for the institutional paths and replication approach for the organizational paths to scale up the fertilizer sector in Ghana. But this conclusion cannot be reached without empirical evidence.

Hartmann and Linn (2008) identify five key drivers to scaling up an initiative. First is ideas. Before any intervention, there is a need to generate an idea, an innovation, or a model that could contribute to addressing some challenges, as with the Ghana Fertilizer Platform (GFP) that aims to tackle fertilizer value chain issues. This idea is not new; for instance, the Kenya Fertilizer Platform (KeFERT) was formed for this reason (IFDC, 2019b). Second is the vision of scale, which is accompanied by a pilot phase that helps to understand the dimensions or pathways for scaling the initiative for a real impact. Third is leadership, as any scaling project needs a "champion" to drive the vision and influence the other stakeholders. According to Hartmann (2012), the private sector is a better driver of the value chain in market economies, and the public sector can support it. External catalysts or incentives and accountability could also lead to scaling up a specific technical tool. For these drivers to be effective, it require some areas with fewer barriers; therefore, political, institutional, financial, and knowledge spaces are critical to reach scaling potential (Brizzi and Mangiafico, 2015; Hartmann and Linn, 2008). Value chain upgrading can be supported or initiated by the government through legislations, regulations, and policies and by the private sector through setup of horizontal governance mechanisms to improve the power balance and facilitate decision-making of actors/stakeholders in the chain (Trienekens and van Dijk, 2012).

Paraphrasing (Ahmadi et al., 2019; Reed et al., 2009; Chevalier and Buckles, 2008), Aremu et al. (2020) defined stakeholders as:

"Actors in the system who could be individuals, groups, or organizations that can affect or be affected by decisions made in the system."

The authors also admitted that actors have their own interests but a common goal that requires cooperation for the mutual benefit of the platform. This is difficult to sustain; therefore, capacity and member's interaction among others needs to be considered for success. Having identified relevant stakeholders, Aremu et al. (2020) defined the value chain and its actors as:

"A system/network of stakeholders that collaborate in the production, transformation, and distribution of fertilizers or support these activities to meet the needs of the end-users (usually farmers) who are also actors in chain."

Aremu et al. (2020) categorized Ghanaian fertilizer stakeholders into six groups: private sector, public sector, academia and research, banks, non-profit actors, and others.

Establishing an effective sustainable GFP is not without challenge. Faysse (2006) identified five challenges of effective MSPs, one of which is power relationships. Misunderstanding of power or power relations could lead to poor social or organizational interactions (Marshall et al., 2010). Therefore, setting up a GFP must not be limited to identifying the actors and their network only, especially as the approaches adopted are relatively new in the fertilizer value chain. In addition, the growing literature about fertilizers in general and fertilizer value chain development particularly seeks technologies to address food insecurity challenges. It has neglected the form and organization of the relationships, which are important components, and the power relationships within the different groups of stakeholders (Pietrobelli and Saliola, 2007; Lasswell and Kaplan, 1950). Power, ignored or known, is present in any relation and affects interactions (Prabhakaran, 2015; Dahl and Stinebrickner, 2002).

2.2.2.2 Power Relations and Decision-Makings in an MSP

Power relations suggest the existence of an interaction between individuals, groups, or organizations characterized by their dynamic. The non-status quo gives power relations a multi-dimensional aspect in its forms (visible, hidden, or invisible), spaces (closed, invited, or claimed), and levels (local, national, or global) where decision-making and authority can be situated. Analyzing stakeholders' power is particularly important in an MSP context. At first glance, it helps to instill a better decision-making process in situations where actors have competing interests, varied profiles, and limited resources and require balancing their needs properly. Stakeholder power analysis also serves in empowering low influential but important stakeholders in policies and institutional improvement (Mayers, 2005). Researchers, practitioners, and non-profit organizations have conducted several studies on power relations in the form of power dynamics, power behavior, and power profile involving different stakeholders in the field of natural resources management, value chain, and multi-stakeholder processes.

Brouwer et al. (2013) facilitated the study of 12 cases of an action research program on power dynamics in multi-stakeholder processes conducted in Africa, Asia, and Central America.[1] The

[1] Countries are: Ghana, Nigeria, Kenya, and Malawi (Africa); Philippines, Indonesia, and Malaysia (Asia); and Guatemala (Central America).

study covered value chain MSPs, natural resources-related MSPs, and service delivery MSPs. The goal of the program was to develop a firm understanding of power dynamics and ways of leveraging power imbalances between various stakeholders involved in different MSPs. In fact, effectiveness and sustainability of multi-stakeholder processes, platforms, initiatives, or partnerships, , as described by Brouwer et al. (2013), based on facilitators feedback about the action learning program and change processes conducted in Africa and Asia, lay more often on the change operated by adjusting the power balance instead of through a cooperation approach. Facilitators noticed that power relations issues (for instance, a perception of unequal distribution of power) appear right from the formation of MSP and civil society stakeholders, where the less powerful think the solution to their status is to gain power by taking it from the most powerful.

Brouwer et al. (2013) considered that trust between actors is the foundation in addressing power dynamics, and it must be created if it does not exist. Once trust is established, power bases of key actors must be explored, as it could be hidden or a long history of exclusion exercised by powerful stakeholders over the least powerful may exist, which would require a reconciliation process. The Philippines MSP showed local politicians hide power in protecting illegal groups using dynamite in fishing. Once the illegal fishermen are arrested, the police must release them as ordered by higher authorities (Brouwer et al., 2013). Culture can also shape power dynamics. For instance, in northern Ghana, MSP processes revealed the authority to be an "earth priest" that presides over issues in the local communities. Becoming aware of their "power within" is the first step in empowering disadvantaged stakeholders; therefore, power dynamics in the MSP could be clarified to them through different tools. This approach was adopted in Kenya's Lamu MSP in the great house of power illustration, where doors represent the visible economic power of local communities. The decision-making rules have been improved, even though during the action research, process changes for disadvantaged stakeholders were very complex due to the difficulty finding a time and place for meeting that were favorable to all the stakeholders. In contrast, in East African region community, Nakangu (2016) underlined the failure to transfer sufficient decision-making power to the local level because the central actors did not want to lose control over natural resources despite the existence of a decentralization policy. In Tanzania, the centralization of the management of protected areas is continuously increasing. The conclusions that emerged from the action learning programs are that stakeholders' interactions in an MSP are driven much more by visible power than invisible power, which is influenced by culture, beliefs, and norms and difficult to change. Less powerful stakeholders must be strengthened to deal with power dynamics, in using their "power with" and "power within" and developing their interaction and networking capacities, through NGO funding and capacity building. Finally, collaborative leadership requires creation of an inclusive and neutral space where all stakeholders can participate and be heard.

The various and numerous tools used in analyzing power relations in the different cases briefly discussed above demonstrate the complexity of power analysis. This first of its kind fertilizer MSP requires different approaches and techniques to capture the power dynamics of the value chain stakeholders.

2.3 Methodological Issues

Scaling analysis (SA) and stakeholder power analysis (SPA) are complementary methods. Respectively, they are known to be used mostly in development programs and in the socio-political domain. Scaling analysis is increasingly popular in international innovation and solutions targeting

large number of actors (PPPLab Food & Water, 2016). Power analysis due to the various concepts of power has allowed the study of power relations in many different ways. Once the SA reveals the potential strengths and weaknesses of the technology at scale, SPA can show the dynamic interaction of actors and its effects in shaping the technology or innovation.

2.3.1 Scaling Analysis

SA is used to assess the success of policies, programs, and other intervention seeking positive change. It is now used as an indicator by funders, implementers, and assessors of developmental projects (Schut et al., 2020). An innovation's strengths, challenges, or effects could be analyzed before or after scale up (PPPLab Food & Water, 2016). SA is also known for agriculturally related projects on food security, water management, and market and value chain development (Frake and Messina, 2018). Analysis done before for scaling and its environment allows a clear vision and better understanding of the changes needed, stakeholder processes, pathways, and drivers of scaling.

Dror and Wu (2020) conducted a review on the CGIAR International Livestock Research Institute scaling framework. The study revealed the existence of different tools used in scaling analysis. These tools differ from one to another in terms of area of application, functionality, and operation. For instance, Scaling Readiness of the International Institute of Tropical Agriculture (IITA) and Wageningen University & Research (WUR), Scaling Scan of PPP Lab and the International Maize and Wheat Improvement Center (CIMMYT), and USAID's Agricultural Scalability Assessment Tool (ASAT) have demonstrated robustness in evaluating technology or innovation in the agriculture sector. Scaling Scan has the particularity of having moderate requirements concerning the time and technology needed with the propensity to be used prior to the implementation of the intended innovation or solution. This was demonstrated in the SNV Netherlands Development Organisation HortIMPACT project with the aim of addressing horticulture sector challenges in Kenya (Jacobs, 2018). Scaling Scan applied to one starting and one finalizing business cases helped identify weaknesses in access to finance, value chain linkages, public sector engagement, and strategic collaboration between key stakeholders (Jacobs, 2018). The users indicated that the Scaling Scan tool permitted them to look at many dimensions, such as engaging the stakeholders and how they can build on the strengths of the business cases to bring positive change in the sector.

2.3.2 Stakeholder Power Analysis

SPA is an approach that allows information on key stakeholders or actors of a system and their interests and level of influence to be captured. It is a relevant approach when it comes to assessing the repartition of power among different actors of a determined sector, such as value chain actors (Mayers, 2005). SPA informs about power wielders, dependencies, influence, sources, and levels of power of stakeholders; therefore, it is useful in informing decision-making when stakeholders' needs must be balanced due to their competing interests and limited resources. The methodologies of SPA are mostly used in sociology and political science (Baldwin, 2016). However, some new approaches have been developed and applied in other fields. For instance, the Quick Guide to Power Analysis, developed by Oxfam based on a case study, deals with the relation of power and poverty to malnutrition in Colombia (Oxfam, 2014). Depending on the definition of power, the chosen indicators of power and the tool of analysis to measure the impact on the findings may vary (Schiffer, 2007).

Brouwer et al. (2012) grouped 10 tools for power analysis when studying power in multi-stakeholder partnerships. The tools are a mix of those for thought (focus on theory) and those for action (concentrating on a product). However, these tools can be combined based on the local context and research interest. For instance, the tools, sources, and positions of power can help in finding stakeholders' control over resources while the power ranking tool can unveil actors' dependencies. In addition, the analysis of power within a decision-making perspective can be decoded by the power cube tool, which synthesizes the forms of power and the spaces and levels of power tools. The latter permits an understanding of power dimensions, its expressions, faces, and arenas and identification of power wielders. These different tools can be used in all stages of the GFP when analyzing stakeholder power relations but a well-established process must be followed to be effective.

While there are different approaches in analyzing stakeholders' power, Mayers (2005) has identified six eminent steps to follow: (1) development of target and strategy and initial understanding, (2) identification of stakeholders, (3) investigation of actors' interests and characteristics, (4) identification of networks and relations between actors, (5) assessment of stakeholders' power, and (6) use of findings to improve the system. This approach provides a structured and transparent way of analyzing power and power balances among stakeholders.

CHAPTER 3: METHODOLOGY

3.1 Research Method and Design

As mentioned, the main objective of this research is to assess the power relations in the fertilizer sector and their impact on scaling the value chain. Insights were sought through discussions from the targeted groups in the fertilizer sector. Therefore, exploratory research with a grounded theory approach, permitting investigation of underexplored topics, has been used. The flexibility, non-conclusiveness, and other characteristics of exploratory research, as well as its types and methodologies, are relevant to in-depth understanding in this novel study (Cresswell and Cresswell, 2018).

To answer questions on this topic, different data collection approaches were combined in order to obtain deeper insights, as a single methodological approach is often inadequate for such a complex topic (Palinkas et al., 2015). In addition to secondary data collected through documentation and available reports, a questionnaire was designed and presented to relevant fertilizer value chain actors who responded to questions on stakeholders' relationships and the FPG. The questionnaire contained three parts. The first part was an interview guide capturing in detail the influence of actors in decision-making. The second part was a survey that attempts to identity power sources. The third part was an adapted version of the Scaling Scan that seeks to analyze scaling opportunities of the fertilizer chain with the FPG.

In this research, qualitative content coding was used to analyze interviews and elaborate in-depth interpretation. The introduction of the quantitative method eased analysis and presentation of results to support discussion.

3.1.1 Population and Sampling

The targeted population of this study is the various actors of the fertilizer value chain who can provide reliable data about the Ghanaian fertilizer sector. In this study, respondents were part of 25 groups (see Appendix A) or six main groups (Table 1) of stakeholders identified by Aremu et al. (2020). The method is purposive sampling via a non-probabilistic technique, which is widely used in qualitative research to select resourceful respondents (Palinkas et al., 2015). Selection of respondents was based on stakeholders' levels of criticality, power, interest, and legitimacy (Aremu et al., 2020). The number of interviewees was limited to 20, as any new interview is not needed when saturation is reached (Saunders et al., 2018). According to size, a quota for each stakeholders' main group was also considered for representativeness. This approach is similar to the study conducted by Eeden (2014).

Table 1. Ghana Fertilizer Value Chain: Stakeholder Groups

Groups	Stakeholders
Development Partners	5
Government/Public Sector	10
Private Sector –- Fertilizer Businesses	6
Associations/CSOs/Farmers/Farmer Groups	1
Research Institutes and Academic Universities	2
Others	4

Adapted from Aremu et al. (2020).

3.1.2 Data Collection Method

Due to the nature of data needed, a mixed research method, following Cresswell and Cresswell (2018), was used to provide strong understanding of the problem. The data obtained from both qualitative and quantitative methods were analyzed and interpreted for new insights. The full questionnaire, comprising Parts 1, 2 and 3 (see Appendix B), was sent via email to reduce movement due to COVID-19 and limit the time required, but only eight responses were gathered through this approach. Therefore, physical interviews were done. This qualitative approach based on the interview guide (Part 1) was designed as a checklist on stakeholders' profiles and influences in the fertilizer market. In addition, literature documentation – about projects, market, resolutions, policies, and events – was undertaken to support the survey (Part 2). The survey allows quantification of textual data informing about the level and source of power and decision-making along the value chain. Part 3, the Scaling Scan, includes a Likert scale (from 1 to 5) permitting respondents to rate the different domains or components for upgrading the fertilizer value chain through the FPG.

The triangulation between value chain scaling ingredients, power relation sources, and validated data after reviewing interviewees' responses, observations, and past event analysis ensures the credibility of the results obtained and the discussion derived. A summary of the research objectives and methodology (data collection and analysis) is presented in Table 2.

Table 2. Research Design Summary

Objective	Data Required	Source of Data	Analytical Method
Measuring strengths and weaknesses of scaling the Ghanaian fertilizer value chain	Which ingredient can serve as a pillar or not in scaling? To what extent can it drive scaling in the value chain?	Questionnaire (Part 3)	Scaling Analysis

Objective	Data Required	Source of Data	Analytical Method
Identifying stakeholders' power type and origin	What relative influence do stakeholders have on the fertilizer market? (demand-supply, prices, marketing) Where does that influence come from? (network, information, financial resources) What are the actors' power bases and sources?	Survey (Questionnaire Parts 1 & 2) Secondary data from literature	Stakeholder Power Analysis Coding and Discussion
Analyzing stakeholders decision-making power	Are fertilizer platform goals or policies aligned with stakeholders' interests? Who sets the agenda during fertilizer discussions? Which stakeholders are participating?	Data from interviews (Questionnaire Part 1), written records, and written accounts of major events	Stakeholder Power Analysis Coding and Discussion
Describing power relation dynamics and impact on scaling the fertilizer chain and then suggesting ways to improve power equity on the fertilizer platform	Do stakeholder power relationships favor or conflict with value chain scaling? Who dominates? Who might resist change? How can power relations be leveraged to make the platform efficient and resilient?	SA and SPA results Secondary data from literature, documentation, and observation	Content Analysis Results Evaluation Discussion

3.1.3 Data Analysis Tools

Each part of the questionnaire was recorded as follows after completion.

The handwritten interviews were typed, and the recorded interviews were transcribed. All of the responses were grouped by question in a Microsoft Word document (e.g., all the responses to question No. 1 were grouped into one document). Data content analysis was undertaken, and the responses were codified using the framework for each open-ended question based on the interview guide. The identified themes were aggregated in a Microsoft Excel sheet. Some insightful quotes found in the next section were also extracted.

All of the answers of the second part of the questionnaire were aggregated in Microsoft Excel. Each question was allocated a sheet, and frequencies of answers were computed for analysis. Data obtained through observation were also embedded in this section. Different stakeholder power analysis tools, such as sources and positions of power, forms of power, and spaces and levels of power, were used in identifying stakeholders' power relations.

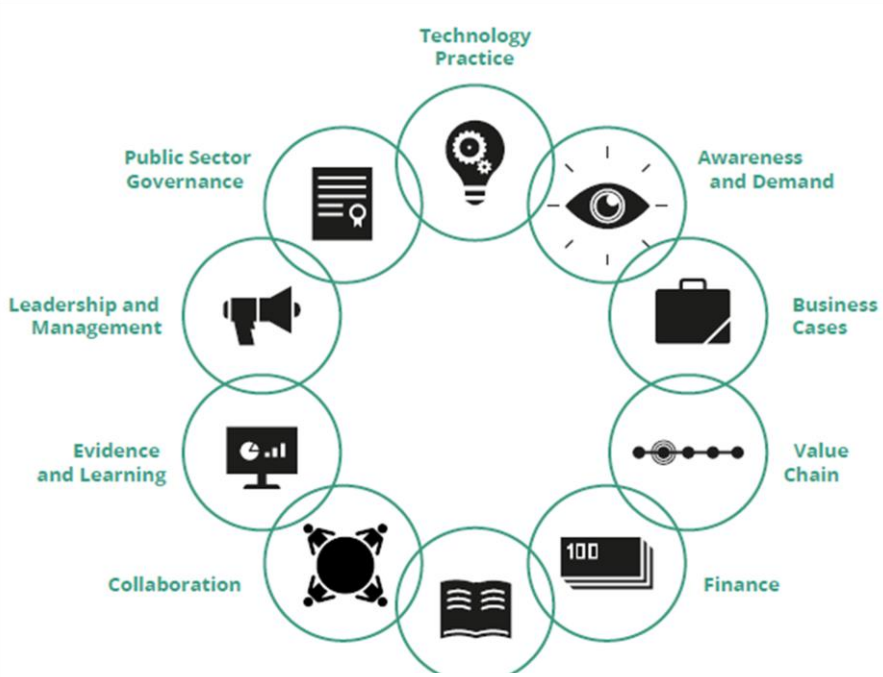
In Part 3 of the questionnaire, the adapted Scaling Scan questionnaire from PPPLab & CIMMYT (2017) was used to assess the challenges of scaling up, and this is built on 10 "scaling components"

(Figure 1). A component is an area that needs particular attention when scaling an innovation in order to be successful. The Scaling Scan tool has helped to understand the dimensions of scaling the fertilizer value chain and identifying the strengths and weaknesses of scaling ambition. A predesigned Microsoft Excel file by (PPPLAB and CIMMYT, 2017) was used to gather the overall scores of the scaling components. Among the 20 fertilizer stakeholders who responded to the questionnaire, only two did not complete this section due to limited knowledge about the fertilizer platform. The results are shown in figures, tables, and narratives.

3.2 Scope and Limitation of the Methodology

This research is framed to study the Ghana fertilizer value chain. After evaluation of the dimensions of scaling up the value chain, this study tries to understand stakeholders' power relations. Actors' power differentiation will play a role in the decision-making process along the chain and the FPG. Therefore, this study also considers stakeholders' decision-making power.

Although the methods used in this study are appropriate, the power analysis interview guide combined with an adapted questionnaire on scaling components did not allow the topic to be fully covered due to its exploratory nature. In addition, power relations are dynamic. Thus, the validity and quality of information depends on interviewee understanding of questions and truthful answers, hence a limitation for this study.



Source: Jacobs et al. (2018).

Technology Practice – An effective and efficient solution for the issue at stake.

Awareness and Demand – A desire and readiness by the consumer or producer to use the solution.

Business Cases – Attractive financial/economic propositions for users and other actors to respond to the demand.

Value Chain – Effective links between actors to pursue their business cases.

Finance – Effective financing options for users and other value chain actors.

Knowledge and Skills – Capacities at individual and institutional level to use, adapt, and promote the innovation.

Collaboration – Strategic collaboration within and beyond the sector to scale the innovation.

Evidence and Learning – Evidence and facts underpin and help gain support for the scaling ambition.

Leadership and Management – Effective coordination and navigation of the scaling process.

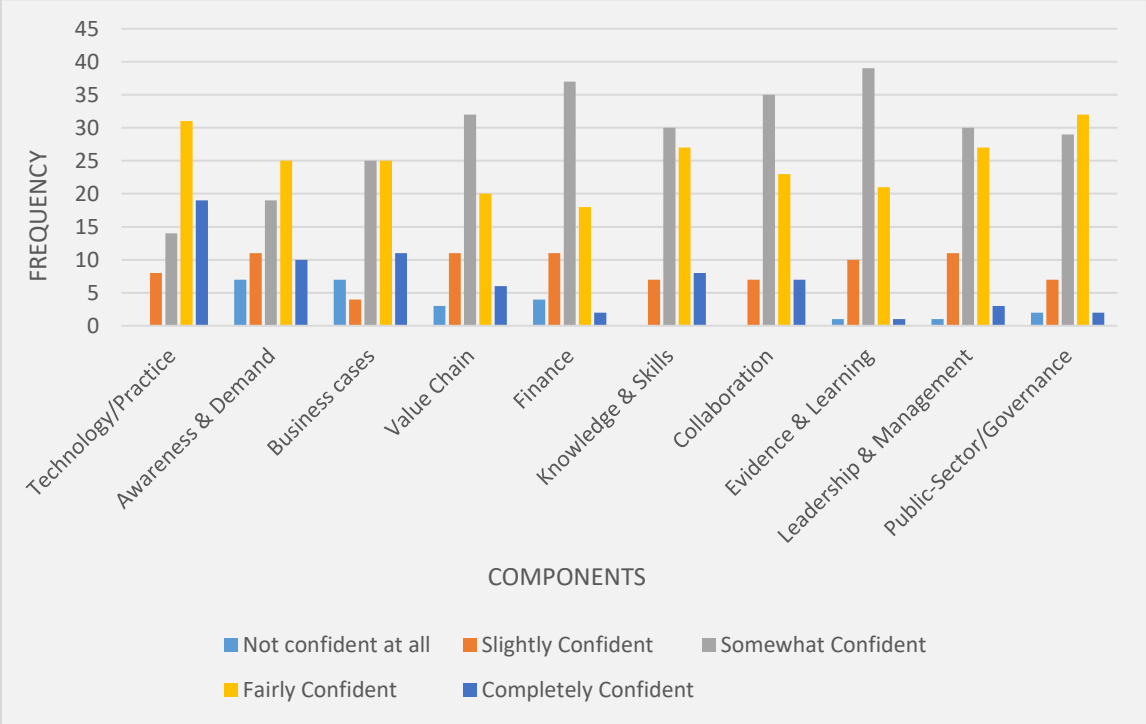
Public Sector Governance – Government support to reach the scaling ambition.

Figure 1. Scaling Components

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Ghana Fertilizer Platform and Value Chain Scaling Pathways

Figure 2 shows the frequency distribution of the scores assigned to the 10 components. The frequency represents the number of stakeholders that answered the four questions on each component. The five-point Likert scale scoring was used to capture the challenges that need to be addressed, strengths, and potential solutions to achieve the scaling ambition. Thus, among the 40 questions of the Scaling Scan for assessing scaling ambition, low confidence responses (score of 1 or 2) are considered complex challenges, limited confidence responses (score of 3) are removable barriers, and high confidence responses (score of 4 or 5) are strengths of the FPG innovation.



Level: (1) not confident at all; (2) slightly confident; (3) somewhat confident; (4) fairly confident; and (5) completely confident.

Figure 2. Fertilizer Platform Ghana Scaling Component Score Frequency

The results reveal that the components of technology practice, awareness and demand, business cases, and public sector governance are adequate for scaling the FPG, while value chain, finance, knowledge and skills, collaboration, evidence and learning, and leadership and management must be improved before scaling. In the subsequent sections, an in-depth analysis of each component is provided.[2] As inspired by the USAID Agricultural Scalability Decision Tree (Kohl and Foy, 2018), the scaling component analysis was then used to determine the appropriate scaling pathway for the fertilizer value chain.

[2] See Appendix C for the frequency value of each component's level of confidence.

4.1.1 Ghana Fertilizer Platform Scaling Potential

As with Liebig's law, or the Law of the Minimum, understanding the role of minor aspects of each major component (Figure 2) is essential for successful scaling. This law stipulates that the potential yield is not dictated by the available resources but by the most limiting factor, the scarcest resource. For scaling the GFP, the least effective component constitutes a limiting factor; thus, the component that does not fulfill its role constitutes the barrier at scale. Color grading was used to indicate the level of confidence of the component with the highest frequency. For example, in Table 3, black indicates the highest frequency and grey highlights the second highest frequency.

4.1.1.1 Technology or Practice

The technology component weighs the stakeholders' views on the expected effectiveness and efficiency of the platform in addressing fertilizer sector issues. Four specific aspects were assessed (Table 3).

The results show that the respondents believe that the GFP is compatible and feasible within the Ghanaian context, and through this, better alternatives could be created for the fertilizer sector. Similar to the findings of Aremu et al. (2020), respondents have strong confidence in the relevance of the platform to tackle the existing challenges in the fertilizer sector and also shared conviction about its advantage to all sector actors. However, in terms of the adoption of the platform by stakeholders, the majority of respondents were uncertain about the ease of setting up the platform. Thus, they held that setting up such a platform in Ghana would be very complex. These findings suggest that facilitating acceptance and use of the platform by stakeholders to address their challenges should draw particular attention from implementers.

Table 3. Technology Practice Parameter Scores

Technology Parameters	Level of Confidence Score Frequency				
	1	**2**	**3**	**4**	**5**
Relevance	0	0	1	9	8
Advantage	0	2	3	7	6
Adoption	0	5	7	4	2
Compatibility	0	1	3	11	3

4.1.1.2 Awareness and Demand

Table 4 shows the evaluation of fertilizer stakeholders' desire for and readiness to be part of the GFP. Most of the respondents were certain about the desirability of the platform by the fertilizer sector actors. They believe the demand for the platform is evident and can identify the different stakeholders for effective promotion of the GFP. In contrast, a limited communication and information channel comforted a relatively higher number of the respondents' uncertainties on the possibility of expanding the GFP.

Table 4. Awareness and Demand Component Scores

Awareness and Demand Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Desirability	0	1	4	6	7
Communication	1	5	6	6	0
Expansion	4	2	5	6	1
Marketing	2	3	4	7	2

4.1.1.3 Business Cases

This component underscores the economic advantages and financial attractiveness that scaling of the platform could bring to stakeholders. Table 5 shows that the respondents have strong confidence about the benefits that the platform for all the value chain actors and are quite confident on their interest in developing the chain.

However, stakeholders were hesitant about the availability of relevant information for developing the value chain. This issue, as discussed by Aremu et al. (2020), is mainly due to a lack of trust among stakeholders. The stakeholders expressed uncertainties about whether or not the fertilizer market is conducive to the activities of all actors, especially as there are subsidy and commercial pricing regimes. With the subsidy regime, the activities of the actors depend on quotas from the Ministry of Food and Agriculture (MoFA). And as highlighted by IFDC (2019b), the operational and financial costs are not covered in the subsidized fertilizer prices. This creates market failures in the fertilizer sector that must be addressed to enable a scaling environment.

Table 5. Business Cases Component Scores

Business Cases Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Beneficial	1	0	2	8	7
Information	2	2	7	6	1
Interest	3	0	6	7	2
Market	1	2	10	4	1

4.1.1.4 Value Chain

The value chain component looks at the effectiveness of the linkages between actors on pursuit of their businesses. In Table 6, the score frequencies of the parameters prove that activities undertaken along the value chain to facilitate the functioning of the FPG are conducive to scaling. However, the stakeholders were unsure or had some doubts about the relationships, performance, and organization of the fertilizer value chain. Therefore, before starting the scaling process, stakeholders' relationships need to be developed, organization of the sector must be improved, and performance of the value chain must be enhanced in order to achieve scaling. For instance, the idea of organizing actors by their activity, especially the importers and blenders, into one association was raised during the GFEP meeting (Iddrisu, 2021).

Table 6. Value Chain Component Scores

Value Chain Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Activities	0	1	4	9	4
Relationships	1	2	12	3	0
Performance	0	2	8	6	2
Organization	2	6	8	2	0

4.1.1.5 Finance

The level of effectiveness of the current financing options in sustaining the scaling of the FPG was analyzed. As shown in Table 7, the respondents are convinced that members have the ability to fund the platform, but they also recognize the need to share existing high-level risks. However, they expressed doubt about the existence of an efficient finance mechanism and sustainable funding from the members. Consistently, Gannon et al. (2021) identified funding as a challenge in establishing the FPG. The implication is that the platform implementers or GFEP must develop a flexible strategy accepted by stakeholders to motivate and ease the funding of the FPG.

Table 7. Finance Component Scores

Finance Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Funding	1	0	7	8	2
Mechanisms	0	3	14	1	0
Risk	0	4	7	7	0
Sustainability	3	4	9	2	0

4.1.1.6 Knowledge and Skills

For the knowledge and skills component, the stakeholders' capacity for adapting and promoting the platform in Ghana were assessed. As highlighted in Table 8, respondents, confident in potential members' expertise and contributions from researchers and institutions, acknowledged the relevance of capacity building and development of the stakeholders on GFP functioning. This assurance can be explained by the engagement of the national research institute, the Council for Scientific and Industrial Research, and the development partners (IFDC, African Fertilizer and Agribusiness Partnership [AFAP], and the Alliance for a Green Revolution in Africa [AGRA]) in setting up the platform. However, participation by the institutes and non-profit organizations paradoxically does not dispel doubts about the availability of training programs and tools necessary to sustain the national fertilizer platform. These latter parameters portray a lack of training and preparedness of stakeholders to adopt and ensure a well-functioning FPG.

Table 8. Knowledge and Skills Component Scores

Knowledge and Skills Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Expertise	0	1	5	8	4
Training Tools	0	3	10	5	0
Training Programs	0	2	11	5	0
Research Inclusiveness	0	1	4	9	4

4.1.1.7 Collaboration

Defined as relevancy, responsibilities, networks, and linkages, strategic collaboration within and beyond the fertilizer sector will help scale the platform. Table 9 reveals that relevant actors of the fertilizer value chain are currently involved in FPG implementation. This is important to ensure the scaling process. But there is a need to dispel the doubts of stakeholders about the roles and responsibilities of potential members. Implementers of the FPG should clearly define the responsibilities of stakeholders in contributing to the scaling of the platform.

The stakeholders were not sure about networks in terms of joint direction-setting and advocacy or links with similar initiatives. Based on the strategic support, advocacy, and training network analysis by Aremu et al. (2020), development partners are the focal point in strengthening the networks between the different actors before scaling the platform in order to help increase the positive impact of collaboration at scale.

Table 9. Collaboration Component Score

Collaboration Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Relevancy	0	0	2	10	6
Responsibilities	0	2	11	5	0
Networks	0	2	11	5	0
Links	0	3	11	3	1

4.1.1.8 Evidence and Learning

This component holds that evidence and facts underpin and help gain support for scaling the platform. Table 10 shows the frequency of confidence score levels assigned by the respondents. The respondents considered that data on the impact (social, economic, environmental, technical, political, legal, etc.) of establishing the GFP within and beyond the fertilizer sector are missing and the use of information technology (IT) tools to support the change process and promote the platform is somewhat absent, similar to the monitoring and experience parameters.

Table 10. Evidence and Learning Component Scores

Evidence and Learning Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Data	1	3	11	3	0
IT Tools	0	2	8	7	1
Monitoring	0	2	10	6	0
Experience	0	3	10	5	0

4.1.1.9 Leadership and Management

As seen in Figure 2 and Table 8, the leadership and management component is one in which the score frequency of confidence level is slightly dispersed. This means that respondents have diverse opinions on the leadership, decision-making, power brokers, and management of the FPG. Under this component, the effectiveness of coordination of the FPG implementation process was evaluated. The respondents expressed some doubts about the leadership, stakeholders' decision-making, and power brokers of the FPG playing an important role in scaling the platform. This means that stakeholders feel the leadership may not connect with the relevant actors or that there is a lack of influential power brokers to ensure scaling. They have observed that most of the stakeholders do not have influence on the FPG process or decision-making along the fertilizer value chain. There is a specific group of stakeholders who are influencing the fertilizer platform behind the scenes. Therefore, the GFEP role in creating management of change in the fertilizer sector within the platform is perceived as critical in reaching the goals of the FPG and meeting potential members' expectations.

Table 11. Leadership and Management Component Score

Leadership and Management Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Leadership	0	4	10	3	1
Decision-Making	1	2	9	6	0
Power Brokers	0	4	7	7	0
Management	0	1	4	11	2

4.1.1.10 Public Sector Governance

The details on government support to the establishment of the FPG are presented in Table 12. This shows that the respondents are equally somewhat and fairly confident regarding the public sector's contribution toward scaling the platform. Some respondents are convinced that the GoG actively supports the development of the platform and trust the existing policies or national strategies to foster the scaling of the platform. Some stakeholders are unsure of the role the GoG will play on the platform, while others think it is clearly defined. This demonstrates the existence of asymmetric information in the fertilizer chain and among potential members of the FPG. Most of the

stakeholders were also unsure or quite confident about the financing mechanisms (from instance, exemptions from tariffs) that the GoG could provide to the platform.

Table 12. Public Sector Governance Component Score

Public Sector Parameters	Level of Confidence Score Frequency				
	1	2	3	4	5
Roles	1	2	7	8	0
Policies	0	2	6	9	1
Support	0	2	8	7	1
Financing	1	1	8	8	0

4.1.2 Scaling Drivers, Pathway, and Challenges of Ghana's Fertilizer Value Chain

Ensuring successful scaling involves a mix of components. The scaling pathway assessment is a survey of who performs certain tasks – the private sector, public sector, or a public-private partnership (including development partners). The evaluation to determine scaling drivers and identify the best pathway and the barriers to scale was based on the role or ability of the public sector, private sector, or PPP in completing some critical tasks along the value chain. For this, information came from the survey answers and an analysis of the Scaling Scan. In the Scaling Pathway Decision Tree, each task is assigned "Yes," "No," or "Maybe," as the score frequency depends on the willingness or ability of each category (private or public sector or PPP) to perform it. To complete the decision tree, respondents were asked to evaluate the relevance of some driving elements of the FPG (Table 13). The results show that 15 respondents agreed that the idea or the model of the platform is very relevant, 13 subscribed to the relevance of the vision of scaling the platform, and 11 acknowledged the high relevance of having a "champion" to drive the vision and other stakeholders and the criticality of establishing a clear procedure for accountability of the platform members. Only 10 of the respondents noted the importance of seeking support beyond the fertilizer sector.

Table 13. FPG Scaling Drivers

Platform Relevancy Parameters	Platform Level of Relevancy Frequency			
	Very Relevant	Relevant	Less Relevant	Not Relevant
Idea/Model	15	4	0	0
Scaling Vision	6	13	0	0
Scaling Vision Driver	11	5	3	0
External Support	5	10	4	0
Accountability Procedure	11	5	2	0

The six platform relevance parameters were computed by stakeholder groups (see Appendix D2) and then grouped into three main categories to weight their willingness or capacity in committing resources to scale the FPG (Table 14). To compute answers, we considered the private sector to

be composed of fertilizer businesses, associations, and farmer groups; the public sector to be composed of government agencies and other groups; PPP to be composed of private and public groups plus development partners and research institutes and academic universities. The Scaling Pathway Decision Tree summarizes the willingness and/or ability of stakeholders from the private, public, or PPPs to contribute to scaling the FPG. The capacity to contribute (resources, expertise, information) by each category varied, and the category able to satisfy successful scaling was the most relevant. The findings from the computation[3] reveal that the best pathway to scale the fertilizer value chain in Ghana is through a PPP.

Table 14. Scaling Pathway Decision Tree

Performing Tasks	Category		
	Private	**Public**	**PPP**
Resources,* expertise, and data/information to drive the scaling process and coordinate various actors?	Yes	-	-
Willingness and ability to pay for the FPG?	Maybe	Maybe	Yes
Resources, expertise, and data/information to simplify, adapt, and ease deployment of the FPG?	No	Yes	-
Resources, expertise, and data/information to drive financial innovation or mobilize and make affordable financing available for FPG members?	No	Maybe	Yes
Resources, expertise, and incentive to create demand for the FPG?	No	Yes	-
Resources, expertise, and data/information to provide training, technical assistance, and extension support for the proper use of FPG?	Yes	-	-
Resources, expertise, and data/information to circulate the benefits resulting from adoption of the FPG along the value chain?	No	Maybe	Yes
Resources, expertise, and data/information to develop the value chain from the widespread adoption of the FPG?	Maybe	Maybe	Yes
Frequency of "Yes"	**2**	**2**	**4**

*Resources include capital/finance, labor/skills, and equipment/support.

An analysis of scaling barriers is necessary for scaling strategies to be effective (PPPLab Food and Water, 2017). Fortunately, the SA permitted the identification of potential challenges that could hinder FPG effectiveness and the various ways to deal with these from the perspective of scaling the fertilizer value chain in securing funding, enabling participative decision-making, capacity, and trust building, and value chain and market development. There were six main challenges identified:

1. Financing: Sustainable and sufficient funding that could secure the FPG operation is missing due to the heavy financial burden and dependency on funding from limited-duration projects.
2. Evidence and learning: Absence of credible data leads to poor decision-making, thus affecting the FPG scaling process.
3. Value chain: The lack of organization of actors, mainly importers and blenders, under one umbrella makes difficult to avoid asymmetric information and underrepresentation.
4. Collaboration: A lack of collaboration seriously hinders trust-building between FPG actors.
5. Leadership and management: The platform lack a "champion" that can drive other stakeholders.

[3] Refer to Appendix D for explanations and the process in designing the Scaling Pathway Decision Tree.

6. Knowledge and skills: The level of materials to build the capacity of the different actors and their knowledge about the platform is low and requires improvement.

To tackle the challenges, some recommendations concerning the role of the team working on the implementation of the FPG, areas in which collaboration is needed, and other external factors were elaborated (Appendix D3).

Scaling the fertilizer value chain through the FPG will largely depend upon three pillars: the design of the platform with respect to the local context and its adoption by the critical private sector stakeholders; a science-based platform, in which methods, training, and monitoring are research and knowledge based and members collaborate in different domains; and support provided by the public sector and its agencies. In addition to these three pillars, it is important to work on reinforcing stakeholders' awareness, commitment, skills, and cooperation and developing a sustainable funding, data sharing, and communication strategy. Addressing funding mobilization, value chain efficiency, data credibility, and asymmetric information challenges and particularly stakeholder power issues will facilitate the creation of political, financial, organizational, and policy spaces that will allow the FPG to grow and the fertilizer value chain to be scaled.

4.2 Power Relations and Decision-Making in the Fertilizer Sector

From the responses to key questions, eight thematic areas were identified as crucial under power relations. Six of the thematic areas that deal with the value chain include organization, decision-making, dominant group, policy, agenda, and subsidy program. The other two involve critical stakeholders and financial mechanisms.

4.2.1 Forms, Sources, and Arenas of Power in the Fertilizer Chain

4.2.1.1 Forms of Power

The results reveal that the different forms of power listed in the SPA (VeneKlasen and Miller, 2002; Hellriegel et al., 1998; French and Raven, 1959) are exercised by stakeholders in Ghana. The respondents have pointed out indirectly the various expressions and faces of power that exist in the fertilizer chain.

Regarding fertilizer sector organization, decision-making, dominant group, and meeting agenda, an agronomist of a company that imports fertilizers recognized that the various expressions of power "depend on the area." Indeed, most of the respondents identified the public sector "Ministry," "government," "MoFA," "politicians," and "policymakers" as having "power over" the fertilizer sector. For instance, a representative from the Plant Protection and Regulatory Services Directorate (PPRSD) indicated that the GoG "plays a controlling and dominant role" in the fertilizer sector.

"The only dominant group here is the government; they can say this is what they can do, the end." – Agronomist at a fertilizer company

"The Ministry has the final decision, even after a stakeholder meeting." – Senior officer at MoFA

This dominancy of the government is possible because the fertilizer sector is "heavily driven by subsidy," according to the country manager of a non-profit agribusiness and fertilizer organization. The form "power to" was also identified within the sector. For instance, some respondents identified large importers as having the "power to" make a difference. An interviewee from a blending company said "some competitors" are powerful in the sector. However, in the fertilizer sector, not all decisions are made by individual powerful groups. There is also a form of "power with," which favors bridging the varying interests, experiences, and knowledge of stakeholders (Brouwer and Woodhill, 2016). This form of power brings together all the actors who "sometimes … agreed on something" collectively, as said by an importer.

"The government makes their own decisions; they sometimes consult a non-governmental organization and some industry leaders but not necessarily all of them." – Fertiliser importer

Some respondents voiced their fear about demonstrating their disagreement with some decisions made by the government, which negatively affects their activities because they are afraid of "being victimized" or "not having a [fertilizer] quota." The "power within" is at the stage of stammering in the fertilizer sector. The respondents believe that the national fertilizer platform could be a mechanism of change.

"We [fertilizer company] don't have a platform, but maybe if the NFP [National Fertilizer Platform] is set up, we will have a common front to fight our case." – Agronomist at a fertilizer company

The interview and survey questions dealing with decision-making and event or meeting organization in the fertilizer sector uncovered the faces of power that are currently operating in the sector, as power is not always visible and tangible. Concerning visible power, a scientific officer of a public regulation agency said decision-making "has become politics related"; to this, a fertilizer statistics officer added that the "Ministry [MoFA] is the decision-maker." The political (visible) power of MoFA seems to be recognized and accepted unanimously by all respondents. In addition, decision-making is also exercised by some hidden powerholders who set meeting agendas and give less consideration to the concerns and voices of less powerful stakeholder groups (Brouwer and Woodhill, 2016; Pfeffer, 2010), as attested by a researcher and a fertilizer statistics officer who said respectively "we [academics] are not at the level of decision-making," "we [statistical organizations] used to be part of the negotiation."

"There are very limited consultations led by government. These meetings are not too representative; most suggestions are not considered" – Country manager of a non-profit organization

"Some [problems] we [stakeholders] discuss together and come out with a resolution. However, the Ministry [MoFA] for some [problems], it makes the decision" – Senior agriculture at MoFA

Powerlessness seems to be internalized by some groups of stakeholders. In answering the question about whether and why their organization participates in meetings involving the stakeholders of the value chain, two categories of respondents were identified by the level of confidence of their responses. The first category included the public sector, fertilizer importers and blenders, and

farmer groups. The responses of these stakeholders were affirmative; to the "why," they responded [because we are] a "key player," the "main stakeholder," "seek the interest of my organization and our network," and "speak and reflect on issues affecting farmers fertilizer needs," among others. The second category, mainly composed of research institutes and universities, development partners, statistical organizations, and organic fertilizer companies, gave answers such as "if we are invited," "it depends," "for data or information," and "for data validation." This second category is somehow subordinated to an invisible power, although not very pronounced, by the first category of stakeholders.

4.2.1.2 Sources and Positions of Power

Five sources of power under five domains – expertise, information, capital, labor, and equipment (Table 15)[4] – were identified, in line with those noted by Aremu et al. (2020) on the stakeholder network.

Table 15. Fertilizer Stakeholder Power Sources

Power Source Parameters	Power Source Frequency				
	Development Partners	Government/ Public sector	Private Sector - Fertilizer Businesses	Associations/ CSOs/Farmers/ Farmer Groups	Research Institutes and Academic Universities
Expertise	12	8	15	9	15
Information/ Data	9	15	10	10	13
Capital/ Finance	15	10	9	4	1
Labor/Skills	5	6	8	12	5
Equipment/ Support	6	6	11	2	4

Table 15 shows perfectly where the different groups of stakeholders draw their influence in the fertilizer sector. The frequency for each group represents the number of respondents who identified the stakeholder group as needed for collaboration in the domain (power source parameter). The higher the frequency, the more the stakeholder can use the given domain to dominate or influence the behavior of others. In the area of expertise, the highest frequency (15) was recorded for the research institutes and academic universities group and the fertilizer businesses group. Therefore, these stakeholders are expected to use their expertise in the sector to dominate the functioning of the platform. Farmer associations have dominance in labor (12), while the public sector has dominance in information-sharing and data validation. The high labor power dominance by farmer associations is because farmers are the end-users of most of the fertilizers. Therefore, their demand for fertilizer is key in influencing the decisions and functioning of the fertilizer platform. Development partners dominate the financial arena, with relatively high influence in the expertise

[4] The stakeholder group "Others," regrouping the statistical organizations, financial institutions, etc., was not included due the no score assigned by the respondents.

domain. Generally, however, power changes and dynamics depend upon the area of stakeholders interactions (Pfeffer, 2010).

Aremu et al. (2020) divided the value chain into five management categories and established that fertilizer businesses (importers, blenders, retailers, etc.) lead production, blending, importation, warehousing, and retailing (PBIWR); development partners lead financing, research and development, and technical advisory (RDTA); and the public sector (including PPRSD, Environmental Protection Agency [EPA], Crop Services Directorate [CSD], and the Ghana Standards Authority [GSA]) leads oversight, policies, regulations, and enforcement(OPRE). The dissimilarity noted for the RDTA category could be explained by the incorporation of technical advisory in the category and the flexible nature of development partners, which even if they do not lead a specific research and development project are always linked through other pathways, such as financing or technical support. Also for the Strategic Support, Advocacy and Training (SSAT) category, the positioning of the development partners and farmers before the fertilizer businesses and the public sector is mainly due to the combination of the three parameters, which does not give a clear picture of the network power source for each actor in each domain because a group can be powerful in some areas and powerless in others (Vermeulen, 2005).

4.2.1.3 Arenas of Power

The respondents ranked the different spaces (social, economic, environmental, financial) in which their organization is more focused in terms of priority in the fertilizer value chain (Table 16).

Table 16. Fertilizer Stakeholder Power Arenas

Priority Level	Power Arena Frequency			
	Social	Economic	Financial	Environment
High Priority	7	10	4	6
Medium Priority	5	3	4	3
Low Priority	4	2	3	5
Very Low Priority	0	2	5	2

In the high priority category, the economic space had the highest frequency at 10. The majority of the fertilizer sector stakeholders invest and capitalize resources (power) in order to get outcomes from the fertilizer market. For instance, fertilizer price setting, bargaining power, or product marketing could vary widely due to the high interest and large number of stakeholders in the economic arena. The social arena is at the top of the medium priority category, which means that actors also consider the importance of contributing in the social dimension; for example, a powerful stakeholder could provide an extension service to another stakeholder within the sector. The social power space is very dynamic and highly depends on actors' competition (Tiruneh, 2014). If there are new entries in the market and non-asymmetric information, thus a perfect competition, the social arena will be more competitive and vice versa. The low priority category recorded more responses for the environmental arena of power. Thus, there is a weak commitment of an important number of stakeholders in fighting greenhouse gases emissions or pollution in spite of the considerable carbon footprint of importers, blenders, and farmers. As the Ghana EPA does not exercise much control or restriction, the environmental space in power priority could take

the descendent path of the sustainability slope. The financial arena dominates the very low priority category due to the low credit access by the stakeholders. The lack of financial means for some stakeholders to pursue their goals and realize their activities could expose them to being dependent, sensitive to influence, and subordinate to decisions from other stakeholders in the fertilizer sector.

4.2.2 Decision-Making as Power in the Fertilizer Value Chain

The determination phase of decision-making is based on the availability of data, information, and knowledge for a given situation (Elwyn and Miron-Shatz, 2010). As presented in Section 4.2.1, information is largely controlled by the public sector, followed by research institutes and universities. Indeed, knowledge institutions, such as universities, are public establishments that are financially dependent and attached to the GoG. This has led to their being underrepresented in decision-making; thus, they rank last (fifth) in fertilizer stakeholder group decision-making power.[5] Data, information, and knowledge from research institutes, academics, and universities are collected by the public sector group in addition to what they get from other public agencies, such as the Ghana Statistical Service (GSS), GSA, private companies, and partners. In addition, the public sector's participation in funding is also consequential. In effect, they are the decision makers (ranking first) in the fertilizer chain, followed by the fertilizer companies (second). Despite having the same level of information and data access as the other stakeholder groups (farmer associations and development partners), fertilizer companies are advantaged by their expertise, equipment, and support capacity. The third-ranked group in the decision-making power ranking is development partners. They draw their decision-making power mainly from their ability to fund and support financial charges. In terms of decision-making power, the farmer group ranked fourth, essentially due to their large number of members, with low unity and financial capabilities.

Some respondents noted that decisions are frequently made during meetings, consultations, or roundtable discussions. Therefore, it is important to consider the second phase of decision-making, which is deliberation (Elwyn and Miron-Shatz, 2010). Respondents were asked to score the agenda-setting propensity of stakeholder groups (Table 17).

Table 17. Agenda Setters in the Fertilizer Sector

Stakeholder Group	Frequency of Meeting Setting				
	Never	Seldom	Sometimes	Frequently	Always
Development Partners	1	3	6	3	4
Government/Public Sector	0	1	3	12	2
Private Sector – Fertilizer Businesses	3	2	6	2	5
Associations/CSOs/Farmers/Farmer Groups	2	3	8	4	1
Research Institutions and Academic Universities	1	6	7	3	1

This reveals that the public sector, or MoFA, frequently organizes meetings that gather stakeholders in the fertilizer sector, while research institutions and universities rarely do so. The

[5] This ranking is based on Table 15 – Fertilizer Stakeholder Power Sources.

fertilizer industry actors, development partners, and farmer groups are all in the third category, i.e., they have sometimes organized meetings in which value chain actors are participants. These findings reinforce the idea that the public sector dominates decision-making in the fertilizer sector. However, some respondents had reservations about the effectiveness of events or meetings organized by MoFA.

"I think only the people in MoFA know how these decisions are arrived at. They are far from being effective. Consultations are limited and, to my mind, biased. Only those who do not seem to have contrary views with what the dominant group [government/public sector] thinks seem to be those consulted." – Researcher

Other respondents noted that the ineffectiveness in decision-making is due to other factors, such as lack of follow up after decisions are made, bureaucracy, and marginalization of some stakeholders. For instance, a country manager of a non-profit organization noted that "most suggestions [from marginalized groups] are not considered," and an agro-dealer specifically added that "views of farmers are not taken into consideration." To others, the unbalanced playing field between stakeholders is flagrant because MoFA "dictates the pace."

"When it is a government agenda, the decision becomes imposed on members." – Fertilizer importer

"Any meeting or events MoFA or the government will call about fertilizer is always about subsidy. I do not think they call beyond that unless [about] the GFEP, but even that still [ends up about] subsidy. Anything that comes across is about subsidy; if it is not about payment, it is about pricing but not on the development of the market. The day there is no subsidy, they will not have any job to do." – Agronomist at a fertilizer company

"What we need to do is to create a level playing field so there is no dominance but everybody is respected." – Senior Agriculture at MoFA

Scoring related to the behavior of the various stakeholder groups within the sector toward the various actors was undertaken. The respondents attributed to each stakeholder the characteristic of sanction giver, activity funder, or expertise sharer. The frequency of each behavior was computed by group of stakeholders, as shown in Table 18.

Table 18. Stakeholder Behavior in the Fertilizer Sector

Stakeholder Power Behavior	Development Partners	Government/ Public Sector	Private Sector – Fertilizer businesses	Associations/ CSOs/Farmers/ Farmer Groups	Research Institutes and Academic Universities
Sanction Giver	1	13	2	1	1
Activity Funder	14	9	13	5	4
Expertise Sharer	11	6	12	15	15

The results reveal that the public sector stakeholder group exclusively imposes sanctions in the fertilizer chain. This is a form of authority over the other groups of stakeholders, who must adhere to the public sector decision. For instance, in the PFJ 2021 campaign, fertilizer industry actors did not agree with the price set by the government, but when the government asked them to write individually a complaint letter, only two organizations did so because of the fear of being sanctioned blindly by MoFA.

> *"So [fertilizer] companies do not come to the Ministry as a united front. For example, there is an issue with the fertilizer pricing and when the Ministry [MoFA] asked the company to write their challenges and address them to the Ministry, only two have done that out of 50+. They are afraid of how the Ministry will see them." – Senior Agriculture at MoFA*

> *"You know, everybody [stakeholders] is trying to be careful to not have issue with the government because the government has big control over this sector. They give quotas and all relating to the business [license, permit]. If you are difficult, they can frustrate you." – Fertilizer importer*

Different stakeholders were found to have different sources of power and dominance in the fertilizer sector. To showcase and ease understanding of the source of influence in the fertilizer value chain regarding the player profile (legal status, activities, challenges, or interests), a pyramid of dependency was designed for some stakeholders.[6]

Despite the organization of participative meetings engaging different actors in decision-making, they are dominated by MoFA and decisions made are far from reaching stakeholders' expectations. To address the challenges through FPG, respondents have differing opinions about the position of key stakeholders within the platform. Some respondents emphasized the need to prioritize stakeholder groups, such as farmers and industry actors.

[6] See Appendix E for examples.

"The bottom line of fertilizer use is the farmer, and to my mind, they should be given high priority. If they do not buy fertilizers, there is no fertilizer value chain." – Agronomist

"The importers play a very major role, so it is good they have special recognition because, whatever happens in the fertilizer sector, the importers are the ones bringing [fertilizers] into the country; if we are not happy, the planting [crop production] will not go well. If we are involved in decision-making, things will go well." – Fertilizer importer

However, other respondents underlined the importance of establishing a level playing field for all the actors.

"If you give priority, it creates some problem. All must be seen as stakeholders, not only participants, so no one will be seen as more important than the other." – Senior Agriculture at MoFA

"It will be beneficial to have all these [stakeholder groups] at the [discussion] table." – Non-profit organization

"I don't think any special priority should be given to any [stakeholder] group; fertilizer use and manufacture is interdependent." – Scientific Officer at a public agency

Decision-making in the fertilizer value chain is driven by power. Thus, by preserving their interests and aiming to achieve their individual goals, powerful actors and stakeholders negatively affect the activities of the powerless actors. For effectiveness and sustainability, the FPG should tackle the challenges affecting the fertilizer sector by operating in a collaborative, trust-based, and level playing field where stakeholders are not marginalized and power relations are not an issue.

4.3 Consequences of Power Dominance and Equity on Fertilizer Value Chain Development

4.3.1 Risks of Dominance by Powerful Decision-Makers on Scaling the FPG

In Ghana's fertilizer sector, the SA revealed the challenges in designing and scaling adoption of an effective and sustainable FPG are funding, value chain efficiency, and data credibility. Tackling the challenges is critical in reaching the FPG objective. However, due to different interests and goals, powerful stakeholders could behave in a manner to dominate the platform and control decision-making to the detriment of powerless actors (Pfeffer, 2010). This could create underrepresentation of some stakeholders, conflict, and unsustainability of the platform (Faysse, 2006).

Based on the SA and SPA findings, two scenarios of having a dominant stakeholder in the FPG and its potential impact on the platform were evaluated. For ease of analysis, five dimensions were considered in which risks were outlined. The dimensions are power regulation, relationships and resources, business activities, agendas, and actors' behavior. Six domains with potential impacts (positive or negative) were noted: data credibility, information sharing, public sector support, collaboration funding, value chain development, and scientific basis for the platform.

The first scenario suggests a dominance of the FPG by the public sector group which is seen by the respondents as having "power over" the fertilizer chain and decision-making. This group is characterized by its higher control of information and data sharing. The public sector group also has an influence on fertilizer meeting agendas and has the power to coerce through sanctions. The risk of dominancy by the public sector group is due to the absence of the possibility to regulate it. Decisions could be imposed on the platform and provoke a strained relationship with the private sector. Funding sustainability and resource provision are a challenge. Regarding business activities, market dynamics and economic impact of the platform members were not really considered. There is also a risk to having meetings dominated by fertilizer subsidy program considerations as the central element driving fertilizer demand in Ghana, thereby neglecting other critical challenges. The FPG members also demonstrate fear of showing their opposition toward public sector propositions due to its coercive power. However, the impact of having the public sector dominate the FPG is mitigated at scale. The first scenario suggests that data sharing, support, and collaboration among actors would be enhanced, but funding, value chain development, and expertise building would be fragile dimensions.

The second scenario considers dominance of the FPG by the private sector – the fertilizer businesses group. They are identified by respondents as exercising "power to" in the fertilizer sector. This group is seen as having expertise and legitimate power. The various stakeholders composing this group have more or less the same level of power, which is the origin of a fierce competition for positioning and difficulty arriving at a consensus on decisions. Despite the unwillingness to share (strategic) information, the fertilizer companies have the financial capacity to fund the platform but need the motivation to do so. Dominance by these fertilizer sector actors would lead to minimization of social and environmental impacts of the FPG while discussion about pricing and market control would be imposed on meeting agendas. As an important contributor, they would also dictate the pace of the platform, thus marginalizing other stakeholders. The impact of the fertilizer business group dominancy on FPG scaling would be positive, especially in terms of funding, value chain development, and an expertise-based platform and negative for data sharing, stakeholder collaboration, and support from the public sector.[7]

The scenarios' outcomes have unveiled the benefits and risks of having the FPG dominated by the public sector or the private sector stakeholder groups. It will need to promote stakeholders' power equity within the platform for its success and sustainability.

4.3.2 Improving Stakeholder Power Equity Within the FPG

4.3.2.1 Ways of Improving Power Equity and Efficiency Among Fertilizer Actors

Balancing power relations is not an easy process to undertake and requires some strategies to achieve. In this regard, respondents provided their opinions about how they would like decisions to be made and the form of power that should be exercised on the platform. Four regulation models were provided to the respondents for their assessment on relevance for handling power issues in the FPG (Table 19).

[7] See Appendix F for a summary.

Table 19. Fertilizer Platform Ghana Power Regulation

FPG Regulation Model	Relevancy Frequency			
	Very Relevant	Relevant	Less Relevant	Not Relevant
Positive Rewarding	6	10	3	0
Punishment	4	7	7	1
Authority Dominant	0	4	6	9
Legitimacy Dominant	0	0	5	14
Expertise Dominant	5	12	1	1

Table 19 shows that the respondents disagree that the FPG should be regulated by stakeholders exercising authoritarian or legitimate power. But as for influencing stakeholders' behavior through punishment, some respondents indicated its relevance for handling power relations in the FPG. This form of regulating dominancy is best applicable in extreme situations in which there is a need to bring to order a member or stakeholder who threatens the proper functioning of the platform. Therefore, this system requires coercive power. Also, stakeholders are favorable toward positive rewarding and expertise dominancy as the main regulation models of the FPG. This means that stakeholder groups, such as development partners and the public sector, could see their influence strengthened to an extent due to their ability to positively reward other stakeholders. Therefore, the different actors playing these roles could contribute to raising power equity within the platform.

Stakeholders also responded to the form of power – visible, hidden, invisible – that should operate efficiently in the FPG (Table 20). Generally, the stakeholders agreed that fertilizer platform decisions must be led by visible power; thus, decision-making power should be easy to perceive and understand by all the members. This form of power must be appropriately framed for the interest and sustainability of the platform to prevent some stakeholders from being marginalized and some issues in the fertilizer sector from being neglected. However, empowering powerless actors requires the application of different methods, starting with platform monitoring and capacity building (Vermeulen, 2005). To allow adoption of the regulation strategy and power equity, it could be incorporated into the statutes of the platform.

Addressing power issues requires reducing or controlling powerful actors' influence or empowering the powerless or developing their influence. This change could create resistance from the powerholders who want to maintain control and can weaken the FPG.

Table 20. Ghana Fertilizer Platform Form of Power Frequency

FPG Form of Power	Visible Power	Hidden Power	Invisible Power
Frequency	15	3	1

4.3.2.2 Anticipating Actors' Resistance to Change

The FPG will bring organizational change to the fertilizer sector and introduce adjustments and performance improvement along the value chain. The change between stakeholders and their behavior is influenced by power regulation and, in contrast, resistance from trying to maintain the status quo to avoid change (Damawan and Azizah, 2020). Some stakeholders' resistance to change in the platform could be challenging to manage. Moreover stakeholders, particularly powerful actors, are often afraid of change that could restrict or rebalance their influence or authority. This would result in opposition to any development of the platform.

Managing resistance through anticipation is possible through different strategies. For instance, one approach could involve searching for opportunities to include actors in the design of the platform. This step is the preparation phase for deciding on changes and can be done through open discussion and commitment to participate in the platform. Another approach involves engaging all stakeholders in every stage of the procedure and developing effective communication that favors guidance in decision-making and prevents asymmetrical information between participants. Relatedly, Mayers (2005) presented collaboration, engagement, capacity building, and preservation of interest as the four general strategies in managing stakeholders' commitment and anticipating stakeholder resistance.

Here, following Table 15, 17, and 18 results, stakeholder groups were classified in a power-potential matrix according to their level of power (high or low) to influence policies or institutions and coerce others into decision-making and their potential level (high or low) to affect or be affected by decisions and policies. The power-potential matrix has four quadrants (Figure 3):

- Quadrant A – Stakeholders with high power but low potential are in this group. The private sector fertilizer businesses (importers, blenders, distributors, retailers) are found in this category. The negative impacts their resistance could have on the platform are considerable; thus, some preventive measures are needed to mitigate these. However, this group needs to be protected or defended against the dominancy of the stakeholder group located in Quadrant B.
- Quadrant B – Stakeholders who wield high power and high potential, such the public sector, are found in this group. A strategy of collaboration and engagement should be implemented to manage this group's resistance.
- Quadrant C – Stakeholders with high potential but low power are in this group. They are development partners, farmers, and research institutions that are identified respectively as worthy to be involved, capacitated, and interests secured. However, in some situations, the development partners wield power that allows them to be located in Quadrant B.
- Quadrant D – There are no stakeholders in this group, which means that none of them have low power and low potential. This aligns with the study, which targeted only key stakeholders.

These results are similar to the Ghana fertilizer stakeholders' power-influence matrix done by Aremu et al. (2020), However, our study revealed that development partners have high potential instead of power, which is situational in this dynamic. These differences are related to the non-differentiation of the definition of power and potential regarding value chain interactions.

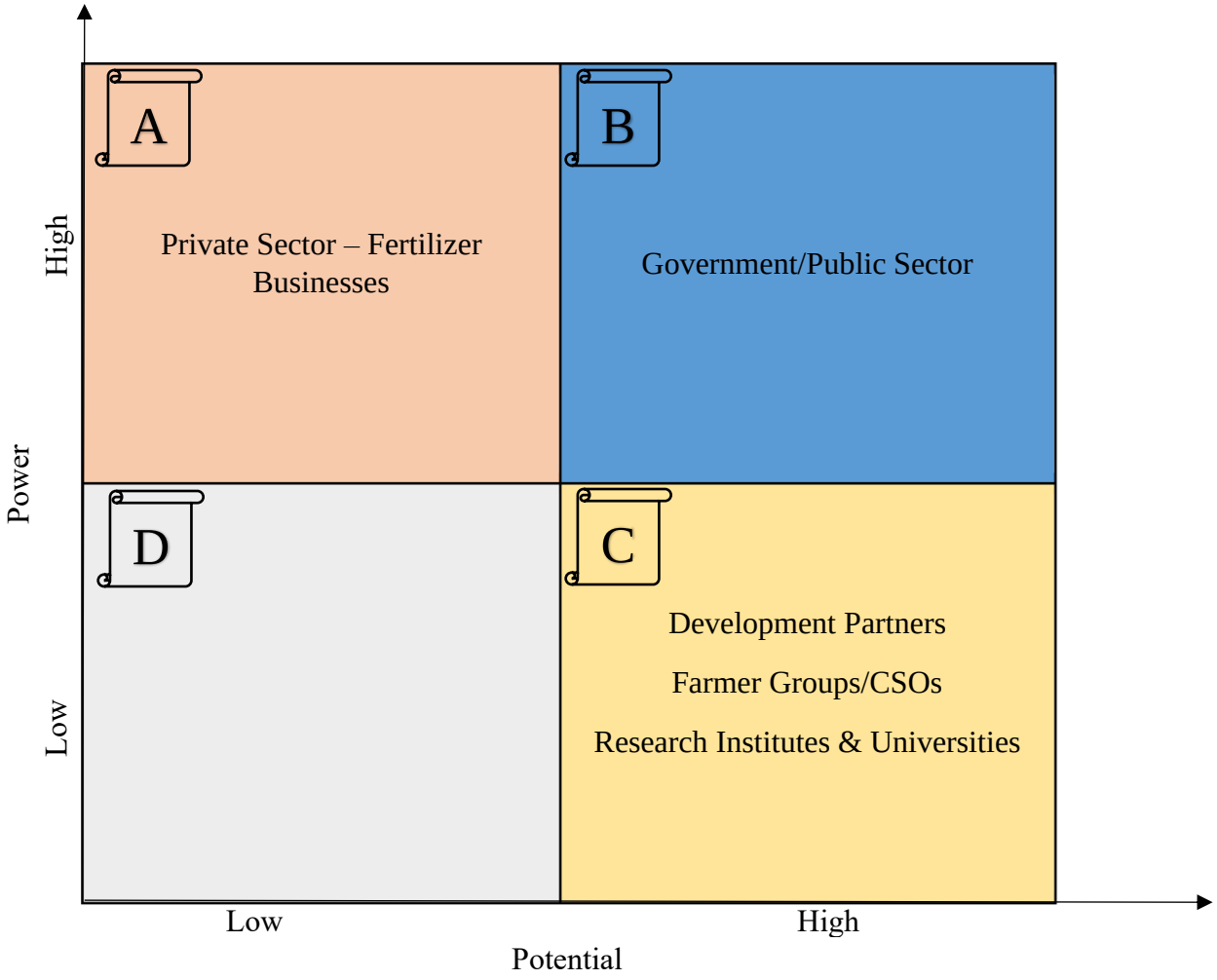


Figure 3. Stakeholder Group Power-Potential Matrix

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The GoG has tasked GFEP, in collaboration with IFDC, to facilitate adoption of an inclusive, balanced power, and resilient FPG by 2024. Adoption of the FPG is an innovative process, seeking to involve all key stakeholders and establish a level playing field favoring the development of effective solutions for tackling fertilizer value chain challenges in Ghana, i.e., scaling the fertilizer value chain. This would facilitate funding, participatory decision-making, capacity and trust building, and value chain and market development. The positive effects of scaling the value chain in the fertilizer sector will be improved accessibility and availability of quality fertilizer, reduction of communication issues and reinforced cooperation, increased fertilizer use, among actors. However, careful monitoring of scaling impacts is necessary, as it can also have a negative side. For instance, production of a new fertilizer production, construction of a new blending unit, or increase in fertilization could increase risks of global warming, water pollution, and loss of biodiversity and arable land due to salinization and acidification. Understanding the risks that could emerge from scaling the value chain is critical. This study analyzed the fertilizer value chain performance through the assessment of the FPG scaling potential, as well as stakeholders' power relations and decision-making. A checklist was designed to guide an interview of 20 key stakeholders in the fertilizer value chain in Ghana and the data was analyzed using SA and SPA.

The SA examines the weaknesses and strengths of scaling the fertilizer value chain. The findings permitted the scaling components to be grouped into two categories. The first category was composed of components such as technology, awareness and demand, business cases, and public sector governance, which are "adequate" for effectively contributing to scaling the FPG. In the second category, value chain, finance, knowledge and skills, collaboration, evidence and learning, and leadership and management were found not readily "adequate." Detailed analysis of each component shows that technology, referring to the platform itself, is likely and desired by the stakeholders. Awareness and demand for the FPG is real for the various actors, who are quite confident about the benefits that scaling of the platform could have for the success of their businesses. Regarding the financial sustainability of the platform, respondents agreed that fertilizer value chain stakeholders have the resources to fund the platform at scale but require risk-sharing. There is no doubt that the FPG will have the expertise and skill, mainly due to the involvement of knowledge institutions. The importance of strengthening collaboration within the sector is critical for organizing activities. The role of the public sector, or GoG, on the platform is not yet clear for some respondents while others agree that policies for implementation exist although that could provide limited support to the platform.

Scaling the FPG is not without potential challenges and risks. The SA permitted the identification of some of the probable obstacles that could prevent this from happening. The results of the overall component analysis determined the complexity of scaling the fertilizer platform in Ghana even if the environment is favorable. Communication and information channels are not adequate, and there are doubts about the availability and accessibility of relevant information for the various activities through the FPG. In addition, actors do not trust the credibility of data in the sector. In addition, some of the respondents have emphasized their dissatisfaction with the organization of, as well as performance and relationships within, the fertilizer value chain and consider this a major obstacle to scaling. Stakeholders have also criticized the absence of a secure financial mechanism in the sector while also pointing out the lack of capacity building and training materials, which

could disadvantage stakeholders with less influence and expertise. As such, the study highlights the importance of enhanced collaboration among actors. Development partners must play a central role in boosting collaboration in the Ghana fertilizer value chain network. The GoG's confidence about sustainable funding of the platform was rejected by some stakeholders. Meanwhile, they consider that the FPG implementers are not using innovative IT tools that could help in information and data sharing. Coordination of the FPG was found to be very poor with regard to leadership and decision-making. Thus, GFEP and its partners should initiate a management of change to tackle these issues before scale.

Six challenges that could hinder scaling of the FPG were identified: problems with secure funding, accuracy and credibility of data, value chain organization, trust between stakeholders, leadership to drive stakeholders, and capacity building of powerless actors. Identification of challenges permitted the design of a Scaling Pathway Decision Tree, which revealed that the best scaling pathway is via a public-private partnership. Fertilizer value chain scaling through the platform requires a design that is adapted to the local context for ease and adoption, science-driven decision-making, and a sustainable funding mechanism. In addition, increasing actors' awareness, engagement, and skills, as well as effective communication and collaboration, should be reinforced before scaling to prevent issues such as power differentiation from occurring in the FPG and threatening value chain development at scale.

From the SPA, the public sector was found to wield "power over" or control of the fertilizer value chain in Ghana, while private sector-fertilizer businesses have "power to," i.e., the ability to drive the sector. The public sector dominates the fertilizer sector mainly due to the fertilizer market, which is driven by GoG's fertilizer subsidy program. Meanwhile, other dimensions of power, such "power with" and "power within," are also exercised although not pronounced in the sector. The expressions of power in the fertilizer sector have a tendency to be more visible than hidden. There are different sources from which power is drawn by the various stakeholders. Development partners dominate funding in the chain, while the public sector leads information and data sharing. The private sector has two sources of power, its expertise and ability to support activities. Farmer groups' and research institutions' power arises from their large membership and expertise, respectively. In Ghana's fertilizer chain, power arenas show that the majority of stakeholders are driven by the economics of the value chain. Consequently, the social, environmental, and financial arenas are likely to be neglected. The combination of the different forms, sources, and arenas give powerholders an opportunity to dominate the decision-making process through agenda setting, a common activity of the public sector due to its coercive power over the other stakeholders. Generally, fertilizer businesses are ranked as second in terms of power, followed in order by development partners, farmers, and knowledge institutions.

There are some risks regarding the effectiveness of scaling FPG due the unlevel playing field that could occur in the platform. In the first scenario in which the public sector dominates, there would be no chance to regulate its power and consequently decisions would be imposed. Meeting topics would always be of its own interests, so other stakeholders' challenges would not be considered. In the second scenario with domination by the private sector fertilizer businesses, there would be fierce competition and lack of consensus in decisions due to the shared level of power within the same group of stakeholders driven by different interests. Both of these scenarios would result in a mitigated impact at scale and marginalization of powerless stakeholders in the FPG. However, empowering actors without voice or decision-making power is necessary to enable power equity

within the platform. For this, the FPG should be regulated by positive rewarding and expertise-based power. However, some stakeholders have also supported the use of coercive power in case of extreme risk triggered by any stakeholder. The use of visible power is preferable for stakeholders in regulating power issues and preventing dominancy of some actors. However, frustrated stakeholders can oppose a change; therefore, anticipating the resistance is important to thwarting the sabotage of the FPG. In addition to incorporating inclusiveness in the platform setting and decision-making, strategies to coping with the power-potential levels of stakeholder groups are to collaborate with public sector, to mitigate impacts and protect the interest of the private sector fertilizer businesses against the public sector decisions, to involve development partners, to build the capacity of farmer groups, and to secure the interests of the research institutions and universities. Overall, the findings of the SA and SPA need to be considered in proposals for improvement of the national FPG, policies, and decision-making processes.

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APPENDICES

Appendix A. List of Stakeholder Groups in Ghana's Fertilizer Value Chain

S/No	Stakeholder	Abbreviation
1	MoFA – Crop Service Directorate	CSD
2	MoFA – Plant Protection and Regulation Services Directorate	PPRSD
3	MoFA – Directorate of Agriculture Extension Services	DAES
4	MoFA – Policy Planning, Monitoring, and Evaluation Directorate	PPMED
5	MoFA – District and Regional Departments of Agriculture	DRDA
6	Private Extension	PES
7	Environmental Protection Agency	EPA
8	Research and Universities	R&U
9	Importers and Blenders	I&B
10	Distributors and Wholesalers	DISTR
11	Retailers and Agro-Dealers	RET
12	Organic Fertilizer Producers	ORGFERT
13	Cocoa Board	COCOBOD
14	Ghana Revenue Authority	GRA
15	Ghana Customs	CUST
16	Ghana Standards Authority	GSA
17	Statistics Organizations	STAT
18	Financial Institutions	FIN
19	Professional Associations	ASS.
20	Development Partners (AGRA, AFAP, IFDC, FAO, USAID, etc.)	DEVPART
21	Transporters	TRANS
22	Farmers/Farmer Associations	FARM
23	Food Consumers	CONS
24	Parliamentary Select Committee on Agriculture	PARL

Source: Aremu et al. (2020).

Appendix B. Ghana Fertilizer Players Interview Guide

The main objective of this research is to assess Ghana fertilizer players' power relations. The specific objectives are to:

1. Assess the strengths and weaknesses of scaling in the fertilizer sector.

2. Identify the power forms and sources of actors in the fertilizer value chain.

3. Analyze actors' power and their influence on decisions in fertilizer sector.

4. Describe how power relations affect the distribution of benefits or disadvantages of scaling along the value chain and recommend ways to improve power equity and efficiency.

Questionnaire for Ghana Fertilizer Stakeholders

<u>Part 1</u>: Interview Questions (QI)

This questionnaire is conducted under the IFDC Fertilizer Research and Responsible Implementation (FERARI) project. The study deals with improving power equity among fertilizer value chain players. The first two questionnaires (Part 1 and Part 2) seek to capture actors' profiles and their activities and the third questionnaire (Part 3) seeks to find out strengths and weaknesses of scaling in the fertilizer sector with the Multi-Stakeholder Platform (MSP). The outcomes of this study are strictly reserved for research purposes. We ask that you answer the questions truthfully.

PS: Personal information (name, organization, designation) will be kept confidential and will not be published in any case.

QI_01: What is the name of your organization?

QI_02: What is the legal status of your organization? A Limited Liability Company, Partnership, or Corporation?

QI_03: What are your organization's goals or interests the fertilizer sector?

QI_04: What is the principal activity of your organization?

QI_05: What challenges affect your principal activities in the fertilizer chain?

QI_06: Do you accept and participate in every invitation for fertilizer stakeholder meetings? Why?

QI_07: How are decisions (e.g., policy, price, levies, subsidies) regarding the fertilizer sector are usually made? Are they effective according to your expectations?

QI_08: Do you think there is/are dominant group(s) (e.g., representatives, time allocation, awareness) during decision-making in the fertilizer sector? If Yes, which group dominates?

QI_09: What are often the constraints in the decision-making process? How are they usually overcome?

QI_10: In your opinion, how can policies and programs integrate fertilizer stakeholders' real concerns? What kind of data do policymakers needs to inform decisions?

QI_11: How can stakeholder meeting be organized so that they benefits the interest (e.g., alliance, coopetition, federation) of all actors?

QI_12: What is the impact of the Fertilizer Subsidy Program on the fertilizer sector (e.g., competition, market barriers)?

QI_13: Do you think some stakeholders must be given a special priority in the fertilizer platform? If Yes, which stakeholder(s)?

- ☐ Development Partners
- ☐ Government/Public Sector
- ☐ Private Sector – Fertilizer Businesses
- ☐ Associations/CSOs/Farmers/Farmer Groups
- ☐ Research Institutes and Academic Universities
- ☐ Others

QI_14: What mechanisms must be put in place to ensure financial stability/sustainability of the fertilizer platform?

QI_15: Please provide any further information on the fertilizer sector (optional)?

<u>Part 2</u>: Survey Questions (QS)

QS_01: Kindly rate the following on their relevance for scaling the fertilizer stakeholder platform

Drivers for Scaling the Fertilizer Stakeholder Platform	(**1**) Very relevant; (**2**) Relevant; (**3**) Less relevant; (**4**) Not relevant
Ideas, innovation, or models that could contribute to address some challenges	
Vision for scaling and an understanding of the dimensions or pathways for scaling	
A champion or leader to drive the vision and other stakeholders	
Positive support from other players not necessarily in the fertilizer sector	
Clear procedure for accountability for each member of the platform	

QS_02: Which of the following do you think must be used in regulating the fertilizer platform?

Regulation Management for the Fertilizer Platform	(**1**) Very relevant; (**2**) Relevant; (**3**) Less relevant; (**4**) Not relevant
Influencing stakeholders' behavior through (positive) rewarding	
Influencing stakeholders' behavior through punishment (e.g., withdrawal of membership)	
Allowing a stakeholder with higher authority to dominant the platform	
Allowing a stakeholder to dominate the platform because of your admiration of that stakeholder	
Allowing a stakeholder with special skills, knowledge, or talent to drive the process	

QS_03: In your opinion, how should decisions be made on the platform? **(1)** There must be a visible power where decisions are easy to perceive and understand; **(2)** there must be a hidden power where decision-making happens behind the scene and is not easily detectable; **(3)** there must be an invisible power where some unseen authorities lead or make decisions for the platform.

QS_04: How often do these stakeholders groups set agenda of fertilizer events/meeting?

Stakeholder Group	**(1)** Never (**2**) Seldom (**3**) Sometimes (**4**) Frequently (**5**) Always
Development Partners	
Government/Public Sector	
Private Sector – Fertilizer Businesses	
Associations/CSOs/Farmer/Farmer Groups	
Research Institutes and Academic Universities	
Others	

QS_05: Rank (from 1 to 4) by resources (capital, time, labor) allocated by your organization in the fertilizer sector in the domain:

☐ Social (e.g., extension service)

☐ Economic (e.g., sales, distribution, blending)

☐ Financial (e.g., research funding)

☐ Environmental (e.g., GHGs emissions and pollution reduction)

QS_06: Which of the following resources are you willing to commit to the scaling of the fertilizer platform?

Resources	**(1)** Yes; **(2)** No
Expertise	
Information/Data	
Capital/Finance	
Labor/Skills	
Equipment/Support	

QS_07: What do you expect from these groups of stakeholders in terms of collaboration?

Stakeholder Group	**(1)** Expertise; **(2)** Information/Data; **(3)** Capital/Finance; **(4)** Labor/Skills; **(5)** Equipment/Support
Development Partners	
Government/Public Sector	
Private Sector – Fertilizer Businesses	
Associations/CSOs/Farmers/Farmer Groups	
Research Institutes and Academic Universities	
Others	

QS_08: Which attitude/behavior could it be affected to some stakeholders toward others in the fertilizer sector

Stakeholder Group	**(1)** Sanction Giver; **(2)** Activities Funder; **(3)** Expertise Sharer
Development Partners	
Government/Public Sector	
Private sector – Fertilizer Businesses	
Associations/CSOs/Farmers/Farmer Groups	
Research Institutes and Academic Universities	
Others	

Part 3: **Scaling Scan Questions**

MSP: Multi-Stakeholder Platform
GFEP: Ghana Fertilizer Expansion Program

QSS_01: Technology Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Is the MSP relevant to the stakeholders?	
2	Does the MSP have a comparative advantage in the current situation?	
3	Is the MSP easy to put in place?	
4	Is the MSP compatible with the local context?	

QSS_02: Awareness and Demand Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Do key stakeholders recognize that the MSP is necessary and desirable?	
2	Do stakeholders have access to information about the MSP and are there effective communication channels?	
3	Do you have evidence that demand for the MSP is real and growing?	
4	Can you distinguish stakeholders' category for effective marketing of the MSP?	

QSS_03: Business Cases Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Are MSPs beneficial for all actors along the value chain?	
2	Is enough information available to continue developing and refining the value chain through the MSP?	
3	Do all value chain actors have a genuine interest to improve the value chain and participate in the platform?	
4	Is the fertilizer market conducive to the activities of all actors?	

QSS_04: Value Chain Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Can the value chain services enable the well-functioning of the MSP?	
2	Are relations between the various actors in the chain adequately developed?	
3	Is the overall performance of the value chain conducive to scaling?	
4	Are the value chain actors adequately organized?	

QSS_05: Finance Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Can the fertilizer players finance the operation of the MSP?	
2	Are relevant financial mechanisms available, accessible, and affordable for all value chain actors?	
3	Are financial risks acceptable for value chain actors and financial institutions?	
4	Is there sufficient and sustainable funding secured so that the MSP objective can be achieved?	

QSS_06: Knowledge and Skills Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Do the value chain actors have the necessary knowledge and skills to use the MSP in the intended way?	
2	Are appropriate training materials and methods available to allow the value chain actors to adopt and promote the MSP?	
3	Are the right actors engaged to provide the training programs necessary for sustainable adoption of the MSP?	
4	Are there any research institutes or universities participating in the development of the MSP?	

QSS_07: Collaboration Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Are all value chain actors relevant to the development of the MSP?	
2	Are roles and responsibilities of key actors clearly identified, accepted, and complementary?	
3	Are there effective networks for joint strategic direction setting, advocacy, and creating buy-in?	
4	Do effective links exist with parallel initiatives that could serve to scale the MSP?	

QSS_08: Evidence and Learning Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Is there useful and credible data available on the impact and other parameters of the MSP establishment process?	
2	Is effective use being made of modern data and IT tools to support, analyze, share, and promote the MSP and to drive the change process?	
3	Are data and monitoring effectively being used to steer the MSP establishment and change course where needed?	
4	Are regular opportunities for reflection organized or lessons learned from similar initiatives so the MSP can become sustainable?	

QSS_09: Leadership and Management Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	Question	Score
1	Is day-to-day leadership of the MSP adequately established, recognized, and connected to the relevant actors?	
2	Are different stakeholders sufficiently affecting the process and decision-making?	
3	Are there adequate, influential, and compelling spokespersons, messengers, conveners, and power brokers for the MSP?	
4	Can the GFEP leadership support required change management of MSP potential members to reach the goals?	

QSS_10: Public Sector Governance Evaluation

(1) No, this is very uncertain; **(2)** Serious doubts; **(3)** Some doubts/unsure; **(4)** Quite confident; **(5)** Yes, this is definitely not an issue

N°	**Question**	**Score**
1	Is the role of the government/public sector in reaching the MSP objective clearly defined?	
2	Are local and national strategies, policies, and regulations conducive to scaling the value chain?	
3	Are government agencies actively supporting the MSP?	
4	Are relevant government financing mechanisms (such as exoneration of tariffs) smart and can they be applied to benefit to the MSP?	

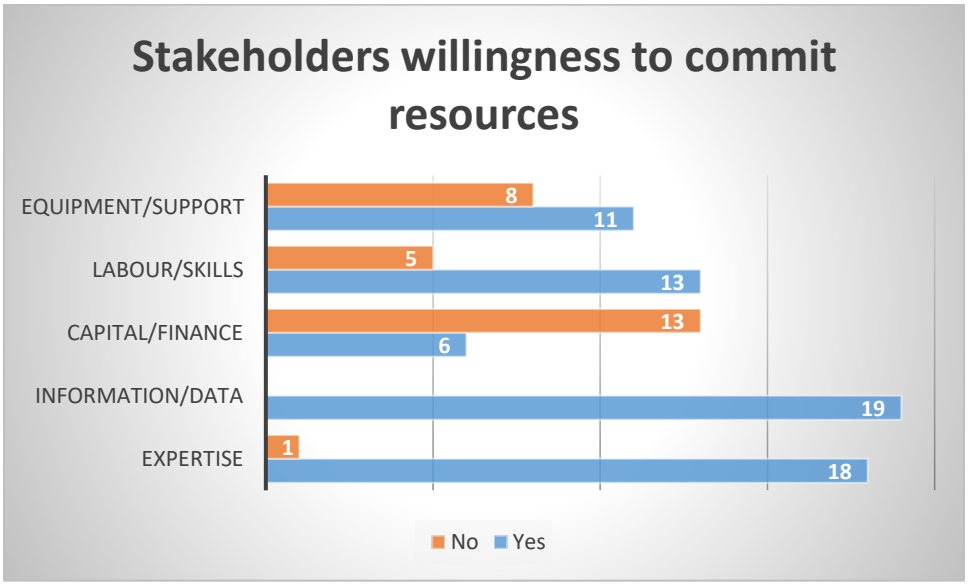
Appendix C. Component Overall Score Frequencies

Component Score Frequency per Confidence Level	1: Not Confident at All	2: Slightly Confident	3: Somewhat Confident	4: Fairly Confident	5: Completely Confident
Technology/Practice	0	8	14	31	19
Awareness and Demand	7	11	19	25	10
Business Cases	7	4	25	25	11
Value Chain	3	11	32	20	6
Finance	4	11	37	18	2
Knowledge and Skills	0	7	30	27	8
Collaboration	0	7	35	23	7
Evidence and Learning	1	10	39	21	1
Leadership and Management	1	11	30	27	3
Public Sector/Governance	2	7	29	32	2

Appendix D. Scaling Pathway Analysis

Appendix D1. Stakeholder Groups Scaling Committed Resources Readiness

This graph below summarized by stakeholders' groups answers of the question QS_06 (Part 2 questionnaire). The frequency of "Yes" responses meaning the commitment of the stakeholder to provide expertise, information/data or resources (capital/finance, labor/skills, equipment/support) are presented out of the number of respondents.



Appendix D2. Scaling Pathway Decision Tree

In this section, stakeholders were grouped in three main category: Private sector (fertilizer businesses, farmers groups, Associations), Public sector (Government agencies), PPP (Private sector & Public sector & development partners & Knowledge institutes). Based on the results of questionnaire (Part 2: Survey Questions and Part 3: Scaling Scan) the answer "Yes" or "No" or "Maybe" was assigned to each category.

Meaning of Answers:

"Yes": means the majority of respondents by category have the will and/or the ability to perform the task

"No": means the majority of respondents by category does not have the will and/or the ability to perform the task

"Maybe": means that half of respondents by category have the will and/or the ability to perform the task

Response Conditions:

1st condition: If the answers is Yes for the private sector, public and PPP categories are not considered.

2nd condition: If the answer is YES for the public sector, the PPP is not considered.

3rd condition: If No is not the answer for both the private and the public category, the PPP answer is Yes.

Note: If the first condition does not apply, we consider the second condition; if the latter does not apply, we automatically consider the third condition.

Performing Tasks	Category		
	Private	**Public**	**PPP**
Resources,[a] expertise, and data/information to drive the scaling up process and coordination among various actors?	Yes	-	-
Willingness and ability to pay for the GFP?	Maybe	Maybe	Yes
Resources, expertise, and data/information to simplify, adapt, and ease adoption of the GFP?	No	Yes	-
Resources, expertise, and data/information to drive financial innovation or mobilize and make available affordable financing for adopters?	No	Maybe	Yes
Resources, expertise, and incentives to create demand for the innovation?	No	Yes	-
Resources, expertise, data/information to provide training, technical assistance, and extension support in the proper use of the innovation?	Yes	-	-
Resources, expertise, and data/information to spread along the value chain the benefits resulting from adoption of the GFP?	No	Maybe	Yes
Resources, expertise, and data/information to develop the value chain from the widespread adoption of the GFP?	Maybe	Maybe	Yes
Frequency of "Yes"	**2**	**2**	**4**

a. Resources include capital/finance, labor/skills, and equipment/support.

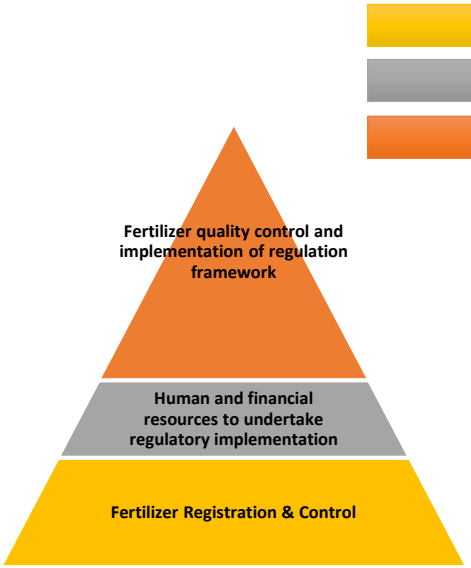
Appendix D3. Recommendation of Solutions to Scaling Barriers

Challenges	Team Roles	Areas of Collaboration	No/Few Influential Factors
Funding	Host the secretariat and support meetings until launch	Sustainable Funding Secretariat hostage	Dues/fees memberships from stakeholders
Evidence & Learning	Incite on the sharing credible data/information	Shared data/information platform	Data/information usage by stakeholders
Value chain	Motivate stakeholders group representativeness	Organization of stakeholder groups/association	Functioning of the stakeholder groups and decision making
Collaboration	Improve network and actor relations	Trust building between stakeholders	Commitment of stakeholders to maintain a collaborative relations
Leadership and Management	Increase time and resources allocated to the GFP	Lessons and experiences from similar initiatives	Recognition and acceptability of the leadership
Knowledge & Skills	Informative and educational materials production	Material content development	Interest and practice of the gained knowledge

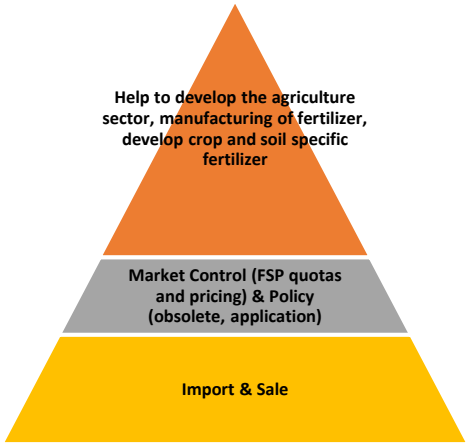
Appendix E. Pyramid of Dependency

Each respondent was asked to do a presentation about its organization (legal status, goals and interests, activities, and challenges). From the codified answers, we iterate for some stakeholders their level of sensitivity to be influenced by another stakeholder or group of stakeholders regarding their goals, activities, and challenges. Thus, a pyramid of dependency was designed for the selected stakeholders. The pyramid levels from the bottom to the top are activities, challenges, interests, and goals in the fertilizer sector. The higher the level, the more difficult it is to reach or influence. The activities were placed at the bottom because it is what the stakeholders are currently doing in order to reach the goals and interests level at the top but before that they need to address some Challenges at the middle. Therefore, they are really dependent on this latter to meet their target. However, any other stakeholder capable to provide what it takes to reach the top level or prevent it has an influence on that stakeholder who is looking to reach its goals.

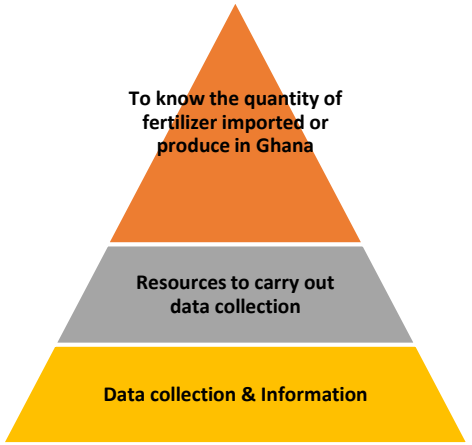
The codified text was based on the occurrences and similarities of the responses obtained for the activities. Data source: see appendix B (Part 1, QI_03, QI_04, QI_05)



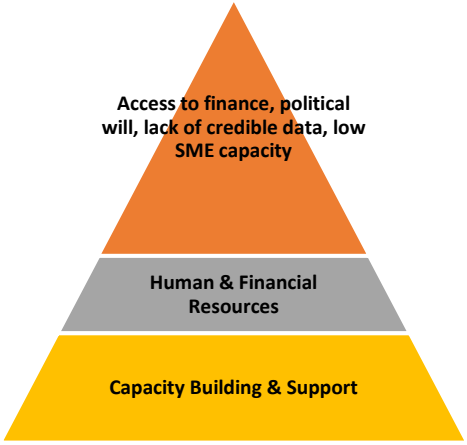
An interviewee from a public institution



An interviewee from a fertilizer company

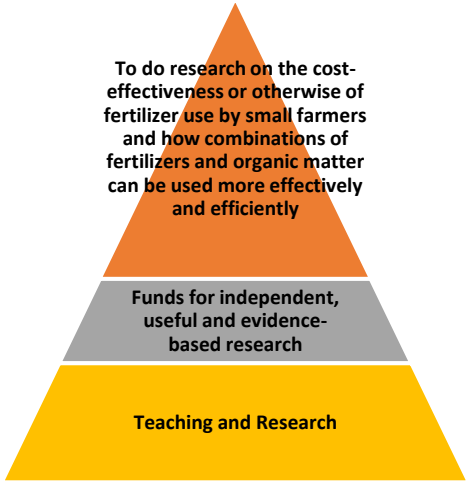


An interviewee from a statistics organisation



An interviewee from a non-profit organization

An interviewee from a farmer association



An interviewee from an academic institution

Powerful Decision Makers on the GFP

Risks and Impacts on the GFP of Powerful Decision-Makers	Risks Dimensions					Impacts Domains (+) positive (-) negative					
	Power Regulation	Relationships/ Resources	Business Activities	Agendas	Actors' Behavior	Data Credibility/ Information Sharing	Public Sector Support	Collaboration	Funding	Value Chain Development	Expertise-Based Platform
Scenario 1: Public sector dominates the GFP	Cannot be regulated Decisions are imposed	Strained relationship with the private sector Unsustainability of funding and resources provision	Limited consideration of market dynamics and economic impact	Subsidy-dominant meeting Low consideration of other challenges	Stakeholders fear opposing Reprimand and sanction against challengers	+	+	+	-	-	-
Scenario 2: Private sector dominates the GFP	Difficulty to have agreement on decisions Competition among powerholders	Financial contribution motivation Asymmetric information sharing	Limited consideration of social and environmental impact	Fertilizer pricing and market control dominant meeting Marginalization of other stakeholders	Want to dictate if they contribute a lot Skew participation of weak contributors	-	-	-	+	+	+

FERARI

FERTILIZER RESEARCH & RESPONSIBLE IMPLEMENTATION

FERARI is an international public-private partnership that builds science-based approaches to site-specific fertilization for widespread adoption by farmers in Ghana for improved food and nutrition security. This calls for a transformation of the fertilizer and food systems that must be driven by evidence-based agro-technical perspectives embedded in multi-stakeholder processes.

To support this transformation, the following institutions have partnered to implement the Fertilizer Research and Responsible Implementation (FERARI) program:

- International Fertilizer Development Centre (IFDC)
- Mohammed VI Polytechnic University (UM6P)
- OCP Group
- Wageningen University and Research (WUR)
- University of Liège (ULiège)
- University of Ghana (UG)
- University for Development Studies (UDS)
- Kwame Nkrumah University of Science and Technology in Kumasi (KNUST)
- University of Cape Coast (UCC)
- University of Energy and Natural Resources (UENR)
- Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development (AAMUSTED) College of Agriculture Education
- Council for Scientific and Industrial Research in Kumasi (CSIR-SRI) and in Tamale (CSIR-SARI) and its subsidiary (CSIR-SARI-Wa)

FERARI operates in conjunction with the Planting for Food and Jobs program of the Government of Ghana (GoG) to embed development efforts into national policy priorities to reach impact at scale. It trains five Ph.D. and two post-doctoral candidates and dozens of master's-level students in building the evidence base for its interventions.

FERARI conducts hundreds of fertilizer response trials on maize, rice, and soybean, on-station and also with farmers, and demonstrates them to farmer groups in the northern and middle belt of Ghana. It conducts surveys among farmers and actors in the value chain to understand the drivers for use of fertilizers and other inputs and the marketing of the produce to enhance farm productivity and income. It helps the GoG to establish a Ghana National Fertilizer Platform, developing its soil mapping expertise toward an information platform.


IFDC
Developing Agriculture from the Ground Up