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**Engagement of Policy Makers in Agricultural
Innovation Processes in Ghana: Cases of Fisheries
and Livestock Commodities**

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Introduction

Background

Ghana's agenda for shared growth and development considers accelerated modernisation of agriculture and sustainable natural resource management as one of seven key thematic areas (GoG, 2014). Productivity improvement is highlighted, and application of science and technology is an important objective in promoting crops, livestock and fisheries. Innovations in terms of new perceived methodologies, techniques, methods, processes or products have been recognised as important step in the agricultural development agenda. The importance of institutional coordination in the promotion of innovation has not been ignored; "...to strengthen the intra-sectoral and inter-ministerial coordination through the platform for joint planning and review; the development and implementation of a communication strategy to improve institutional coordination; as well as create and strengthen the framework for coordinating activities among the range of diverse stakeholders in the sector" (GoG, 2007). What is not yet well understood is the effectiveness of including different personnel from a wide range of institutions related to agricultural innovation development and dissemination. The issues of who policy makers are, the contribution they bring on board and how they maintain their status in the agricultural innovation process are the concern being addressed.

This study is about the success stories of engagement of policy makers in agricultural innovation processes in Ghana. Mytelka (2000) defined innovation as the 'process by which firms master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors', their countries or the world. Makini et al. (2013) defined innovation as the process of application of new or existing knowledge in new ways and contexts to do something better. According to Ampadu-Ameyaw, Omari & Essegbey (2017), agricultural innovation includes all kinds of profitable, reproducible/disseminable changes (radical and/or incremental) and/or adaptations that occur in the agricultural sector. It is a process that transforms ideas into outputs by replacing older established products, processes and services with new ones. Agricultural innovation can relate to capitals for production such as land resources, financial resources, human resources and livestock resources at local, national, regional and international levels. It can also relate to inputs such as seeds, breeds, water, fertilisers, feeds, pesticides, extension and advisory services at local, national, regional, and international levels. An innovation can relate to technics/practices, technologies, infrastructure and hard and soft institutions (policy initiation/identification, [re]designing, implementing, monitoring and evaluation organisations and policies), guiding access to, management of, learning from/about, and innovation processes.

In another vein, this study considers an agricultural innovation process as all the steps that lead to an agricultural innovation. These steps essentially include interaction with/among human beings and humans and natural phenomena, learning from interactions, inspiration or perception of innovation idea; taking initiatives for the materialisation of the innovation idea; and the materialisation of the innovation idea. The other steps include the test of the or use of

the innovation; evaluation of the performance of the innovation; disclosure of the innovation to potential users; commercialisation and/or dissemination of the innovation; monitoring and data collection on users' perceptions and additional aspirations about the innovation; and finally, the continuous improvement of the innovation for improved performance based on information gathered from users, or inspirations of innovators. Studying agricultural innovations would therefore come down to researching on changes occurred/induced in agriculture related capitals, inputs, technics, technologies, infrastructures, hard and soft institutions at local, national, regional, and/or international levels, depending on the level concerned with the study.

Context and Justification

Achieving greater strides in the agricultural sector growth requires the innovative use of existing and new technologies and innovations that are directed towards increased land and labor productivity, efficient use of natural resources as well as adopting policies that ensures that producers in general can reach markets that generate greater value additions and sustainable incomes. Ensuring that such innovations contribute to the 'One World No Hunger' initiative of the German Government, the project dubbed "Programme of Accompanying Research for Agricultural Innovation" (PARI) is currently running in 12 different African Countries, each supported by the German Government through BMZ and coordinated in Africa by the Forum for Agricultural Research in Africa (FARA). This project aims at contributing to food and nutrition security through efficient and functional innovation systems research and development in partner countries.

In 2016 the PARI sponsored a study into exploring the factors determining scaling up of innovations and technologies in Ghana to inform policy about the factors needing critical focus in scaling up of agricultural innovations. It is understood that investments in promising agricultural innovations can hardly succeed without the firm contribution of policymakers. Hence, studies that document the conditions relevant for effective engagement of policy makers in agricultural innovation processes become relevant. In 2017, CSIR-STEPRI and FARA expanded their research and development activities to include aspects which focused on policy makers' involvement in the development, implementation and promotion of agricultural innovations in Ghana.

Agricultural innovation development is seen as important tool by which majority of the poor in developing countries, whose livelihoods depends on the agriculture sector can descent out of poverty. Yet despite this understanding most agro based technologies and innovations developed still find themselves on the shelves of the scientific communities. The rate of adoption of these technologies remains low and limited, circulated among a few farmers in most of these countries. It is widely admitted that decisions targeting people in any area are hardly and effectively implemented, when policy makers are not sufficiently and efficiently engaged for the relevant design and effective implementation of the concerned decisions. This is because, all over the world, policy makers are often the people granted with the means and powers necessary for the identification/initiation, (re)design, implementation, monitoring and

evaluation of public policies. This reality applies also for agricultural innovation policies in countries (Jones and Kimura, 2013).

While many studies have addressed adoption of agricultural innovations, there seem to be very few studies focusing on success stories of engagement of policy makers in agricultural innovations in African countries (Ampadu-Ameyaw et al., 2016 & 2017). This study aims at filling this gap and inspiring the success of further agricultural innovation policies. Findings from this study will provide useful inputs for researchers, governments, the private sector, donors, and other stakeholders to improve policy-maker engagement processes for innovations to ensure appropriate development and dissemination of innovation and maximise their socio-economic impacts on the wider population.

In the context of this study, the levels to consider for the study are local and national. Given the need for focus, the study addressed four agricultural innovation processes in the country. These agricultural innovation processes included:

- Improved soybean variety
- Improved Technology for Tilapia
- Formulated feed for growing tilapia in Ponds
- Combined starter and finished diet for broilers of chicken

The four can be grouped mainly under livestock development. In the Ghana Shared Growth and Development Agenda II (GSSDA II), government has specified its intention to support large-scale cultivation of maize and soya-beans for the formulation of animal feed to improve access to quality feed. In the case of aquaculture, the major intervention in the medium-term “will entail among others, ensuring the production of fish seed of high value, fish feed with the appropriate nutrients and support for private sector investments in the sub-sector as well as support for fish farmers associations” (GoG, 2010).

Study objectives and expected results

Objectives

The main objective of this study is to examine the success stories of engagement of policy makers in agricultural innovation processes in Ghana. To achieve the stated objective, the following specific objectives that emanate from the topic were addressed:

- I. Identify and document two brilliant success cases of engagement of policy-makers/authorities/officials in agricultural innovation processes in Ghana.
- II. Identify and document two brilliant failure cases of engagement of policy-makers in agricultural innovation processes in Ghana.
- III. Draw and document lessons about key success and failure factors of engagement of policy makers in agricultural innovation processes.

Expected results

- I. Two brilliant successful agricultural innovation process cases are identified and documented.

- II. Two brilliant non-successful agricultural innovation processes are identified and documented.
- III. Lessons about key success and failure factors of engagement of policy makers in agricultural innovation processes are documented.

Scope and Limitations

The study was planned to discuss four case studies, two successful and two unsuccessful. It was phased in one month. The challenges with rapid appraisal studies are obvious – missing key informants in the relevant institutions. The period slated for the assignment coincided with the 2017 Christmas Break and Leave period (January 3-19, 2017) for many officers in both public (including directors and members of parliament) and private institutions. Persons who had knowledge of the innovations but were not directly involved in the processes, were more likely to be encountered. Many officers who were involved in the specific innovation processes were no longer with the institutions after 2-3 decades. Key target beneficiaries of the agricultural innovations were also to be identified and interviewed on their appreciation of the innovation processes and gains obtained. However, the key target beneficiaries of the innovations were not identified and interviewed due to time and logistical constraints. Evidence of photos, videos and documents online in the World Wide Web and grey literature were sought to triangulate information provided by informants at the institutional level

Organisation of the Report

The report is organised into five sections. Apart from the introduction, section two presents a literature review of conceptual definitions and a brief description of agricultural policy making in Ghana. Section three presents the study's methods, describing the approach for data collection and analysis as well as brief background and perceptions of study interviewees. Section four addresses the results and discussion, presenting the history of each innovation, factors of innovation success and the level and process of engaging policy makers in the innovation process. The study's conclusions, decision and policy implications are described in the last section.

Literature Review

Innovation, Innovation System and Organisation

The challenges of today's world are bringing many pressures to bear on agriculture: population growth; the impact of climate change; the need to reduce greenhouse gas emissions in agriculture; rapid development of the emerging economies and growing instability associated with land; water and energy shortages, etc. This scenario heightens the critical role of innovation to make agriculture more competitive and sustainable.

Innovation: In general terms, innovation is a process by which something new is implemented in a given context; it is socially appropriate and provides benefits for the parties involved. It serves as a driver of economic growth and competitiveness in countries (IICA, 2014). In the context of farming, innovations are concerned primarily with increasing production – of food,

fodder, secondary products – and enhancing quality – of products, growing conditions, production process, etc. Agricultural innovations typically involve one or more of the following areas: crops and animals (biological and/or genetic changes), growing conditions, implements and management practices (Evenson, 1974).

Innovation system: The innovation process comes about largely within “innovation systems” made up of organizations and private and public stakeholders interconnected in different ways and possessing the technical, commercial and financial competencies and inputs necessary for innovation (IICA 2013 & Albaiges et. al, 2009). The World Bank (2007a) defines it as a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance. Investments in innovation should reflect all parties’ diverse needs for knowledge (World Bank 2007b). The performance of innovation systems depends on the interaction among the different people and institutions responsible for generating and disseminating knowledge and technology (OECD, 2002), stakeholder learning processes and the creation of an innovation-friendly environment.

Agricultural innovation systems (AISs) are characterized by two chief factors: the combination of participants involved, and the dynamic interactions among them. The key participants include farmers and farmer associations, providers of inputs or technical and financial services that promote the development or adaptation of new knowledge, those who encourage an exchange of knowledge and promote learning, those who are engaged in adding value to production, and those who facilitate market access. Research and technology development organizations are an integral part of the AIS, as are public and private extension services that play a critical role in facilitating access to knowledge and capacity building. If the work of the AIS can be improved through better coordination among participants, it will produce a greater capacity for innovation to respond to emerging needs and opportunities (IICA, 2014). It can also encourage the private sector to invest in creating and implementing innovations.

Innovation process: A common classification or categorization of the stages of innovation in the management literature is exploration/invention (which captures the activities of transforming an idea or insight into a specific product/service offering and illustrates the degree of learning and competence building), and exploitation or commercialization (which involves the activities of moving that new product/service through the stage gate process to assess its value in the market place and actually offer it to customers or end users). The innovation process itself has been described by various authors resulting in a high number of different approaches. Gerpott (1999) describes the three phases from an idea perspective: (1) Idea Generation and Selection; (2) Idea Realisation; and (3) Idea Commercialisation. The Stage-gate process of Cooper (2001) consists of five stages of different activities (scoping, building business case, development, testing and validating, and launching) and five gates where the outputs of these activities are assessed/reviewed. Mohanty et al. (2005) summarize the innovation activities into three phases: (1) basic phase; 2) applied phase; and 3) development phase. The basic phase is the

stage during which the knowledge concerning the technology and the needed resources is collected through methods such as surveys, various laboratory studies, process plans of previous products, economic evaluations of different process plans. In the applied phase, the technology is developed, and process plans for the development of the new products are mapped out. Feasibility studies and economic evaluations are also conducted in this phase. During the development phase, the technology developed in the previous phase is used to develop the new product. Design, quality, and procurement issues are considered at this time.

Conditions of innovation: The transfer of new technologies is a complex process and fraught with difficulties, primarily because such new techniques and technologies can function successfully only if they can be embedded within local circumstances (Evenson 1974; Mokyr 1990; Rogers 2003). Apart from the specific characteristics of the innovation, economic, social, cultural, ideological and psychological conditions all play a significant role in the diffusion process and serve as conditions for innovation. Most particularly, sufficient domestic development, institutional and regulatory frameworks, a reservoir of knowledge and human skills, economic and financial conditions, a society that is demanding innovation, and a welcoming regional and global environment. It is therefore important to ensure an enabling environment for innovation, and the government (including the different sectors, ministries and institutions) must play a key role by improving the quality of human resources by means of a sound educational system, health policies, infrastructure and the like (OECD, 2013). There should be agricultural policies that reduce market distortions, and policies for science, technology and innovation, intellectual property rights policies, simplification of regulations whenever possible, and the development of financial and technical services that support innovation processes along the links of the value chains. A basic requirement is the presence of safe, predictable legal and regulatory frameworks with clear government objectives that encourage innovation; innovation systems also need to be developed.

Stakeholder Engagement

Stakeholder platforms engage producers together with market agents and agricultural service providers (including public policy service) in group activities to identify market interests, share market knowledge and develop new business opportunities (Devaux et al., 2008). These forms of collective action should generate commercial, technological and institutional innovation and new market niches and benefits for all actors. Biggs et al. (2010) also referred to stakeholder engagement as the process of engaging people with a stake in a decision in the process of decision making, taking into account their varying perspectives, priorities, and limitations. To sustain stakeholder engagement, Klerkx et al. (2012) suggested innovation brokering (IB). IB is about performing several linkages building and facilitation activities in innovation systems, creating an enabling context for effective policy formulation and implementation, development and innovation. Initiatives that foster environmental awareness and attachment to local ecosystems, develop capacity for social entrepreneurship in the environmental arena, promote dialogue between key stakeholders, and provide institutional support to new institutions may facilitate the emergence of integrated, collaborative ecosystem-management approaches

(Biggs et al, 2010). Neef and Neubert (2011) contended that agricultural researchers engaged in participatory processes with local stakeholders should decide for which issues and in which phases certain participatory elements could be used in a specific research context.

The challenges with engaging stakeholders successfully and for a long time have been identified. A critical challenge in ameliorating the emergence of new problems is the design of ecosystem-management institutions that remain innovative and adaptive over time (Gunderson and Holling 2002; Berkes et al. 2003, Chapin et al. 2009). Broad engagement means more objectives, tradeoffs, and complexity. Various constraints of stakeholder involvement are recognized, with institutional and governance concerns identified as the most severe obstacles to implementation (Sayer, 2013). Failure to engage stakeholders in an equitable manner in decision-making processes will lead to suboptimal, and sometimes unethical, outcomes. All stakeholders should be recognized, even though efficient pursuit of negotiated solutions may involve only a subset of stakeholders. Solutions should encompass a fair distribution of benefits and incentives. Wilsdon and Willis (2004) observed that public engagement in the scientific process can lead to better, more robust funding decisions provided it is used to open up questions, provoke debates, expose differences and interrogate assumptions.

In Ghana, multi-stakeholder platforms for decision making in the agricultural system has been experimented by the International Water Management Institute (IWMI), GIZ, International Institute of Tropical Agriculture (IITA), Forum for Agricultural Research in Africa (FARA) and UG-Led Convergence of Science. For IWMI success was linked to the “flexibility in process facilitation and implementation, supported by the achievement of various outcomes (Amerasinghe et al., 2013). Another factor was the participatory involvement of stakeholders in the decision-making process in iterative steps that allow for shared learning, collaborative planning and eventual interventions with a likelihood of institutionalization, out-scaling and up-scaling.

For GIZ, the success of the value chain platform at the local level was linked to the specificity of issues and benefits derived by both business and non-business actors. A key challenge was linked to the use of ToT Approach to select members who were referred to as “competent to participate”. As Sunding and Zilberman (2000) assert private investment in the generation of embodied innovations requires appropriate institutions for intellectual property rights protection. When the gains in engagement were not forthcoming some members exited the platform and ceased to make contributions.

A recent review of the Research for Development (R4D) Platforms used by the Africa Rising Project of IITA concluded that the intervention worked because stakeholders shared similar visions, were interested in addressing farmer needs and rollout technologies; joint efforts of active stakeholders could be mobilised and sharing and learning could be supported (Yasabu, 2017). However, private sector could not be engaged, and government officials could not retain their membership. Other unclear issues bothered on time for operation, ownership of platform and budget.

FARA's Dissemination of New Agricultural Innovations in Africa (DONATA) project employed Innovation Platforms for Technology Adoption (IPTA), a multi-stakeholder

innovation platform comprising representatives of farmers and farmers' organizations, extension workers, agro-processors, marketers, agribusiness actors, transporters and researchers, policy makers and, in some cases, media practitioners and credit-services providers. In Ghana IPTAs for cassava value chains was implemented from 2011 to 2014. Success of IPTA in Ghana is linked to clarifying relevancy to the community to ensure that proposed interventions are the real felt needs of the community. Others were, resolving the following challenges to sustain the IPTA: Limited skills and competence in setting up a functional IP through training in multi-stakeholder processes and value chain approach, and learning visits in 2012 to Burkina Faso and Gambia IPs, respectively; setting up of effective governance for sustainability of IP; effective integration of M&E on platform activities; presenting a result-based M&E report; changing mindset of research and extension facilitators and other actors and providing regular internet services.

The COS-SIS implemented from 2006 to 2014 helped national, sub-regional and African agricultural research organisations, universities and other public and private sector agencies, including non-governmental organisations (NGOs), to strengthen their programmes. In Ghana, the success of the project in the oil palm value chain was linked to lengthy and thorough exploratory and diagnostic scoping studies before the platforms were initiated; it was recognised that joint learning requires good skills in adult learning and facilitation. Joint learning on platforms is also time demanding for stakeholders.

Policy makers and Agricultural Policy Making in Ghana

The observation that public engagement in the scientific process can lead to better, more robust funding decisions (Wilsdon and Willis, 2004), leads to the question of how policy makers get engaged? Agricultural policy is a public policy. Public policy making refers to action taken by government, decisions that are intended to solve problems and improve the quality of life of its citizens. By implication, policy makers are powerful government officials and others in society. They hold superior positions and can exercise a high degree of control or influence in the agricultural science, technology and innovation system (CTA, 2005).

In Ghana, agricultural policy-making follow the typical cycle with the following elements: (see also Birkland, 2011):

Stage 1- Problem definition or agenda setting,

Stage 2 - Policy formulation,

Stage 3- Policy legitimacy/ adoption,

Stage 4- Policy implementation,

Stage 5- Policy evaluation and

Stage 6- Policy change

There are several types of inputs/ influences that policy makers provide to the process at all stages –idea initiation, coordination, research (basic, applied, baseline or impact assessment studies). Government officials are mandated by rule (embodied in the President) to interrogate key issues in agricultural sector development and thereby provide options for resolving the issues. At stage one of the policy making cycle government officials coordinate the constraint analysis activities involving other political agents (including private consultants, academia, farmer groups and public-sector researchers) (see also FAO 1998). During policy formulation, government officials coordinate the activities to ensure that sectoral objectives, strategies and components of plans align with the broad national agenda. Agricultural innovations are suggested by researchers and discussed by government officials and other political agents. Policy legitimisation/adoption is strictly in the domain of legislators (in Ghana, Parliamentary sub-committees). However, the consultations made with non-state and other civil society groups before adoption is well documented (IFC, 2011). During policy implementation (including baseline studies, piloting and scaling up of innovations), government officials (including public sector research directors) at the national and local level (in Ghana, regional and district), participate as project coordinators, monitors or researchers (Dubbeling et al., 2010). They may partner with private sector and non-governmental organisations to implement innovative or replicated projects and programmes. During policy evaluation, government officials join the review or impact assessment teams as team members/coordinators/responsible officers. Request for better policy frameworks and outcomes may be initiated by private sector but it is public officials who coordinate the change process and set the agenda for constraint analysis and follow the cycle again.

Sova et al. (2017) admit that some recognised policy stakeholders in climate adaptation policy regimes in Ghana may be more powerful than others. “...several potential cross-level bridging institutions are not considered influential at all operational levels. Farmers, traditional authorities, and the District Assembly, for example, are all considered highly influential from the perspective of local-level respondents, but their counterpart agencies at the national level are not considered influential by policymakers. It is also observed that, in earlier times agricultural policy was presented as the classic case of policy developed by tight policy communities characterized by stability, shared ideology and limited membership (Booterill, 2005). The value of the concept of policy communities in explaining policy development processes and policy change has been demonstrated. The role of farm groups in agricultural policy making in Australia in the early 2000s led to the conclusion that “the combination of ideological and institutional change, particularly in the presence of looser policy networks, can disrupt policy making and lead to network termination resulting in policy change” (Booterill, 2005).

Recent statements on agricultural policy making provide sufficient evidence that policy making is led by the President and officials of the Ministry in Charge of agricultural development (Food and Agriculture, Fisheries and Aquaculture Development, Environment Science and Technology,

Trade and Industry) but there are other powers- project financiers, technical advisors and civil society advocates (see Box 1).

Box 1: Statements about Agricultural policy makers in Ghana



“Dr Kwame Nkrumah’s agriculture policy started with the establishment of Co-operative and State Farms that were supposed to be run on commercial basis, and by 1962, 26 state farms were established...”

“...the National Liberation Council (NLC) that overthrew the Nkrumah regime in 1966 spelt out its[agricultural] policies as follows: support for farmers by way of marketing, feeder roads, water conservation and irrigation, extension advice and agricultural credit. ...”

“...Under the policy, implemented by the Ministry of Agriculture, the State Farms Corporation, Food Distribution Corporation, Settlement Farms, National Investment Bank and private farms, educational institutions were given specific production targets to meet.” (IFD, 2007)

“MOFA is the lead agency and focal point of the Government of Ghana, responsible for developing and executing policies and strategies for the agricultural sector within the context of a co-ordinated national socio-economic growth and development agenda. By means of a sector-wide approach, the Ministry’s plans and programmes are developed, coordinated and implemented through policy and strategy frameworks.... ”

“[Agricultural Policy Support Project] (APSP), which is supporting MoFA to implement [Medium Term Agricultural Sector Investment Plan] METASIP, is being funded by USAID at the cost of approximately US \$225 Million up to 2017. The Project is being implemented by

Chemonics International Incorporated with Iowa State University (ISU), Centre for Policy Analysis (CEPA) Ghana and the Ghana Institute of Management and Public Administration as its implementing partners, while the Government of Ghana (GoG), public and private academic and research organizations and Civil Society Organizations (CSOs) are its key counterparts. The five-year Project—December 2013 to September 2018—is expected to strengthen the capacity of policy-makers to identify and implement agriculture policies based on evidence and analysis, strengthen local research capacities to contribute to the policy process and support the efforts of CSOs in their policy advocacy activities” (www.ghana.gov.gh/index.php/).

Study Methods

Method of Data Collection

Survey instrument

A questionnaire was developed (as part of TOR) as the instrument that was used for the collection of data for this study. The questionnaire consisted of four sections: information on the agricultural innovation stakeholder, understanding of agricultural innovations, policy makers and engagement, history of engagement of policy makers in the agricultural innovation process and the key factors of success and failure of engagement of policy makers in agricultural innovation processes (Appendix 3.1). The histories (about initiation, [re] design, implementation, monitoring and evaluation, and outputs) were documented.

Sample selection

The target population for the study was identified as officers in governmental and non-governmental organisations that were related to the agricultural research and development system. Since no initial list was provided, the plan was to use a snowball sampling approach, and a questionnaire. The snowball sampling will allow surveyors to identify and interview key policy makers and informants. To ensure that the sample for the survey was considered representative of the various policy makers in the agricultural sector, the potential institutions that were considered important in the agricultural innovation process were identified. A listing of government Ministries, departments and agencies (MDAs) and non-governmental institutions that were considered critical in the agricultural innovation process in Ghana was generated. Once the MDAs and institutions were selected, a contacts list was drawn, and a snowball approach was adopted to identify more respondents. A total of 30 contacts were made and given three weeks to respond and complete the questionnaires. Nineteen (19) questionnaires were returned for analysis.

Training of research assistants

In order to ensure that the data collection methods (survey instrument and sampling procedure) were adequate and that collected data were reliable, research assistants (degree holders) were employed and trained. The one-day training session was aimed at ensuring that all field research assistants fully understood what the study sought to achieve and also the rationale for the data collection. The field research assistants were then taken through each question on the questionnaire to clarify and to equip them with a better understanding of the context of every question.

Data collection procedure

The data collection was undertaken over a period of fifteen working days. It started from Wednesday, 3rd January and ended on Friday, 19th January 2018. The survey started from CSIR-STEPRI where researchers helped identify the major agricultural innovations, research institutions and some key informants. Each enumerator was expected to administer at least 5 questionnaires over the period of the data collection. About 70% of the interviews were face-to-face while the rest were completed by respondents and returned through email or collected by RAs or through telephone interviews. In all, 24 questionnaires were completed and returned from the Greater Accra and Ashanti regions. A full list of respondents and contacts is attached as Appendix 3.2. The respondents were mainly from academia, research institutions, public administration of ministries' departments and agencies (MDAs) and NGO/specialised group (Figure 3.1). Other groups that were initially targeted but were not able to respond within the limited time were the parliamentary sub-Committee on Agriculture and Cocoa Affairs and political parties. Political Parties have Research and Policy Analysis Units but their involvement in fora that discuss agricultural innovation has been meagre. Other Think Tanks such as The Dankwa Institute, Imani Ghana, Institute of Economic Affairs, Centre for Policy Analysis and Institute for Democratic Governance that discuss economic transformation and food security issues were identified but could not be consulted due to time and logistical constraints. Bringing officers from these institutions in a workshop to include their opinions will be a good way forward.

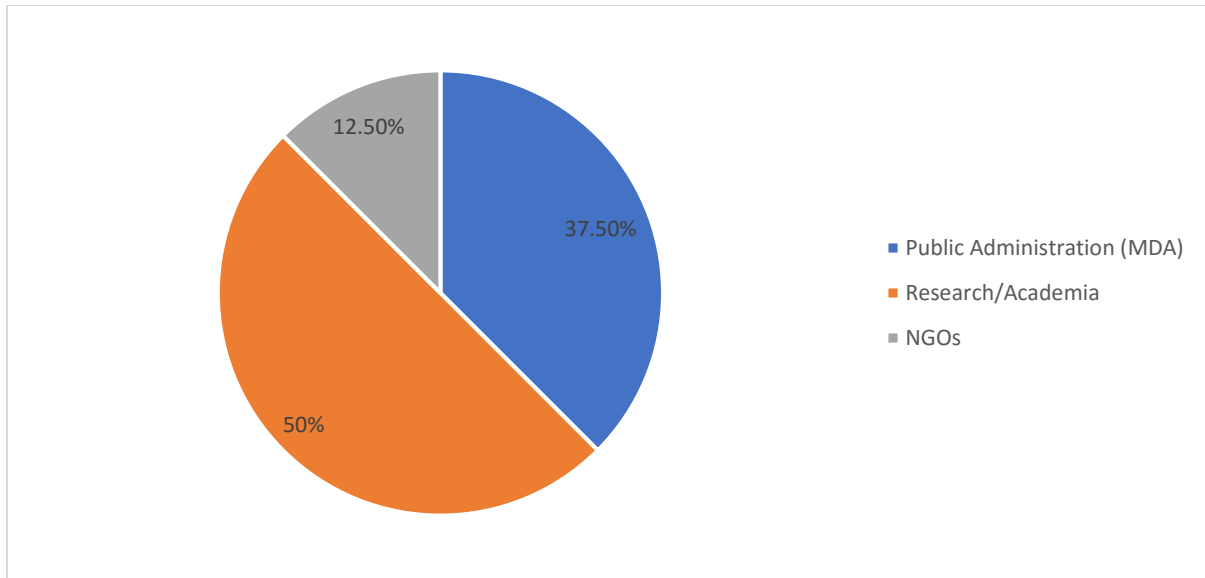


Figure 3.1: Distribution of respondents by category organisation

Method of Data Analysis

The study was a rapid appraisal, which entailed the collection of data using a semi-structured questionnaire and application of simple descriptive statistics.

Identifying and selecting most significant agricultural innovations

The agricultural innovations selected for study were included in the Terms of Reference of the study. The “successful” and “non-successful” agricultural innovation were not defined. Hence, the study considered successful innovations as those, which were i) well-known to targeted officers contacted (interviewees) and ii) have documented evidence of continued adoption by farmers. The non-successful innovations were those not known or less well-known and with little or no empirical evidence of adoption success. The four innovations were:

- Improved soybean variety (ISV): considered as a crop biological/genetic change;
- Improved technology for Tilapia (ITT): considered as animal biological/genetic change;
- Formulated feed for growing tilapia in ponds (FFT): considered as management practice and
- Combined starter and finished diet for broilers of chicken (CSFD): considered as management practice.

Although all the four innovations were identified by the relevant institutions, evidence of success of FFT and CSFD was meagre. Hence, they were considered unsuccessful.

Identifying and discussing with policy makers on their engagement in agricultural innovation processes

Policy makers interviewed about the selected agricultural innovations were categorized into two: (1) Those directly involved in the innovation processes (identification/initiation, [re]design/adaptation, implementation, monitoring and evaluation) and (2) Those who were not involved but are competent to contribute to the analyses of the processes. Through relative frequency analysis, the functions and roles performed by interviewees in the national agricultural research and development system were identified. The understandings of interviewees concerning agricultural innovation, policy-making and engagement were analysed.

Determining key factors of success and failure of engagement of policy makers in agricultural innovation processes

Key factors of success and failure of engagement of policy makers in agricultural innovation processes were deduced from the point of views of interviewees, and from the identification of key differences of events/facts between success and failure stories. Success was defined as factors that bring policy makers to engage and failure was defined as factors that prevent policy makers from engaging. The perception of value addition of innovations to livelihoods of producers and consumers as well as other advantages/disadvantages were assessed. Respondents were presented with suggested factors. Rank analysis was employed in order to understand the most important and least important factors. Comparison with other similar success/failure experiences in other countries (especially in Africa and Asia) planned could not be carried out effectively due to time constraint.

Documentation of the agricultural innovation processes and engagement of policy makers

The full stories of the processes of the selected agricultural innovations (events, stakeholders, and periods of time, locations and outputs) were reported as narrated by interviewees, and triangulated with evidence from previous published reports of STEPRI (Obirih-Opareh, 2008; Quaye et al., 2015; Ampadu-Ameyaw et al., 2016 & 2017)). The stories of engagement of policy makers were considered as systematically part of the agricultural innovation processes; a few were isolated in a separate audio document. The contribution through proposal writing, funds and grant searching/screening and disbursement, project coordination, forum/workshop organising, project monitoring, evaluation and technical advising were documented.

Characteristics of the Respondents

In all, twenty-four (24) respondents (out of the 30 targeted) were interviewed for the four innovations identified. The distribution of the respondents according to the four innovations were: Improved technology for tilapia (33%), improved soybean variety (25%) formulated feed for growing tilapia in ponds (25%) and combined starter and finished diet for broilers of chicken (17%) and (Figure 3.2).

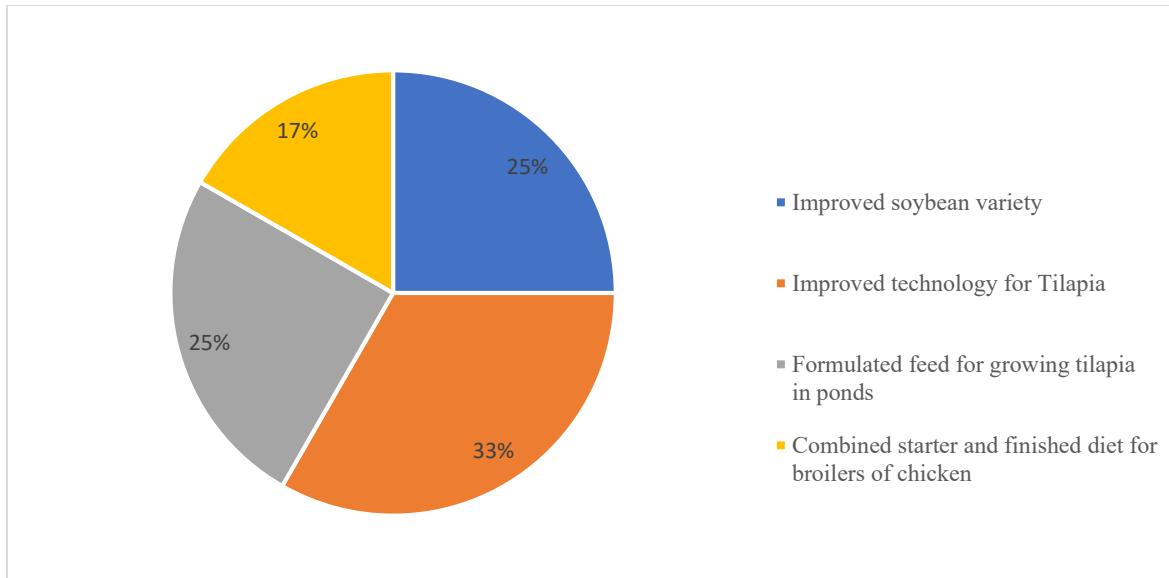


Figure 3.2: Distribution of respondents by innovation

All the respondents except one were males and were between the ages of 28 years and 69 years with a mean age of 47 years (Standard Deviation=8.6). The respondents have attained tertiary education: Degree/Diploma (8%), Masters (46%) and PhD (46%). The professional profile of the respondents revealed, livestock specialist (25%), fisheries/aquaculture specialist (17.0%), economist (12%), natural resource management specialist (8%), food/nutrition specialist (8%), Crop specialist (8%) and others (21%). The organisations represented are as indicated in Appendix 3.3. Apart from the Ministries (including Ministry of Environment, Science, Technology and Environment (MESTI), MoFA, MoH, MoF and Ministry of Trade and Industry (MoTI)), the University of Ghana and NGOs represented by a farmer based organisations and civil society were covered. Directorates of Crops and Agricultural Extension Services, identified as lead in varietal release and innovation diffusion respectively, could not respond to the questionnaire. Hence, no public administration officers contributed to the narrative on ISV.

All the respondents had performed and continue to perform various roles in the national agricultural research development system. The roles previously and currently performed were not significantly different (Figure 3.3, viz., professor/lecturer/teacher, project team member, project/programme manager, socio-economist, member of a specialised NGO, project/programme designer, project/programme implementation technician, technical advisor to the Minister and member of a political party).

Respondents' understanding of agricultural innovations, policy makers and engagement

To enquire how the various actors in the agriculture policy making system appreciated and understood what an agricultural innovation was, the survey asked the respondents to define what an agricultural innovation is from their own perspective. The common themes that were identified in the definitions: The introduction of new processes, product or method; improving

upon an existing process, product or method and both the introduction and improving upon a product, method or process. (Appendix 3.4).

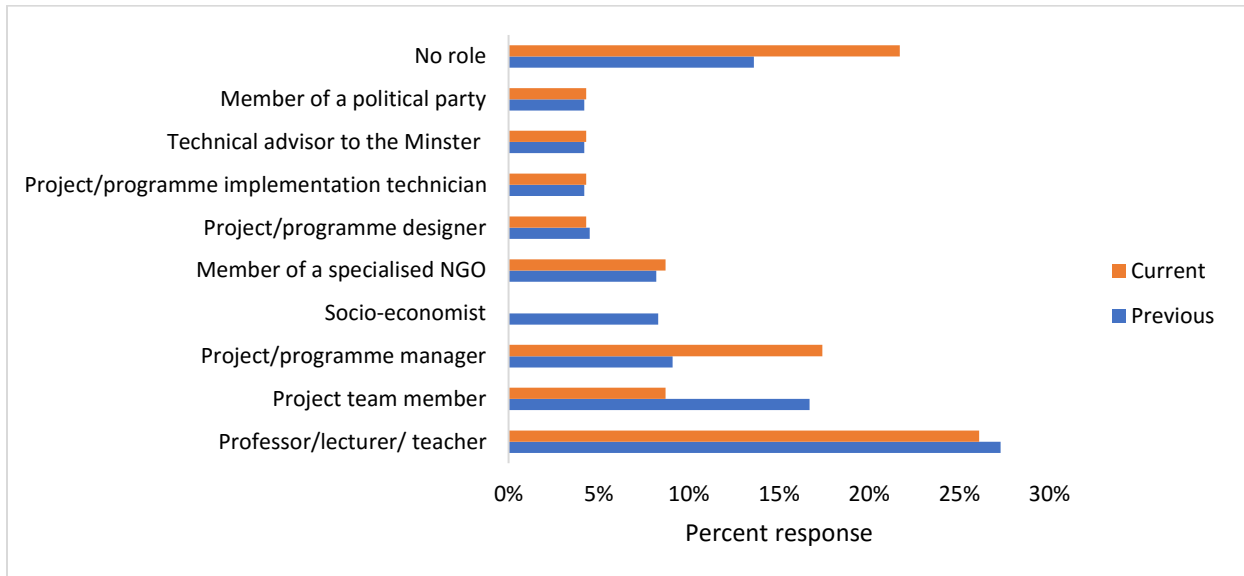


Figure 3.3: Previous and current roles performed in the research and agricultural development system by respondents

The existence or the development of policy in the agricultural sector is critical to the growth of the sector. In this regard, the respondents were asked to define what they would consider as an agricultural policy and who is a policy maker. The common themes in the definition of policy were: Specific goals and objectives and timeframes within which these goals and objectives are to be achieved; guidelines, rule/regulations to lead to improvement, enhancement or promotion of the agricultural sector or sections of the value chain (Appendix 3.5). The key agricultural policy-makers were identified as the President and the Minister in charge of agriculture; others included technical advisors to the minister, heads of research institutions and members of Parliament (Figure 3.4).

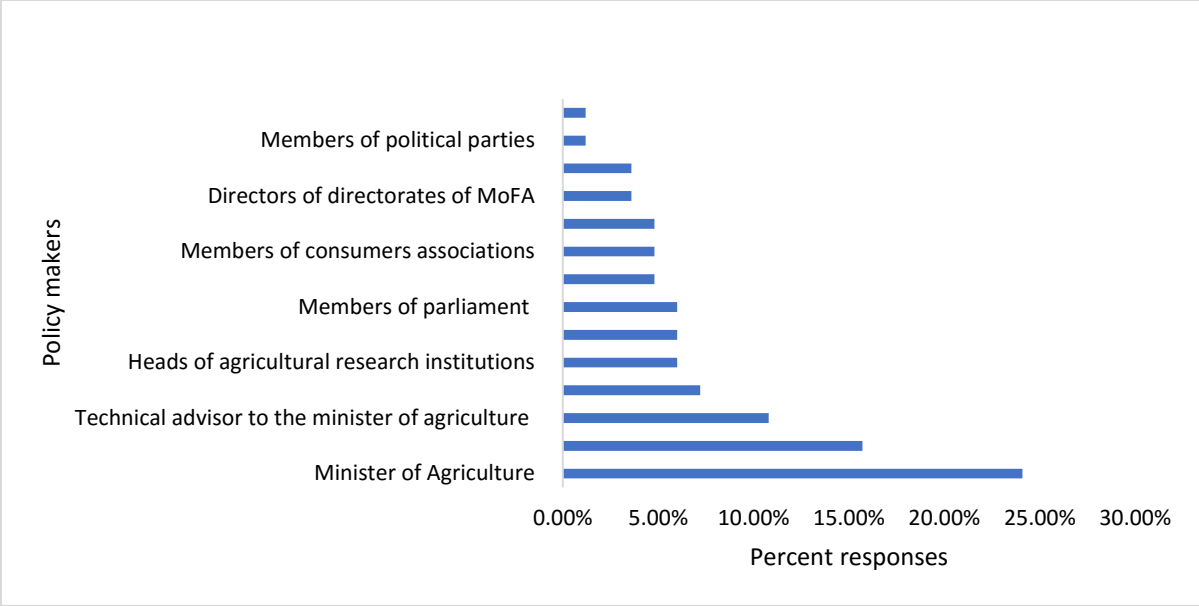


Figure 3.4: Respondents perception of who policy makers are

With regards to when a policy maker is considered engaged in an agricultural innovation process, majority (79%) of the respondents indicated that, a policy maker was engaged when he/she participates at any stage. Only a few (17.5%) interviewees indicated that participation in ‘all the stages’ of the innovation process should be termed engagement (Figure 3.5). Yet it is noted that policy makers (particularly representatives of President and Parliament), should be engaged at all stages to set the agenda and coordinate all the activities during project design, implementation, monitoring and evaluation. The President expects the Ministry of Food and Agriculture/Fisheries and Aquaculture Development, its directors and mandate officers to lead/participate at all stages of the policy cycle. Participation at all stages lead to consistently learning about and understanding the challenges of each stage of the innovation process and providing the necessary technical advice and logistical support needed for success. The IITA/Africa Rising Project’s R4D platform approach, maintained each stakeholder at all stages of the innovation leading to more effective design, implementation, evaluation of project activities and dissemination and communication of research findings (Yasuba, 2017).

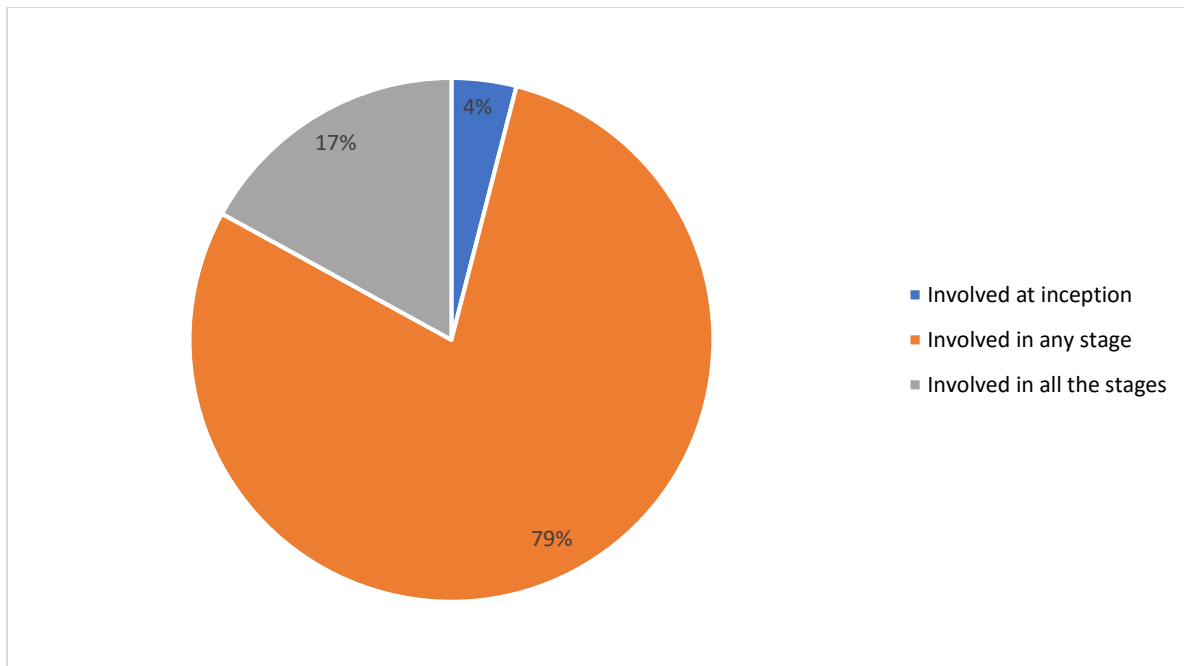


Figure 3.5: Respondents perception of policy-maker engagement in innovation process

RESULTS AND DISCUSSION

History of Improved Soya Bean Variety (ISV)



Initiation: The improved soya bean variety Jenguma was developed by Savanna Agricultural Research Institute of CSIR (CSIR-SARI) between 1991 and 2003. It was in response to farmer requests through the Regional Research and Extension Linkage Committee for a solution to the early shattering problem in soybean. Other collaborators included IITA, FRI, CRI, the Food Crops Development Project and MoFA. The Food Crops Development Project, funded by the African Development Bank, provided financial support to FRI for suitability for proximate or chemical

analysis and to MoFA (through the Women in Agricultural Development Directorate-WIAD) for food preparation.

The National Varietal Release Committee's inspection visits were also sponsored by the Food Crops Development Project. Respondents' (only Research/ Academia and NGOs) account of the history and success of the innovation is summarised and presented in Appendix 4.1.

Implementation: Specifically, IITA provided technical backstopping and germplasm, while FRI was involved in testing its nutritional qualities. CSIR-SARI geneticists introduced early generations of the variety from IITA and advanced them through several generations, identifying suitable lines selection for yield, shattering resistance and stability of yield through genotype-environment interaction studies. On-site evaluation, varietal selection, and testing were conducted using CRI data at four SARI stations—Nyankpala, Damongo, Yendi, and Manga. MoFA provided support in on-farm testing and conducted demonstrations on farmers' fields. The Grains and Legumes Board produced foundation seed from the breeder seed provided them and seed growers produced certified seed for sale to farmers.

Concrete results: The *Jenguma* variety was released in 2003. Other varieties such as Tax 1445-2E, Nangbear and Aphoto were released in 2005 onwards. The *Jenguma* variety is still top of the list among farmers in Northern Ghana (Amanor-Boadu et al, 2015; PC Dr. Denwar, SARI, 2017). Respondents also confirmed the widespread use of the *Jenguma* and other new soy bean varieties as evidence that their engagement in the innovation process was useful (Appendix 4.1 Q3.9a).

Success factors that may have been decisive/most influential in the results of the innovation process:

Four out of the six interviewees were involved at a certain stage of the ISV innovation; three at inception and one at dissemination. All of them indicated that the project was successful. The interviewees were of the view that that the major factors that were most influential in the results of the innovation included: i) adequate number of researchers, ii) laboratory and on-station facilities and iii) willingness of farmers and processing industry to patronize the product.



Government department of Agriculture at the district level provided resources to promote the technologies among farmers at all levels.

Farmers were taught practices in both field and post-harvest processes. However, a few limitations to the success of the innovation were linked to: i) inadequate human resource in the technical processes at the research level, ii) low level of farmer sensitization; the number of fora and geographical locations was not many and iii) lack of funds to commercialise the produce effectively. Commercialisation involves producing large volumes of foundation seed for consistent supply to farmer growers who will then produce certified seed for food crop farmers (Appendix 4.1, Q3.11&12). In order to correct these anomalies, it was suggested that adequate budget, project inputs (materials and human resource) and farmer education be improved.

Level and process of engagement of policy makers in the innovation process:

Policy makers at the different directorates of the Ministry of Food and Agriculture were engaged. The Crop Services Directorate was the major section engaged in the ISV innovation. The overall engagement process was mainly motivated by the SARI's mandate as a research institute. All the four interviewees mentioned their directors or officers in charge of research (say breeding/agronomy) as persons or functionaries who included them in the ISV project (Appendix 4.1, Q3.3). The Farm Radio (NGO/civil society) was invited by the Regional Directorate of Agriculture. Two interviewees were involved as breeders or project team members during the late 1990s or early 2000s and others less than ten years ago (2009 and 2015), indicating that work on the innovation is ongoing at the research stations as expected. As researchers they partnered other researchers and project managers in the MoFA to engage in the innovation process (Appendix 4.1, Q3.2). In general, officers were consulted to be part of inception and other project meetings that discussed technical or socio-economic/ political challenges (Appendix 4.1, Q3.5). Selection of officers is usually based on their work mandate or due to past performance and experiences. The researchers provided technical information. The policy makers are the project managers or coordinators who contributed both technical information and institutional support, participating in laboratory work and dissemination activities with farmers (Appendix 4.1, Q3.8b). Farm Radio used its resource persons and media partners to broadcast lessons and advertise for the seed when feedback is obtained during stakeholder interactions. The effective marketing after product development led to growth paths.

The role that the Ministry of Food and Agriculture as policy makers played at the national, regional and district levels was highlighted by all the respondents. MoFA's agricultural extension officers at the community level facilitated the diffusion of innovation. The Statistical Research and Information Directorate of the MoFA provided national data on soya bean production. Recent statistics on soya bean production point to increased area under cultivation, output and yield. The area has increased from 62,000Ha in 2006 to 86,000 Ha in 2015. Production increased from 54,000 metric tonnes in 2006 to 142,000 metric tonnes in 2015. The yield gap is bridging from less than 0.5 Mt/Ha in year 2000 to 1.2 Mt/Ha in 2014, achieving 57% of expected (MoFA, 2016). In 2015, the top ten districts in the Northern region for soya bean recorded a yield range of 1.8 Mt/Ha (Zabzugu) to 2.68 Mt/Ha (Nanumba South). Respondents

have pointed to seed companies (Heritage Seeds and Pee Farms Company Ltd.) and growers' associations in the Northern and Brong-Ahofo regions.

Interviewees' considered that contributions of innovation to livelihoods of agricultural actors and consumers are the key factors that drive the engagement of policy makers in the ISV innovation process (Figure 4.1). Again, any innovation that contributes to gross domestic product attracts the interest of different stakeholders, including policy makers.

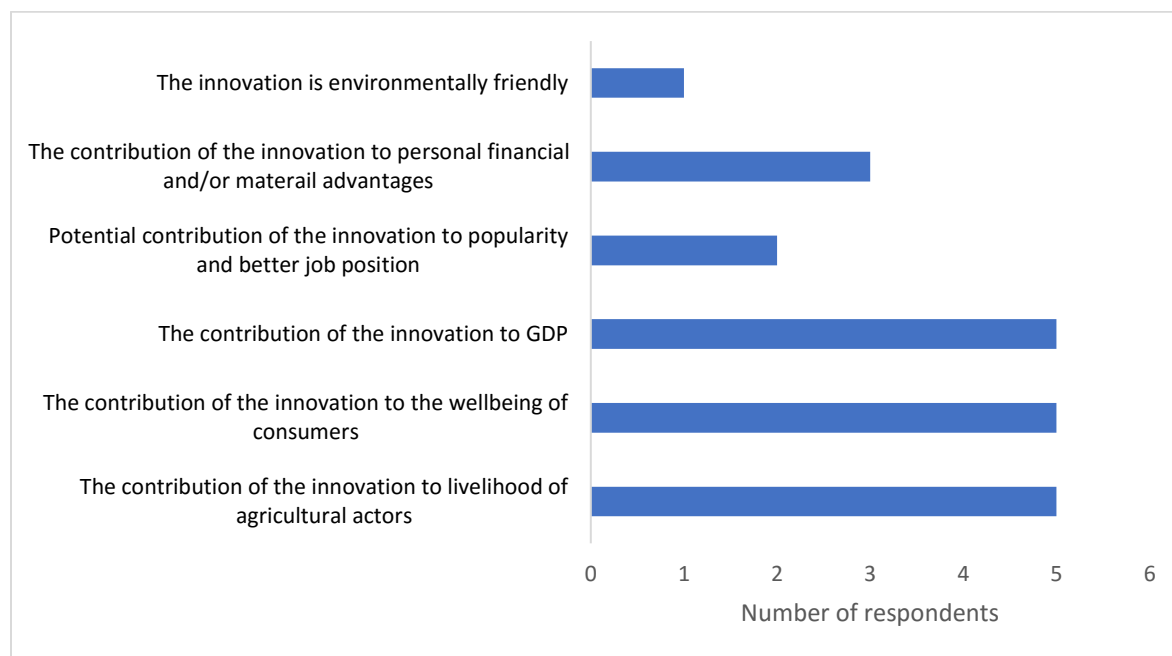


Figure 4.1: Factors that brought policy makers to engage in the ISV innovation

The commitment of policy makers and other stakeholders ensure that innovations are monitored till they are fully commercialised. One respondent also mentioned the facilitating role that other NGOs, seed/input dealers, international research and funding agencies play in technology development and transfer, especially during commercialization stage. The contribution is deemed positive since farmers have adopted the variety and companies such as Ghana Nuts (Brong-Ahafo region) are using the variety in oil and animal meal processing.



Interviewees suggested that important strategies for the successful engagement of policy makers in further agricultural innovation processes should include: i) Availability and provision

of adequate funding for the innovation (26.6%), ii) Broad consultation of policy makers at different operational levels before start of projects (20%), iii) adequate and timely information given to policy makers (13.3%), iv) design innovation to fit into national development framework (13.3%), v) proper needs assessment among policy makers and all other stakeholders (6.6%), vi) proper monitoring and evaluation of the innovation from start to finish, vii) innovation process should not be politicised and viii) engagement of adequate technical human resources.

Conclusion

The implementation of the ISV innovation process begun in the early 1990s. A combination of activities including in-lab breeding, on field trials of the Jenguma varieties of soya beans, training of farmers in good agronomic practices as well as involving grower associations and large scale industrial users during commercialisation has been key in its success.

History of Improved Technology for Tilapia (ITT)



Initiation: The improved technology for tilapia known as the Akosombo strain of the *Oreochromis niloticus* (Nile Tilapia) was initiated by the CSIR-Water Research Institute in 1997 and the process was completed in 2006. The advantage of the improved strain includes its fingerling growth rate that is at least 25% faster than that of those collected from the wild. Quaye et al. (2015) reported that apart from the higher growth rate, it has higher survival rate, fecundity, flesh quality and better resistance to diseases. Under the project titled Breeding and selection of *Oreochromis niloticus* for faster growth, scientists at the ARDEC of the CSIR-Water Research Institute (WRI) initiated the process. The project was funded by the Government of Spain (Phase I) and the Food and Agriculture Organisation (FAO) (Phase II) in collaboration with World Fish Centre and Volta Basin viz: Burkina Faso, Togo, Mali and Cote d'Ivoire.

Implementation: Successful implementation and scale up strategies was through dissemination of information at workshops, local and international conferences, seminars, on-farm trials in farmers' ponds, and farmer-to-farmer contacts. One of such workshops was in 2007

“Pioneering Fish Genetic Resource Management and Seed Dissemination Programmes for Africa: Adapting Principles of Selective Breeding to the Improvement of Aquaculture in the Volta Basin”. These dissemination efforts proved to farmers that they could increase their yields by rearing the strain. All male fingerlings of 5.0g were stocked in either ponds or cages at appropriate densities and fed with pelleted feed based on monthly fish biomass. The normal culture period of between 8 and 9 months was shortened to between 5 and 6 months because of the 30% faster growth of the improved strain. The strain has higher qualities compared to the traditional tilapia.

Concrete results: In 2008, an organization in Burkina Faso, Project d’élevage Piscicole (PEP) purchased 10,000 mixed-sex fingerlings and 220 breeds of the Akosombo strain from WRI-Aquaculture Research and Development Center (ARDEC). Further purchases were made for brood stock in subsequent years. “The response is phenomenal, the tilapia industry in Ghana is booming with the new Akosombo strain. At the current pace, tilapia production in Ghana was projected to increase tenfold by 2015,” (said Dr. Felix Attipoe, the former Officer-in-Charge at WRI in 2017). During the 28th National Farmers Day celebration in December 2017, the WRI was awarded winner of the National Best Agricultural Researcher Award in Ghana for the development of the Akosombo strain of Tilapia. The Akosombo strain is also benefiting the West African sub-region with surplus fish exported to La Côte d'Ivoire, and fingerlings sent to Burkina Faso and Nigeria for breeding (Quaye et al., 2015). A number of people have turned the venture into income generating activities. A recent report by the Department of Agricultural Economics and Agribusiness on Profitability of Aquaculture in Ghana showed that a minimum of 5 fish farmers in each region of Ghana stock catfish and /or the improved tilapia (DAEA, 2017).

Success factors that may have been decisive/most influential in the results of the innovation process:

Interviewees identified the following factors as key in the success of the improved tilapia technology: i) specialised human resource, who understood the science and art of developing the strain ii) training and demonstration facilities that were provided at WRI to consistently carry out experiments and on-field tests, iii) training services provided to both scientists and farmers and iv) adequate funding provided to facilitate the whole process. Other success factors included dissemination efforts organised through scientific platforms. Business opportunities were identified during dissemination workshops and taken advantage of. Orders from Burkina Faso were obtained at the “Pioneering Fish Genetic Resource Management and Seed Dissemination Programmes for Africa: Adapting Principles of Selective Breeding to the Improvement of Aquaculture in the Volta Basin”, workshop. The attributes of the fish (higher growth rate, survival rate, fecundity, flesh quality and better resistance to disease) contributed highly to the success of the innovation. Farmers make money, consumers have good nutrition and obtained a product which compared favourably with the old one there were used to. Tilapia is readily available on the market.

Level and process of engagement of policy makers in the innovation process:

Stakeholder engagement in innovation development is generally motivated by institutional mandate. Public administrators' engagement in the ITT was motivated by directors of MoFAD and Fisheries Commission. Researchers' engagement in the innovation process was mainly motivated by the Water Resource Institute's mandate (Appendix 4.2, Q3.2 and Q3.3). Two of the researchers were involved as geneticists during the 1990s and two as project team members in the early 2000s. The public administrators joined in the process less than ten years ago (2009 and 2012). Work on the innovation is ongoing at the research station. In general, officers are consulted to be part of inception and other project meetings that discussed technical or socio-economic/ political challenges. Selection of officers is usually based on the work mandate or due to past performance in similar engagement and experiences (Appendix 4.2, Q3.8). While researchers participated in laboratory work and dissemination activities with farmers, public officers of the MoFAD at the district level (extension officers) coordinated effective training exercises and awareness campaigns, facilitating diffusion of information among fish farmers. The regional level Fisheries Commissions also provided marketing services after product development by building hatcheries and stocking feed, leading to growth paths. The wild tilapia, the substitute of the Nile tilapia was no competition on the market; it had limited distribution channels. At the national level, statistics on fish were provided by the Fisheries Commission to show progress. Recent statistics suggest that despite concerns about depleting marine resources per capita consumption of fish has increased slightly from 23.6 in 1990 to 24.5 in 2015. The output of cultured fish has increased from 1,667 Mt in 2006 to 44,515 Mt in 2015 (MoFA, 2016). Hatchery companies such as Tropo Farms and West African Farms as well as small cages on the Volta Lake in Kpong are stocking fingerlings of the Akosombo strain.

The end-users of the new strain are fish farmers across Ghana and within the West-African Sub-region. Farmers operating hatcheries used the brood stock to produce fry and fingerlings for grow-out farmers. Women fish traders who deal in table-size fish benefit indirectly through their trading activities. The interviewees' considered that the contribution of the IIT innovation to livelihoods of agricultural actors (including hatcheries, farmers, traders and processors,) and consumers were the key factors that brought policy makers to engage in the process (Figure 4.2). A third factor considered very important was the contribution of the fish subsector to gross domestic product. The commitment of public administrators and other stakeholders ensured that the ITT innovation was monitored till it was fully commercialised.

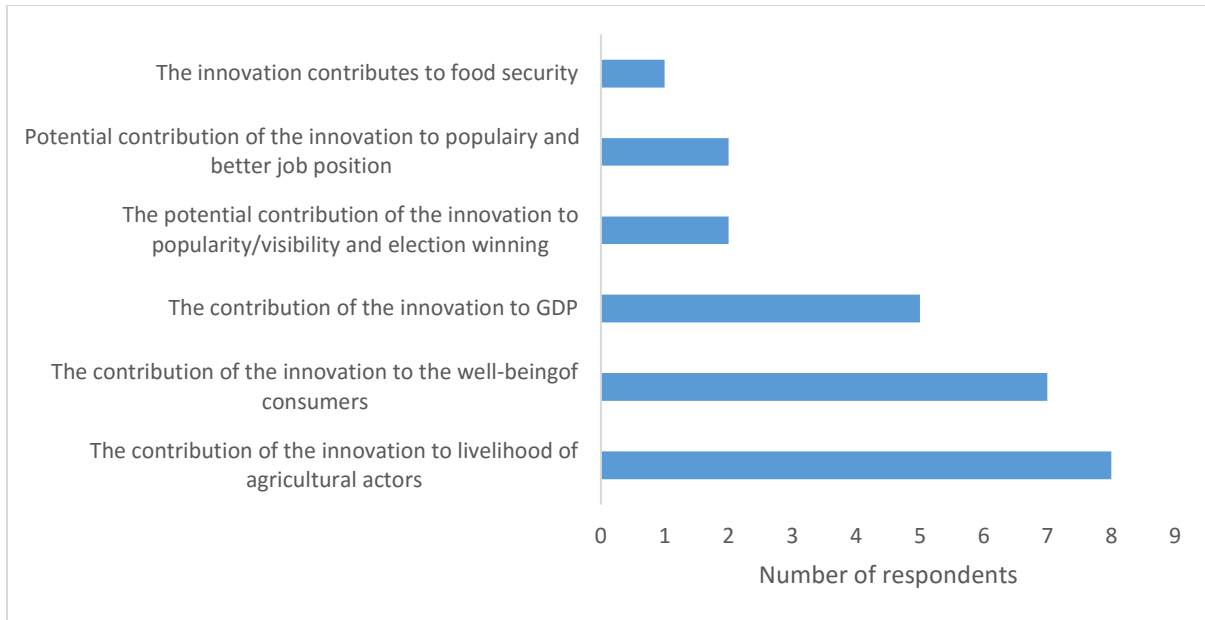


Figure 4.2: Factors that brought policy makers to engage in the ITT innovation

Interviewees suggested that important strategies for the successful engagement of policy makers in further agricultural innovation processes should include: i) Broad consultation before start of projects (31.2%), ii) adequate and timely information given to policy makers (25%), iii) availability and provision of adequate funding (18.8%) and iv) design innovation to fit into national framework (12.5%) and v) engagement of adequate and technical human resource (12.5%).

Conclusion

The implementation of the ITT innovation process begun in the early 1990s. A combination of activities including on-station and on-field trials of the improved tilapia variety, training of hatcheries and grow-out farmers in good husbandry practices during commercialisation has been key in its success.

History of Formulated Feed for Growing Tilapia in Ponds (FFT)



Initiation: The project was initiated in the early 1990s. It was a collaborative work between WRI and Animal Research Institute (ARI). It was financed by the government of Ghana and the World Bank through the National Agricultural Research Programme (NARP) of the Ministry of Environment, Science and Technology (MEST). The study was carried out at the ARDEC of WRI, Ghana.

Implementation: ARI formulated the feed and analysed the feed and carcass for crude protein, fat and moisture contents. WRI provided the earthen ponds and Nile tilapia fingerlings on which the feed was tested. All the two organizations played crucial roles during the feed testing period, contributing greatly to the development of the project. Formulations were given to Agricare Ltd., a private feed company for market promotion.

Concrete results:

Prior to 2005, 90% of fish farmers formulated their own feed from agro-industrial by-products. The Ghana Food Company (GAFCO) started selling and formulating sinking pellet fish feed in 2005 and Agricare Ltd. started formulating and selling in 2007 (Ponzoni, 2008). A community mill at Duayaw Nkwanta (Brong-Ahafo region) has been in operation since 2010. However, the Brong Ahafo Regional Chairman of Fish Farmers Association, Paul Chame in an interview with Department of Agricultural Economics and Agribusiness lamented on the lack of patronage of local feed (DAEA, 2017). Most of the fish farmers used commercially formulated feed, accounting for about 88% of farmers while 12% used locally formulated feed or agricultural/farm feed (DAEA, 2017). More than half of farmers who reported using commercially formulated feed indicated they purchased the feed from Raanan Fish Feed West Africa Ltd., located in the Tema Metropolitan Area of the Greater Accra Region.

Factors that may have been decisive/most influential in the failure results of the innovation process:

The limited success of the innovation was linked to infrastructure for production of commercial quantities, awareness creation, funding and logistical constraints and institutional support for promoting the innovation. The project faced challenges with late release of funds and lack of

man power or technical personnel who will continue with the experimentations. Awareness was created about the innovation, but information was not well disseminated to farmers for adoption throughout the country. Interviewees were of the opinion that the strategies for ensuring success of innovation were not considered, since, i) there was limited commercial linkage to industries, ii) few businesses and entrepreneurs picked up the innovations, iii) there was no provision of aid by Government and amendment of national policy on feed use (Appendix 4.3, Q13). Anani (2015) observed that, a major constraint to aquaculture development and expansion in Ghana is affordable nutritionally balanced and cost-effective fish diet. Currently, the fish farmers who produce their own farm-made fish diets, do not use ingredients and follow protocols that meet the nutritional requirements of cultured fish.

Level and process of engagement of policy makers in the innovation process

The researcher interviewees of the study indicated that project coordinators (public administrators) from the Ministry of Environment Science and Technology (MEST) were involved from start to finish. They supported the assertion that, policy makers' engagement in FFT innovation process could be motivated by the mandate of their institution (Appendix 4.3, Q3.3). The process of policy makers' engagement begun with heads of institution. The interviewees engaged in the process of FFT innovation mentioned a researcher at WRI and University of Ghana as functionary who included him in the FFT project. They were involved as researchers in 2014; the work on the innovation ceased at the WRI research station in 2017. The officers were consulted to be part of inception and other project meetings that discussed technical or socio-economic/ political challenges. The interviewees confirmed the observation that selection of officers to participate at different stages of an innovation process is usually based on the work mandate or due to past performance and experiences (Appendix 4.3, Q3.8). The commitment of policy makers is not sustained where there is no consistency in logistical support. Without that, they are not able to coordinate workshops and field visits and monitor activities till they are fully commercialized.

Interviewees considered that the key factors that could bring the engagement of policy makers in the FFT innovation process were contribution of innovation to livelihoods of agricultural actors and consumers and to gross domestic product (Figure 4.3). Despite the intention, lack of funds led to ineffective training exercises and awareness campaigns as well as providing marketing services after product development. Interviewees suggested that important strategies for the successful engagement of policy makers in further agricultural innovation processes should include: i) Broad consultation before start of projects (50%), ii) involvement of relevant MoFA directorates (16.7%), iii) design innovations to fit national framework (16.7%) and iv) adequate information given to policy makers (16.7%).

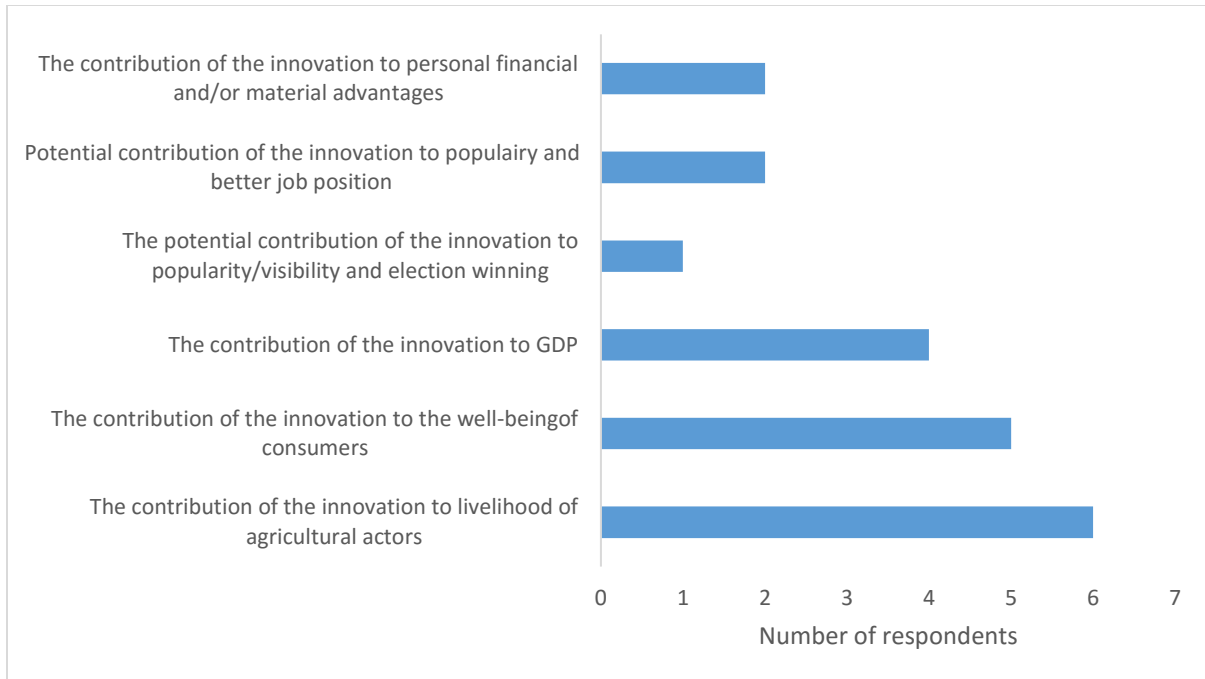


Figure 4.3: Factors that brought policy makers to engage in the FFT innovation

Conclusion

The implementation of the FFT innovation process begun in the early 1990s. The implementation of the planned activities that would ensure the success of the innovation were fraught with several challenges. Policy makers could not ensure widespread dissemination using field trials among farmers. Industrial producers were not effectively involved in the process of commercialisation among farmers and this has been key in its failure.

History of Combined Starter and Finished Diet for Broilers of Chicken (CSFD)



Initiation: The innovation, feed for broilers was developed in the 1980s (Obirih-Opare et al., 2008). The intention was to give one feed formulated to birds throughout their entire lifespan

in the poultry farm. Conventionally, broilers are given different feed (starter feed) and then later on as they are growing, they are given different feed (finisher feed). The Department of Animal Science, Kwame Nkrumah University of Science and Technology initiated and funded the project. Other funding support was provided by the National Agricultural Research Project (NARP) of MEST and the Sasakawa Global 2000 project.

Implementation: The breakthrough that this innovation has is that it reduces the time and costs involved in developing different feeds for broilers. Prior to the development of this broiler feed, poultry farmers were administering two main feeding phases. The technology resolves these feeding regime challenges by providing a single diet for broiler chickens.

Concrete results: Apart from KNUST Farms and Animal Research Institute experimental station, no other poultry farmers were introduced to the innovation. The Greater Accra Poultry Farmers Association could not confirm knowledge of the innovation and extent of adoption among its members.

Factors that may have been decisive/most influential in the failure results of the innovation process:

The key factors that limited the success of the innovation were inadequate laboratory facilities and lack of widespread dissemination of innovation. Facilities such as bomb calorimeters, amino acid analysers and chemicals were lacking, hence, challenging the scaling of the innovation. There was no funding for dissemination workshops and demonstration of innovation to a large group of poultry farmers to understand and compare the cost effectiveness of the product with imported alternatives.

Level and process of engagement of policy makers in the innovation process

The interviewees of the study of CSFD innovation process included a programme manager of Animal Research Institute (involved at a later stage) and three others from the Ghana Standards Authority, MoFA and (Greater Accra Poultry Farmers Association, NGO) (not involved in the process). The programme manager was of the opinion that, engagement of policy makers in the innovation process was mainly motivated by the mandate of the MoFA to ensure that research institutions contributed to scientific knowledge and reduce cost of animal feed (Appendix 4.4, Q3.3). The researcher was introduced to the innovation process in 1999 by a professor/ lecturer in the University of Science and Technology, to support the experiment as a graduate student. He provided research support. During project meetings, there were public administrators who joined to discuss technical or socio-economic/political challenges of the project. It was agreed that, selection of officers, including policy makers was based on the work mandate as well as past performance and experiences (Appendix 4.4, Q3.8). Officers' contributions during technical discussions led to the formulation of feed that is less costly than the separate starter and finisher feeds for poultry. The interviewees considered that the CSFD could contribute to livelihoods of producers of the feed as well as poultry farmers. The contribution of poultry to gross domestic product is also well known. Hence, policy makers should be driven by these factors to engage in the CSFD innovation process (Figure 4.4). Yet, the minimum collaborations

formed in this innovation could not facilitate the pooling of expertise available and knowledge base, especially from the University of Science and Technology to undertake, the research. Limited training exercises and awareness campaigns resulted in low adoption of innovation by poultry farmers. Interviewees suggested that important strategies for the successful engagement of policy makers in further agricultural innovation processes should include: i) Broad consultation before start of projects (20%), ii) design innovation to fit national framework (20%), iii) innovation should not be politicised (20%), iv) proper needs assessment among stakeholders (20%) and proper monitoring and evaluation (20%).

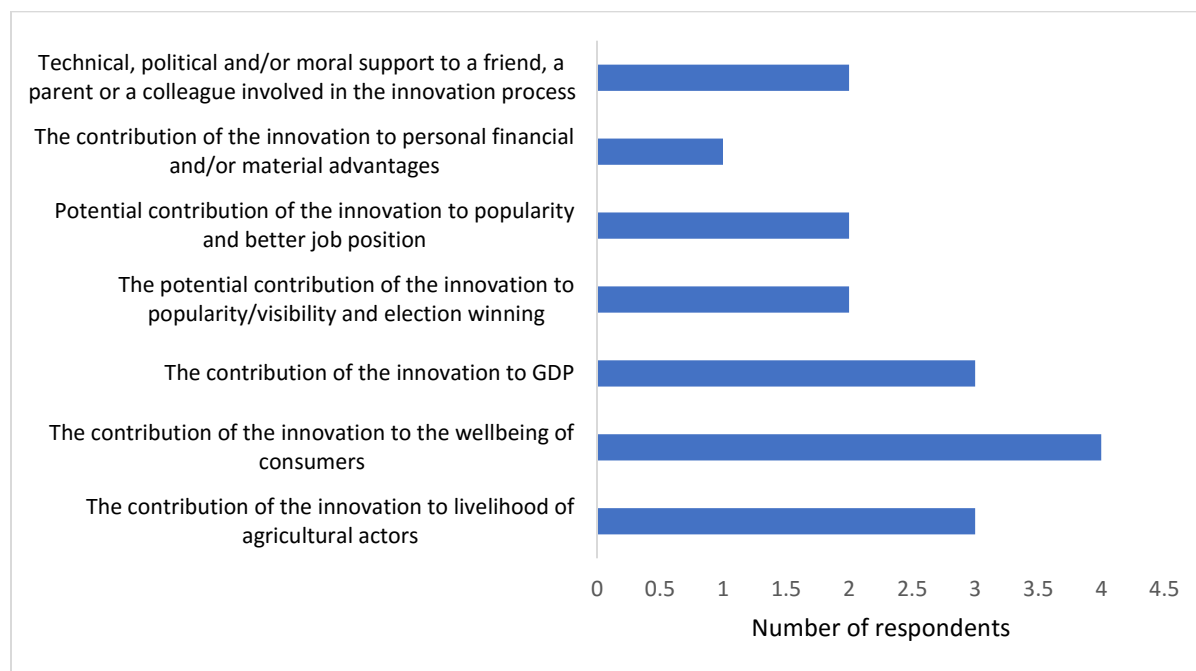


Figure 4.4: Factors that brought policy makers to engage in the CSFD innovation

Conclusion

The implementation of the CSFD innovation process begun in the early 1990s. The planned activities targeted at the success of the innovation were not fully implemented. The role of policy makers in ensuring widespread dissemination of the initial results could not be carried out effectively. Industrial producers were not effectively involved in the process of commercialisation among farmers and this has been key in its failure.

Synthesis of factors influencing the engagement of policy makers in innovation processes

Policy makers identified in the study included those who worked with **Ministries, Departments and agencies. They are initiators, advocators, designers, decision makers, and implementers of agricultural policies.** They get involved actively in multi-stakeholder exchanges and activities that occur to facilitate and realize agricultural innovations. These interactions and engagement with other system actors of the agricultural innovation process offer insight and provides

learning platform for policy makers. Policy makers actively engaged in a subject produces an experiential policy making process with the successful realization of the agricultural innovation. The discussions of both success and failure cases show that livelihood enhancement and GDP growth are the main factors that brought policy makers to engage in any agricultural innovation processes (Figure 4.5). All the four innovations studied (IVS, ITT, FFT and CSFD) were expected to increase the supply of feed for fish or poultry, hence increasing food security. Occasionally, policy makers may engage for personal gain, in terms of material advantage and better job position. This motive is driven by professional progression and wellbeing, which are linked to livelihood outcomes. Carney (2000) considered livelihood outcomes as food security, income well-being, reduced vulnerability and improved use of natural resource base.

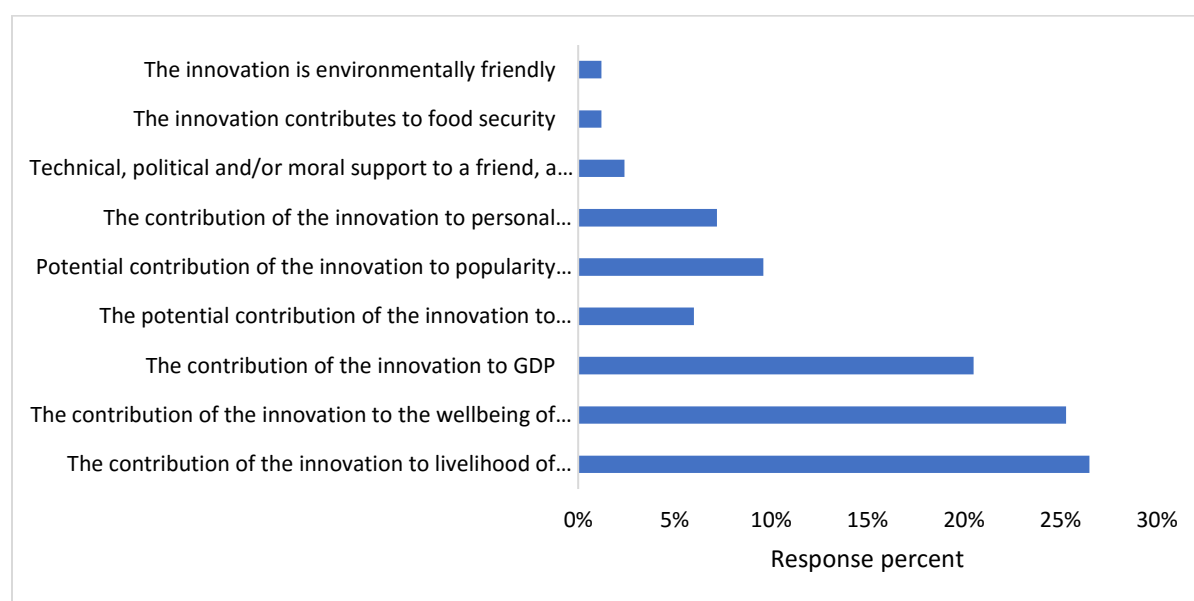


Figure 4.5: Factors that brought policy makers to engage in agricultural innovation processes

The implication is that policy makers will be prevented from engaging in agricultural innovation process when the innovation adds no value to the well-being of agricultural actors and consumers and GDP as a whole. A few interviewees were of the opinion that some policy makers refuse to engage in the innovation process due to: i) Lack of potential contribution of the innovation to political popularity/visibility and election winning; and, ii) lack of potential contribution of the innovation to better job position, technical, political and/or moral support to a friend, a parent, or a colleague involved in the innovation process.

For successful engagement of policy makers, interviewees suggest as major strategies: i) Broad consultation at initiation; ii) adequate funding; iii) adequate technical human resource; and, iv) establishing effective information flows as most important (Figure 4.6). Other strategies that should not be overlooked include linking innovation to national development framework, not

politicising the innovation process, conducting policy makers’ needs assessments, effective monitoring and evaluation of innovation process and involving the relevant MoFA directorates.

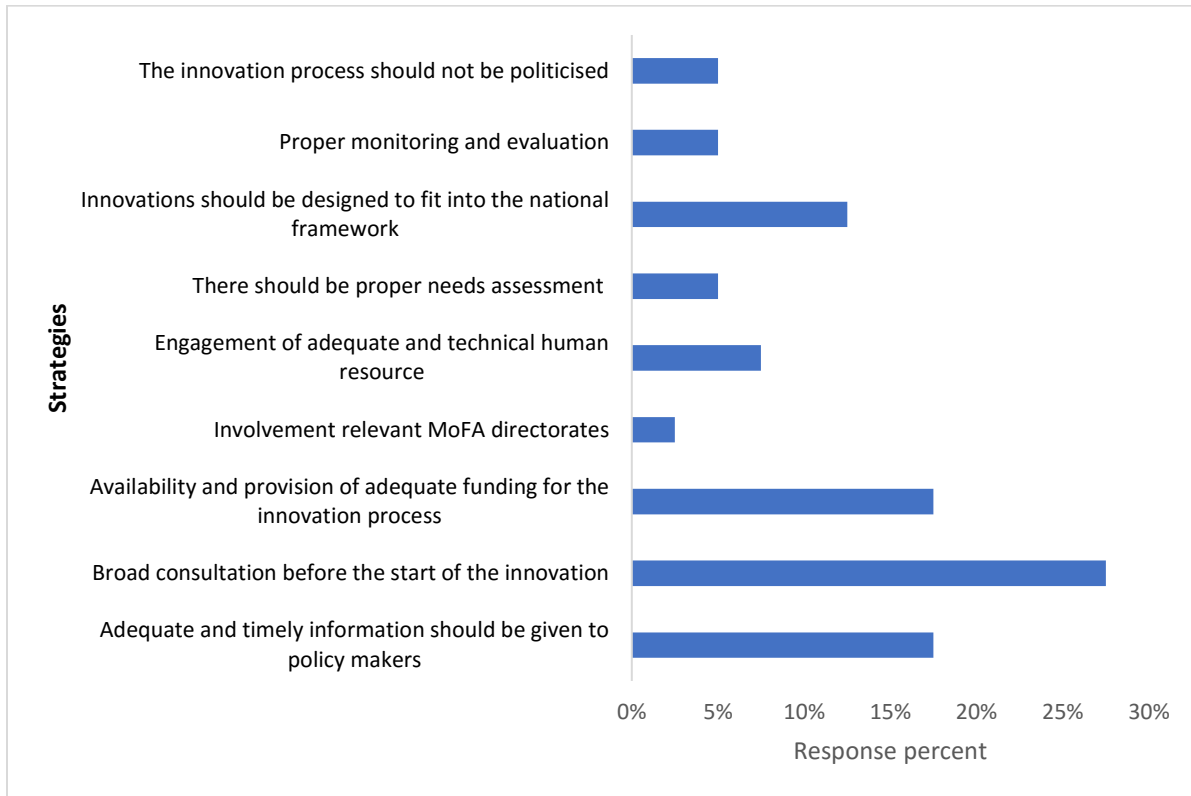


Figure 4.6: Suggestion of strategies for successful engagement of policy-makers in further agricultural innovation process

Discussion

Four innovations were studied. The Improved Soya bean Variety and Improved Tilapia Technology were identified as two fairly brilliant success cases and Formulate Feed for Tilapia in ponds and Combined Starter and Finisher Diet for broiler of chickens as largely unsuccessful cases of engagement of policy makers in agricultural innovation processes in Ghana. The four cases demonstrated that effectively engaging different policy makers at different stages of the innovation process requires five capitals –human, physical, financial, social and natural (Carney, 2000). The human resources should be adequate in terms of numbers and technical and managerial competencies. Consistent financial flow in timely manner will allow procurement of logistics and infrastructure building and maintenance. It also allows for human capacity building, advertising and effective commercialization. The availability of seed and fingerlings needed for planting and raising fish respectively on the market has supported the adoption by farmers and continued engagement of stakeholders. The ownership of rights to a process that is crucial in developing an important product may be a source of significant economic power. Effective information flow among the policy makers build strong social capital. As Klerkx et al. (2012) suggested, in order to sustain stakeholder engagement, innovation brokering involving

performing several linkage building and facilitation activities in innovation systems, creating an enabling context for effective policy formulation and implementation, development and innovation is needed. The assurance given to different actors through the policy will impact on economic agents and markets better and different aspects of the innovation can be explored: Yield-increasing, cost reducing, quality-enhancing, risk-reducing, environmental-protection increasing, and shelf-life enhancing. As Sunding and Zibbermann (2000) states, access to private investment in the generation of embodied innovations requires appropriate institutions for intellectual property rights protection.

What the unsuccessful cases teach is that it is not enough to justify the initiation of an innovation process only on biological-chemical mechanical basis (Rogers 2003). The business environment for processed products should be well mapped and understood before start of projects. Otherwise when there is competition as seen in the case of FFT and CSFD, policy makers will lose interest in engaging. The stages of innovation in the management literature distinguishes the exploration/invention (which captures the activities of transforming an idea or insight into a specific product/service offering and illustrates the degree of learning and competence building), from the exploitation or commercialization (which involves the activities of moving that new product/service through the stage gate process to assess its value in the market place and actually offer it to customers or end users) (Gerpott, 1999). When funding support is also irregular, awareness campaigns among target groups including farmers, processors and industry as a whole become limited and policy makers get discouraged. Most of the policy makers are driven by social welfare to engage, yet it is effective markets that are needed to sustain the innovation system.

FFT is considered non-successful; when the private company Agricare Ltd. is able to repackage the message and commercialise effectively the product life cycle will be revived, and policy makers will revive interest in engaging again. For the Ministry of Food and Agriculture to be proud and associate with the success, it should provide budget for public relations aspect of promotion. Researchers' interest in further improving the variety can continue and all other stakeholders can re-examine their role if the public policy making officers take post and contribute effectively. Neef and Neubert (2011) contended that agricultural researchers engaged in participatory processes with local stakeholders should decide for which issues and in which phases certain participatory elements could be used in a specific research context. Although the private sectors participation in FFT was identified at the initial stage the marketing research and consumer studies expected from public sector funding were not well integrated.

In initially engaging stakeholders a simple, compelling focus is important in enabling a collaborative group to form and "gel." For example, in the Soya bean case, preventing shattering provided a clear issue for approaching different stakeholders (farmer organisations, breeders and extension agents) and initiating discussions with MoFA's Food Crops Development Project. Once the group had formed, it was possible to develop more complicated and diverse foci. In the case of ITT developing fingerlings with faster growth, provided a clear issue for CSIR-WRI for approaching the different stakeholders and FAO for funding. In the case

of FTT, reducing the cost of fish feed, provided a clear issue for approaching and initiating discussions with different stakeholders (food scientists, fish experts, private sector processing companies) and approaching MEST's NARP for funding. In the case of CSFD, reducing the time and costs involved in developing different feeds for broilers, provided a clear issue for approaching and initiating discussions with different stakeholders (poultry scientists, farmer groups, extension agents) and approaching MEST's NARP for funding. All the innovation processes recognised the inclusion of relevant Ministries in fund raising to support initial and subsequent activities of innovation process. The role of other stakeholders in shared learning was not overlooked. The examples from innovation platforms applied by IWMI, COS-SIS, FARA and IITA also support shared learning at different levels. To sustain the interest of policy makers in shared learning, motivation in the form of regular and timely information flows, capacity-building to strengthen ability to provide technical advice and providing logistics to contribute to monitoring and evaluation of outcomes at all stages become important.

Emerging findings/theories

Agricultural innovations are complex socio-ecological systems, with many different actors and numerous interconnected subsystems (Rooyen et al. 2017). Agricultural innovation platforms should create an environment in which specific scheme actors can engage, experiment, learn and build adaptive capacity to increase market-related offtake and move actors out of poverty. In initially engaging stakeholders a simple, compelling focus is important in enabling a collaborative group to form and "gel." The initial collaborative group should include policy makers, whose major role should be to coordinate activities that will ensure consistent success at the initial, intermediate and end-term level. Once the group has formed, it is possible to develop more complicated and diverse foci. The most severe obstacles to sustaining policy maker involvement are linked to institutional and governance concerns - institution should remain innovative and adaptive over time and there should be fair distribution of benefits and incentives among stakeholders during engagement ((Sayer, 2013; Gunderson and Holling 2002, Berkes et al. 2003 & Chapin et al. 2009).

Conclusion, Decision and Policy Implications

Agricultural policy makers hold influential positions and are able to exercise a high degree of control or influence in the innovation system. They control the resources (human, financial, physical, natural and social) needed to get the system to function. They regulate by promoting or slowing down the growth of processes designed to improve the lives of ordinary people. They promote growth when they coordinate institutions, release of funds timely, provide technical advice, and engage in innovation diffusion, commercialisation as well as monitoring and evaluation. Any actions short of these attributes slow down growth and development. It means that their involvement at all stages of the agricultural innovation process is not only necessary but should be the sufficient condition.

The study sought to identify and document success and failure cases of engagement of policy-makers in agricultural innovation processes in Ghana and draw lessons about key success and

failure factors of the engagement. Four innovations developed in the last two decades were used as case studies. Two of the innovations including Improve Soya bean Variety and Improve Tilapia Technology were considered as success cases; they were well known on the market at the time of study. Two others, Formulated Feed for Tilapia in Ponds and combined Starter and Finisher Diet for Broilers were considered as unsuccessful cases; they were not known on the market. All the four were initiatives of research institutes of the Council for Scientific and Industrial Research or departments in Universities, in collaboration with international research institutes and financiers.

The key factors of success of the ISV and ITT innovations are linked to effective promotion among end-users (marketing). After the laboratory and field experimentation stages all stakeholders, especially extension agents at the local level, support private sector to bring innovation to the attention of farmers. When Farm Radio (Civil Society) was invited by the Regional Directorate of MoFA to support activities in the ISV innovation process it contributed to advertising and personal selling through social sensitisation campaigns. Farmers generate income from sale and consumer acceptability has sustained the product on the market. The competition of the two products with imported alternatives is low, contributing to their continued success.

The key failure factor of FFT and CSFD is linked to lack of effective commercialisation. The new feed for poultry and fish is not on the market. The marketing of the FFT is not aggressive; there was not enough funding for extension agents to support private sector to engage in market promotion among farmers. Other commercial brands of fish feed such as Ranaan have become household names.

The main factors that bring policy makers to engage in the four agricultural innovation processes are the expected enhancement of agricultural actors and consumers' livelihoods and growth in gross domestic product. The commercialisation stage of the agricultural innovation process should not be assigned totally to private sector alone. The core policy-making institutions (Ministry of Food and Agriculture, Ministry of Science Technology and Innovation and now Ministry of Local Government and Rural Development) need to budget for engagement at each stage, particularly the commercialisation of agricultural innovations. In this way, policy officers mandated to participate in stakeholder engagement can sustain their interest and support other stakeholders (especially private sector) to promote the innovations through advertising and personal selling techniques.

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