

Key Factors of Success for Decentralized Public Agricultural Extension: An Expanded View from a Ghanaian Case Study

By

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ABSTRACT

The research was based on a single-case study of a district agricultural extension organization that operates under a decentralization system that was judged by the Ministry of Food and Agriculture in Ghana as successful. The results of the study emphasized the importance of the effects of both, external and organizational, factors on the performance of the case organization. The external factors included: (1) the political will to decentralize, (2) the level of decentralization of other government departments, (3) the provision of a clear legal framework for decentralization, and (4) the existence of established institutions that are willing to support the decentralization process. New external factors that were identified in this study were: (1) the drivers of decentralization, (2) stakeholders' willingness and commitment to support the decentralization process, and (3) the community characteristics, in terms of land tenure arrangements and gender roles. The results confirmed the importance of the organizational factors prescribed in the literature: (1) stakeholder participation, (2) managerial and technical capacity, (3) operational funding, and (4) accountability. However, the study also identified five other interrelated organizational factors that influenced the success of the case organization. These included the needs to: (1) have extension agents with right attitudes to decentralization, (2) develop a needs-based extension programme, (3) expand the extension service focus and roles, (4) foster a cross-sector pluralistic extension approach, and (5) use needs-based groups for service delivery.

INTRODUCTION

The strength of the Ghanaian economy is based on agriculture, which contributes some 45% of Ghana's gross domestic product (GDP) and employs about 70% of its labour force. Agriculture and rural development in Ghana, thus, have been supported by extension services through the public sector under the Ministry of Food and Agriculture. From the 1960's, there had been a progression of extension reforms in Ghana. The country shifted its focus from the promotion of export crops – a policy in the 1960's, to food crop production and adopted a Ministry-based *general extension approach* in 1978. The aim of this shift in focus was to modernize traditional farming practices by transferring improved agricultural technologies to develop rural farm life in general (Donkor, 1989; Ntifo-Siaw & Agunga, 1994). At the beginning of the 1990's, the general extension approach in Ghana was criticized as being deficient, ineffective, top-down, and less targeted to poorer farmers and women (Hailu, 1990; Amezah & Hesse, 2002). To improve the extension system, Ghana adopted a new nationwide agricultural extension approach, called the Unified Extension System (UES), in 1992. The approach, which is based on the World Bank 'training and visit' (T&V) model (Benor et al., 1984), emphasized frequent and regular (e.g. bi-weekly, monthly) staff training and extension visits to farmers. Although the T&V extension approach in Ghana was indicated to have yielded some gains in farmer empowerment and their standard of living between 1992 and 1996, it was criticized as being rigid and non-responsive to the needs of farmers nationally (MoFA, 2001).

To improve upon the T&V in Ghana, decentralization reforms were introduced in 1997. This reform emphasized the grassroots participation of local people, extension pluralism, stakeholder collaboration, and poverty reduction. Recent literature (MoFA, 2002; MoFA, 2003; Ackah-Nyamike, 2005) however, has suggested that the Ghanaian extension service is struggling to implement the decentralization policy. Interestingly, contemporary studies have focused on national policy strategies, with little empirical work on the factors that can contribute to the successful decentralization of extension at the local level. This research contributes empirically to this area. The aim of the study, therefore, was to understand what factors contribute to the successful operation of a decentralized extension organization at the district level and how such factors influence that organization's success. In this paper, the key factors that can influence the success of a decentralized public agricultural extension system have been highlighted.

RESEARCH METHODOLOGY

To understand what factors determine the success of a district level extension organization, an embedded single-case study method was adopted. This was considered appropriate for an in-depth study of complex organizational processes. The units of analysis covered the broad area of the organization's operation in terms of participation, accountability, institutional capacity building and resource mobilization based upon the existing literature. To select a case for this study, the determining criteria were that it was seen as successful in terms of (1) increased stakeholder participation and enhanced contribution to farmer household livelihood security; having staff that could articulate why the organization was successful; (2) having the majority of the staff - particularly senior staff - who had worked for the organization from the date when the organization was decentralized; and (3) having good archival records of its extension activities. Multiple sources of data collection were used – interviews (primary source), documents, and observations. Participants for the study were selected from a broad area – within the case organization and outside - using a stratified sampling technique. The aim in the stratification process was to obtain information from both key informants at different levels of the organization and different stakeholders they work with.

A qualitative data analysis approach was used to analyse the data. This involved coding data, searching for relationships, cross-checking for major themes, and integrating the data into a common coherent explanatory model. The computer programme NVivo was used to undertake the qualitative data analysis. To ensure a high quality case study, several tactics including data triangulation, establishment of chain of evidence, and explanation-building analytic strategy were adopted to reduce threats to reliability and validity throughout the study.

The Context of the Case Study

The organizational and environmental context of the case organization exhibits a wide range of factors that may have consequences for the way in which the organization operates. It is part of a national extension organization in a developing country, Ghana, and is a district extension organization which has been decentralized for nine years. The case organization is administratively decentralized, but this can be described as deconcentration because it has only operational responsibilities to design and implement extension programmes together with the local people, under supervision by the MoFA at the regional and national levels.

The organization has highly qualified, mature (mostly 30-45 years old), and experienced management and field staff. However, the organization has limited physical infrastructure, and funding from government is inadequate and uncertain. Also, according to policy, the organization is expected to provide extension services to address the needs of farmers - especially the poor - to increase agricultural raw material production and to ensure food security and a sustainable natural environment. The aim is to increase food security, reduce poverty, and improve the livelihoods of farmers in the district. Thus, the organization must service a large number of farmers over a large geographical area where the road network is poor. The agroecological environment is diverse; therefore, there is a diversity of farming systems. Farmers in the district are generally poor, illiterate, and farm small plots (≤ 4.0 ha). They practice mainly subsistence agriculture that is crop-based and mixed-cropping systems.

Immigrant farmers are moving into the area because of relatively good agroecological conditions, and this has resulted in a dispersed settlement pattern and cultural diversity in the area. The extended family structure, combined with the cultural diversity and land tenure systems, presents a complex sociocultural system for the extension organization to serve. The land tenure system limits large-scale agricultural production due to high tenancy costs. Moreover, the district has health problems including HIV/AIDS, child malnutrition, and water-borne diseases. There is also limited infrastructure in terms of road network and transportation, telecommunication, electricity, potable water, credit facilities, input suppliers, markets, and processing facilities. The district has farmer organizations, NGO's, some support organizations (e.g. banks, agro-industries, input shops) and several decentralized departments under the District Assembly (e.g. health, education). These features described above presents the context within which the key factors that can influence the success of a decentralized public agricultural extension system have been identified and discussed.

Factors key to Improving Decentralized Agricultural Extension System

To achieve the aim of this paper, an attempt was made to develop a theoretical framework to provide an understanding of how a decentralized government agricultural extension organizations with a livelihood security focus in developing countries can operate successfully. Over the last four decades, a number of approaches and strategies for agricultural extension reform have been implemented, of which the latest is the sustainable livelihood approach (SLA). The characteristics of the sustainable livelihood approach suggest that, there is no single theory or blueprint for extension reform in developing countries. However, it appears that grassroots participation, pluralistic partnerships, and a focus on rural poverty alleviation and farm household livelihood security are

potentially the way forward. It is believed that these principles are attainable if developing nations properly decentralize their agricultural extension organizations.

Decentralization is a multi-dimensional process of transferring power from central government to institutions or participatory systems at lower levels to ensure that public services meet the preferences and demands of local people. The aim of decentralization is to increase community participation and ownership of programmes, ensure more efficient and equitable allocation of government resources, promote accountability to stakeholders, build local capacity, and respond more effectively to local needs to promote rural development. However, the decentralization reforms in developing countries over the past decade have encountered problems. Given the purpose of this paper, a review of the literature was done to develop a framework (Figure 1) that provides some understanding how a decentralized extension organization in a developing country can achieve success.

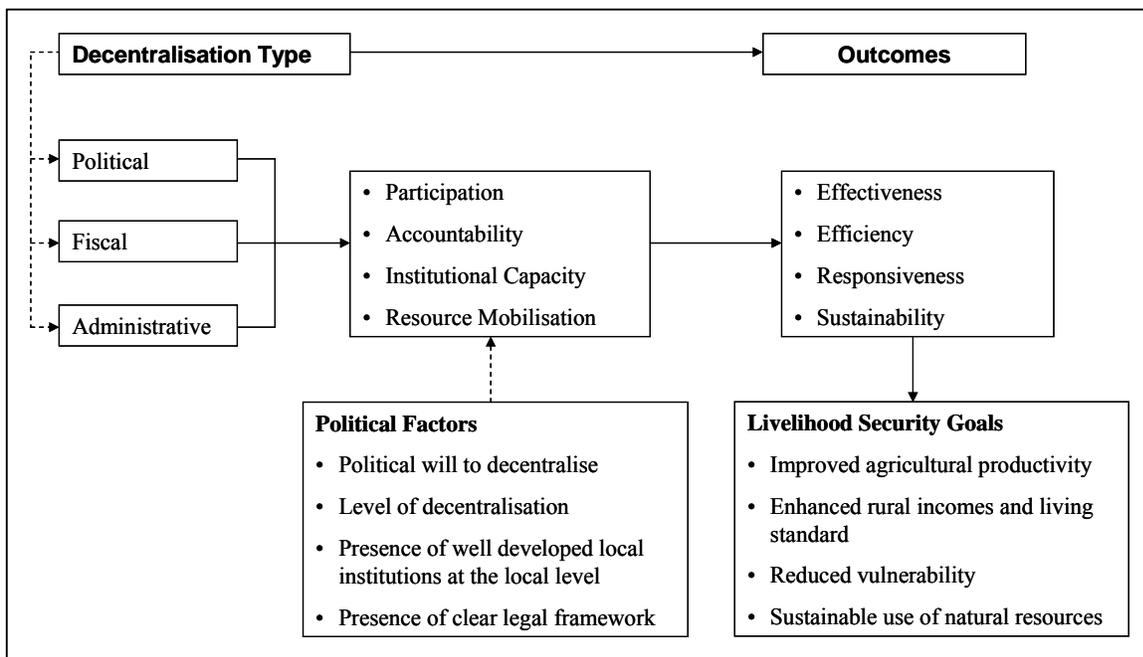


Figure 1: Conceptual Model of Decentralized Extension Systems with Livelihood Security Focus Outcomes and Goals

The literature (Parker, 1995; Swanson & Samy, 2004; Lai & Cistulli, 2005) suggests that, irrespective of the type of decentralization, the effectiveness, responsiveness, and sustainability of a decentralized extension system can be influenced by a number of factors that can be classified into two types: political and organizational (see Figure 1). The decentralization of extension must be

accompanied by a real political will by the central administration to transfer legislative powers, and clear definition of authority and responsibility to the local level administration to avoid interference and overlap of roles. These policy factors must then be supported by local institutions. The review shows that in order for decentralization extension systems to be effective and sustainable, the right combination of organizational factors must be present. There must be actual empowerment of farmers and other stakeholders through participation. In addition, there must be an effective mechanism for accountability to stakeholders and sponsors, by improving transparency and stakeholder participation in extension programme activities. Finally, decentralized extension systems must also have adequate capacities in terms of skills and knowledge, and sufficient resources in terms of finance, material resources and staff numbers to ensure delivery of the appropriate services and accomplishment of the tasks at the local level. The key assumption had been that through good participation, accountability, institutional capacity building, and resource mobilization, extension organizations in developing countries' context will be more effective, efficient, responsive, and sustainable in meeting livelihood goals of farmers – which include production increases, enhanced income and living standards, reduced vulnerability, and sustainable use of natural resources.

An Expanded View of Factors Key to Improving Decentralized Public Extension

Given the scope of the topic, this article only highlights the high level factors that are critical for improving decentralized public extension through this case study. Subsequent articles will provide in-depth understanding of the individual factors that are identified in the study. The study found that it was useful to make a clear distinction between external and organizational (internal) factors when determining what factors influence the success of a decentralized extension organization at the local level (Figure 2). In the study, the external factors were defined as those factors outside the control of the organization which can affect the operation of the organization. In contrast, the organizational factors are those factors which are internal to the extension organization, and over which the organization has a degree of control.

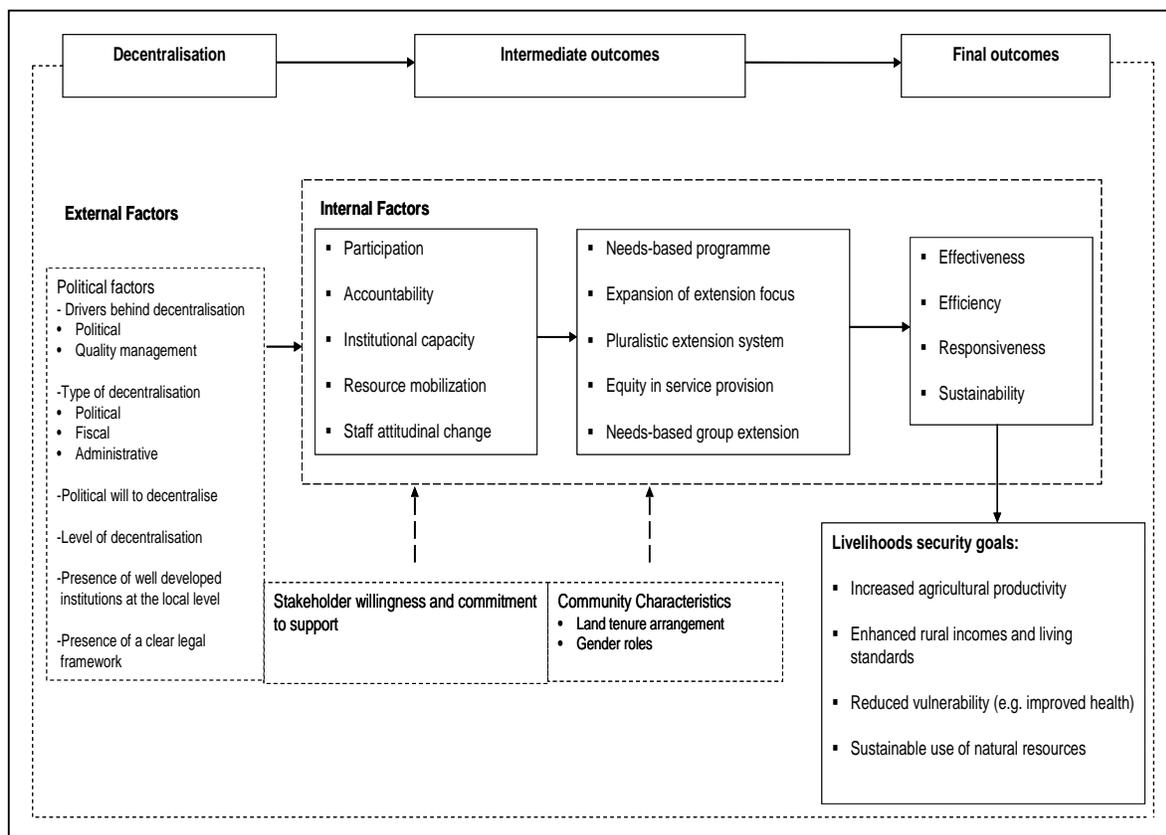


Figure 2: Expanded Conceptual Model of Decentralized Extension Systems with Livelihood Security Focus Outcomes and Goals

External Factors

In terms of the external factors, the study highlighted the importance of the drivers of decentralization in a country. Ghana’s extension decentralization is interesting because it seems to have a number of intersecting drivers to its extension decentralization. The scenario surrounding this case suggested that Ghana seemed to be following a mix of *political* and *quality management* ideologies. The government wanted to achieve three main outcomes through decentralization in relation to agricultural extension: 1) liberalization and de-regulation of markets, 2) the withdrawal of state direct support for farmers through the promotion pluralistic extension system, and 3) the development of a needs-based extension system. These triple drivers of decentralization have required the case organization to try to meet both local level and government needs – a somewhat complicated issue of effectiveness (doing what is desirable to the people) and efficiency (doing what is feasible to government) for district level extension organization.

The research results support the views of Parker (1995), Smith (2001), Swanson and Samy (2004), and Lai and Cistulli (2005) that external factors - such as the type of decentralization, political will to decentralize, the decentralization of other government departments, the presence of a clear legal framework of responsibilities, roles and coordination mechanisms, and the existence of established institutions that are willing to support the process - have an important influence on the performance of a district level extension organization.

The type of decentralization environment the case was located can be described as administrative deconcentration. Under this system, the organization at the districts has deliberative, legislative, and executive powers to plan and implement their own development programmes within general government policy guidelines. Furthermore, there is lack of fiscal decentralization and as such, has no legal mandate to generate its own revenues, transfer financial resources, or recruit its own staff. Rather, financial and human resources are supplied by the central government through the Ministry of Food and Agriculture. The study found that this type and level of decentralization restricts funding of extension activities because funds released from government are sometimes delayed or fall short of what the case organization has budgeted for. In many instances the organization was unable to deliver on some of the activities in its annual plan and have to re-prioritise. The District Director of Agriculture (DDA) stated:

... We are in the middle of the year and when I look at the funds available, I can see that we cannot achieve our target 100 per cent. I am always working and trying to see if we can achieve between 60 to 65 per cent. In fact, we could have done better if our budget is met by MoFA, but always the budget is 'cut' and always the executives tell us to prioritise again (DDA, personal communication May 21, 2004 para 30).

The case organization is part of a local government (District Assembly) administration in the district, and receives political support through the district's coordinating council. The literature (World Bank, 2000; Feder et al., 2001) suggests that local extension organizations can be more effective if they are strongly supported by the local government. The organization works in an environment where other government organizations are decentralized. This makes it easier for it to collaborate with other government organizations at the district level.

A key characteristic in the policy environment is that, the government through the MoFA, has provided a legal framework that clearly defines the roles, tasks, and coordination mechanisms for the

case organization in relation to the MoFA and the District Assembly under this decentralized system (MoFA, 2004). This supports the view in the literature (Smith, 1997; World Bank, 2000; Nie et al., 2002) that a clear legal framework is critical for improving extension decentralization reforms, because interference and overlapping of roles in the extension system can be avoided and coordination and efficiency can be improved.

The study also revealed that stakeholders' (farmers and organizations) willingness and commitment to support the decentralization process, and the characteristics of the local community particularly land tenure arrangements and gender roles, have an important influence on how a decentralized extension organization operates at the local level. Extension delivery is restricted because land tenancy costs are high, especially for migrant farmers who want to rent land and invest in large-scale production and land improvement. Farming is, therefore, generally on a small and subsistence scale (1-4 ha) and undertaken by resource-poor farmers who have limited capacity and drive for extension information. The extension organization has to invest time and resources to support the formation producer groups to ensure efficiency in service delivery. Furthermore, it gives special attention to all-women groups to ensure that women participate and benefit from extension – an attempt to improve equity in service delivery. This is vital because the women are mainly those involved in food crop production and agroprocessing, determined by gender roles in the division of labour and production systems in the case district.

Organizational Factors

As indicated earlier (see Figure 1), the literature has identified four main interrelated internal (organizational) factors that are believed to have an important influence on the performance of a local level decentralized organization. These include stakeholder participation, accountability, institutional capacity building (managerial and technical capacity), and resource mobilization or operational funding. The results from this study support this claim. However, the study also revealed five other interrelated factors that had not been reported in the literature. Distinctive amongst these new factors is extension staffs' attitudinal change necessary for the acquisition of new knowledge and skills and working with multi-stakeholders. To focus on livelihood security of farm households in the district, a major change in attitude or paradigm shift from agricultural productivity focus to livelihood security focus is essential. The case organization has taken a broader approach to extension and as such, the field staff need a broader base of technical knowledge. Similarly, they are playing multiple roles, working in collaboration with other organization, and trying to improve farmer participation, which also means giving consideration to indigenous farmer knowledge, the

extension staff need different attitudes and skills from those they required under the previous extension approach.

The other organizational factors included the need to develop a needs-based extension programme, expand the extension service focus and roles, foster a cross-sector pluralistic extension approach, and use needs-based groups for service delivery. These high level factors can also be considered as interrelated outcomes that the organization needs to achieve to ensure that it can help improve the contribution agriculture makes to the livelihood security of farm households in the district.

In accordance with the literature (World Bank, 2000; Richardson, 2003; Garforth, 2004), the case organization has adopted a needs-based programme development approach to enhance the contribution which agriculture makes to the livelihood security of farm households. Through this research, a more specific and useful definition of *farmer needs* has been developed for use by extension organizations that adopt a livelihood security focus. From the case study, the term *farmer needs* is defined as *on-farm and non-farm needs that have impact on the contribution agriculture makes to the livelihood security of farm households in the district*. This view of farmer needs is more useful than previous views because it sets a more precise boundary around what needs an agricultural extension organization should target.

The study revealed that the case organization uses several mechanisms that operate at different levels (district and sub-district) to develop a needs-based extension programme. Farmer needs are identified informally through contact between field staff and farmers. At a more formal level, farmer and stakeholder organization representatives are invited to fora on a specific issue that affects farmers. One of the outcomes from these fora is the identification of farmer needs. At the most formal level, farmer and stakeholder organization representatives are invited to be involved in the development and evaluation of the district extension programme. During the programme planning exercise, the farmers' needs for the district are identified. The case organization also uses a quarterly evaluation process to identify emerging farmers' needs.

As suggested in the literature, stakeholder (farmers and other organizations) participation is one of the critical factors influencing the performance of the case organization. Three benefits were identified to flow from stakeholder participation. First, it is critical for identifying farmer needs. Second, it is important for reducing duplication in extension effort and promoting collaboration between extension providers. Finally, it allows the case organization to mobilize additional resources from the various stakeholders involved in the process.

Although fora are one of the mechanisms by which stakeholders participate in the extension system, the primary mechanisms are through the case organization's programme planning and evaluation processes. The case organization adapted these processes to ensure much greater stakeholder participation. Although the ultimate aim of decentralization is the development of a demand-driven extension service, this change will take time and has yet to happen in Ghana. To foster greater participation of farmers, the case organization has modified its programme planning, monitoring and evaluation processes through consultation and collaboration with farmers. It undertakes a pre-planning meeting with farmers where extension field staff consult farmers to obtain a wide cross-section of views at the village level. All field staff are then invited to the annual planning workshop so that the views from each sub-district are represented.

Once the field staff have consulted at the sub-district level, the case organization conducts an annual planning workshop where it invites farmer representatives who are chosen on the basis of enterprise type and location to provide a broad cross-section of views at the district level. The mechanisms for improving farmer participation during the planning process include allowing farmer groups to select their own representatives for the consultative planning workshop, dividing the planning workshop into two shorter workshops so that farmers are not away from their farms for too long, and the use of the local language during the planning workshop. However, the level of farmer participation during the planning workshop can be classified only as *consultation* because the case organization is the primary decision maker in this process.

The case organization undertakes its action planning process at the sub-district level where its field staff negotiate with farmers to tailor their action plans to specific local needs. Participation at this level moves from consultation to collaboration because the farmers and the case organization's staff jointly make decisions. Farmers also participate in the regular monitoring and evaluation (quarterly and annual) of the extension programme, however, this participation is only at the consultative level. The case organization is helping to develop needs-based farmer groups into cooperative farmer-based organizations (FBOs) so that they will eventually have the capability to initiate their own farming projects and demand and pay for the extension services they require. The results from the study, however, suggest that attaining self-mobilization and demand-driven extension will require a considerable length of time - particularly given the resource limitation and the nature of the changes required to move from top-down to demand-driven extension.

The mechanisms by which the case organization fosters greater participation of other stakeholder organizations also include its programme planning and evaluation processes, and other fora. The case organization has built a database that records information about the key stakeholder organizations in the district. It uses this data-base to identify which individuals it should invite to its various fora.

Accountability was identified in the literature as an important factor that influences the performance of a decentralized extension system. It is interesting that although the case organization does not explicitly seek to ensure accountability to stakeholders, it does have a monitoring and evaluation process that contributes to accountability. In addition, stakeholders are involved in quarterly and annual evaluation of its extension programme. These same stakeholders are involved in the programme planning process and receive copies of the annual extension programme, ensuring further transparency in the process.

The results of the study confirm the views expressed in the literature that for an extension organization to provide a livelihood security focused extension service, it must adopt multiple roles and a cross-sector pluralistic approach to extension delivery. The study identified that the case organization uses a role selection process during its programme planning to determine which role it will adopt for a specific farmer need. The criteria for the role selection were identified to include whether or not the need: (1) is within the government extension policy, (2) is a public need, (3) is being met adequately by other extension providers, (4) can be met by the case organization's working with other extension providers, (5) can be met with the current capability of the case organization, (6) is important enough to require the case organization to develop the capability in the long-run to meet it, and (7) is important enough to require the case organization to purchase expertise from other extension service providers to address. Based on these criteria, the study identified a broader typology of the roles an extension organization can adopt to ensure it meets the needs of farmers in this more holistic approach. Its role is not only to transfer agricultural technologies, but in this broader approach it may act as a farmer advocate, a linkage broker between farmers and support organizations, a contractor of extension services, a collaborator with other extension providers, and a provider of for-fee inputs or services. These roles were directed to the needs-based groups as means of ensuring equity in service provision – where equity is driven by needs of farmer groups that work with the case organization.

To meet the broader livelihood security needs of farmers, the case organization has to work with organizations from outside the agricultural sector. The organization does not have the capabilities or resources to meet all the needs of farmers, so it has adapted its extension programme planning process to facilitate cross-sector and within-sector coordination and collaboration. The multi-stakeholder approach to planning, where the needs of farmers and the roles and capabilities of the various organizations in the district are discussed, allows the case organization to facilitate coordination and collaboration within the extension system.

Because of resource constraints, the case organization has adopted the use of needs-based groups so that it can have greater impact on the farming community in the district. A needs-based group here represent a collection of people in the farming community who have come together voluntarily because they have a common need or face similar problems relevant to agriculture. The case organization organized and used such groups in its extension delivery because they were more stable than geographic discussion groups and this stability is improved through training in management techniques and cooperative practices.

The results of the study confirm the significance of the role of effective resource management in ensuring the success of a decentralized extension organization with a livelihood security focus. They also highlight the importance of the managerial and technical capacities of staff in ensuring the successful operation of a decentralized extension organization. To improve staff capacity, the study highlighted the critical role of training, an informal learning culture and staff motivation. In relation to staff training, the importance of needs-based (competency-based) training and the role of farmers' indigenous knowledge in training of field staff were highlighted. Because of the multiple roles played by the extension organization, the need to provide a wide range of competencies to narrow the gap between the knowledge and extension skills of the staff vis-à-vis the roles they are expected to play in the district was emphasized in this study. These competencies include extension and facilitation skills, technical knowledge and skills in agricultural production, other off/non-farm issues (e.g. health and marketing) that have direct impact on agriculture and livelihood security, and public administration and management skills for the senior management staff.

The study showed the case organization to have some characteristics of a *learning organization*, something not previously reported in the literature on public extension organizations in developing countries. These characteristics include fostering an open environment, in which the staff feels comfortable sharing information, the provision of in-house fora, whereby the staff can meet, interact,

share, and reflect upon their knowledge, and other fora where staff can meet with staff from other organizations to share ideas. The study, however, revealed that the case organization did not set out to explicitly become a learning organization; rather, it exhibited these characteristics as a result of seeking ways to ensure continuous improvement in its operations.

The study showed that the case organization did not have the power to control staff remuneration, recruitment, and promotion - a problem faced by many district extension organizations in developing countries. As such, the organization had to use a range of other mechanisms to ensure that it had motivated and committed staff. It uses a more inclusive approach to management that values staff input in management decision making, provides rewards for high staff performance, and fosters good staff relationships based on mutual trust and respect within the organization.

The results of the study confirmed the importance of resource mobilization in ensuring the success of a decentralized extension organization. The study, however, has identified useful mechanisms for ensuring effective resource management which takes into consideration the efficient use of existing resources and resource mobilization. The study revealed that an extension organization with a livelihood security focus in a decentralized context can mobilize additional resources for extension provision through collaboration with stakeholder organizations, and lobbying for projects and development grants from government and donor organizations. To ensure the efficient use of existing resources, the study highlighted the importance of avoiding duplication of extension effort, the use of a group-based approach (enterprise-based farmer groups and farmer based organizations), and the use of a systematic control process.

IMPLICATIONS

Extension decentralization reform in Ghana is relatively new; however, there are many theoretical and practical lessons that have been learnt from the study of a district level agricultural extension organization identified as successful. The study showed that to succeed, it is critical to have other government organizations (e.g. health, forestry, and education) decentralized to facilitate coordination, collaboration, and support for extension provision at the local level. This implies having (1) a policy that supports the decentralization of other government departments, (2) a clear legal framework that specifies the roles and responsibilities of these departments, and (3) proper mechanisms for internal and external coordination, collaboration, and local support. Finally, there is the need for long-term investment and support from central and local government for extension

decentralization, given that the reform process will require a considerable amount of resources and time (≥ 15 years) for a significant shift from a top-down agricultural production-focused extension service to one that is demand-driven with a livelihood security-focus.

The study has provided a general model of the key factors that are crucial to the successful implementation of a decentralized agricultural extension policy. This provides a framework from which other local level extension organizations and their staff can learn, and adapted to their particular contexts to improve their performance. The findings suggest that in order for extension organizations that are decentralized to adopt a livelihood security focus and to succeed in improving the contribution which agriculture makes to the livelihood security of farm households, they should adopt a needs-based approach to programme development. To do this effectively they would need to adopt a multi-stakeholder approach that would allow them to draw information from a wide cross-section of farmers, their field staff, and other stakeholder organizations from within their district to define farmer needs and their extension focus. The results of this study also suggest that extension organizations that adopt a livelihood security focus in a decentralized context must take on multiple roles and collaborate with other extension providers, both within and across sectors, to meet the broader needs of farm households.

The results of the study suggest that the traditional training in technical areas and extension methods is not sufficient in this new environment. With the shift from a top-down management approach, managerial staff need much better training in management and administration. With a cross-sector pluralistic system, they also need training about the mechanisms that will facilitate coordination, collaboration, and lobbying within the extension system. Also, given the broader focus and roles the extension organization must adopt, the technical staff need a broader technical knowledge base and right attitudes. This will require extension organizations to (1) train staff so they have this broader knowledge base, (2) train staff for attitudinal change so they can search for knowledge that they do not have - including the indigenous knowledge of farmers, and/or (3) train staff so they can seek out others to provide the necessary knowledge.

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