Changes in the Agricultural Sector and Extension Workers Roles: Implications to Training Sector in Tanzania

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Abstract

In Tanzania and elsewhere, extension workers roles have been focusing mainly on transfer of technologies from research centers to farmers and train them on the same for improving agricultural production. However, agricultural extension system has been criticized as not effective in improving the agricultural sector. This is mainly caused by changes that are taking place in and outside the agricultural sector like technological, climate, and others that affect performance of extension workers roles. The objective of this paper is to present these changes and their implications to the training sector. The information presented in this paper was obtained from author's long experience in the topic, literature review and synthesis of the collected information from various sources like Journals, books and reports. The collected information show that there are various changes that are taking place in the agricultural sector like technological, social, climatic and political that require extension workers to change their roles in line with these changes. These include shifting from technology transfer to facilitation, beyond training to learning, lobbying and advocacy, networking and partnering, coaching, negotiation, problem-solving, capacity to reflect and considering value chain aspects. These changes should be well addressed through long and short term training programmes involving new curriculum development and review and organizing short courses. It is recommended that training organs should conduct training needs assessment through participatory approaches to identify relevant knowledge, skills, attitudes and new ways of extension service delivery needed to build capacity of extension workers for them to perform their roles effectively for improving performance of the agricultural sector in general.

Keywords: Changes, agriculture, extension workers' roles, training

Introduction

Agricultural extension plays pivotal roles in enhancing performance of the agricultural sector in Tanzania and elsewhere in the World (URT, 2015). These include improving household food security, farm incomes and alleviating rural poverty (URT, 2013). The role of agricultural extension in national agricultural development is pertinent. It has been established that no nation will have real growth in the agricultural sector without effective agricultural extension services (Anaeto *et al.* 2012). In realization of this, various efforts have been made to improve the performance of the Agricultural extension system in Tanzania. These include recruitment of extension workers to fill various posts from grassroots to national levels, development and implementation of programmes and projects that support extension system, development of approaches and methods for agricultural extension service delivery, capacity building of extension workers, just to mention few.

As far as capacity building of extension workers is concerned, among others, the government launched training institutions at various levels aimed at producing different cadres of extension staff who are expected to serve at various levels from village to national level. These include Ministry of Agriculture Training Institutes and the Livestock training Institutes (LITIs), currently known as Livestock

training Agencies (LITA). Furthermore the government established the Sokoine University of Agriculture (SUA), which is the oldest agricultural university in the country. The MATIs and LITAs are mandated to produce frontline extension staff with Certificate and Diploma qualification in the agricultural and related fields expected to serve farmers at village and Ward levels. On the other hand, SUA is mandated to train the diploma-holders from the MATIs and LITAs to B.Sc., M.Sc. and PhD levels who are expected to serve as extension officers, administrators and policy makers at ward, district, regional and national levels. Some of them are employed by Non-governmental organizations (NGOs) as well as tutors of MATIs and LITAs, etc.

Traditionally, the extension workers performing at various levels were expected to play the role of training and technology transfer from research centers to farmers for increasing agricultural production and productivity. For those involved in agricultural extension administration and management roles including policy making their activities focused also in improving agricultural production. This is attributed by the fact that extension workers were trained by using production oriented curricula focusing on the same while they were pursuing their studies at different levels in the training institutions they attended. This is in line with Davis *et al.* (2010) who contends that the traditional view of agricultural extension in Africa was much focused on increasing production, improving yields, training farmers, and transferring technology.

The situation explained in the preceding paragraph has exerted pressure to the extension system and caused it continue being criticized as focusing mainly on production, neglecting other actors in the innovation systems and not being relevant. Others include not being adequately effective not being efficient, not pursuing programs that foster equity, having insufficient impact due to failing to bring substantial changes in the performance of the agricultural sector (Mkuki and Msuya, 2020; Davis *et al.,* 2010; Christoplos, 2010; Spielman and Birner, 2008; Klerkx *et al.,* 2010, World Bank, 2006; Sulaiman, 2015). Among other factors, this has been accelerated by the failure of extension workers to perform their roles according to the changes that are taking place in the agricultural sector. The purpose of this paper therefore is to explore the current changes that are taking place in the agricultural sector that necessitate for changing roles of extension workers, which imply the need for long and/ or short term training of extension workers in Tanzania.

Methodology

This paper consolidated information from author's knowledge and experience in the subject area, reviewed and analyzed various literatures and documents, which are books, journal papers, reports, thesis, dissertations, just to mention few. These were obtained from the Sokoine National Agricultural Library (SNAL) located at Sokoine University of Agriculture (SUA) Tanzania, the Department of Agricultural Extension and Community Development Library located at SUA, Personal library, internet search, Ministry of Agriculture and other development agencies. To facilitate the literature review process, the literature search cycle indicated in Fig. 1 was followed as proposed in https://libguides.csu.edu.au/review/Search_Strategies. This included identification of the main concepts to search related to the subject under investigation. This involved defining the search question highlighting what to be searched. This was followed by selection of library, internet and other resources to search from. Thereafter the resources were searched by using various techniques including truncation and proximity searching. Thereafter searched materials were reviewed, refined and the process continued until the information required for this paper was fully exhausted.

The reviewed materials were organized into various themes and subthemes namely the general importance of agricultural extension in improving performance of the agricultural sector, changes that are taking place in the agricultural sector and their influence in the performance of extension system, pressure to agricultural extension due to these changes, need for changing roles of extension workers due to the changes that are taking place. From the obtained information this paper provides

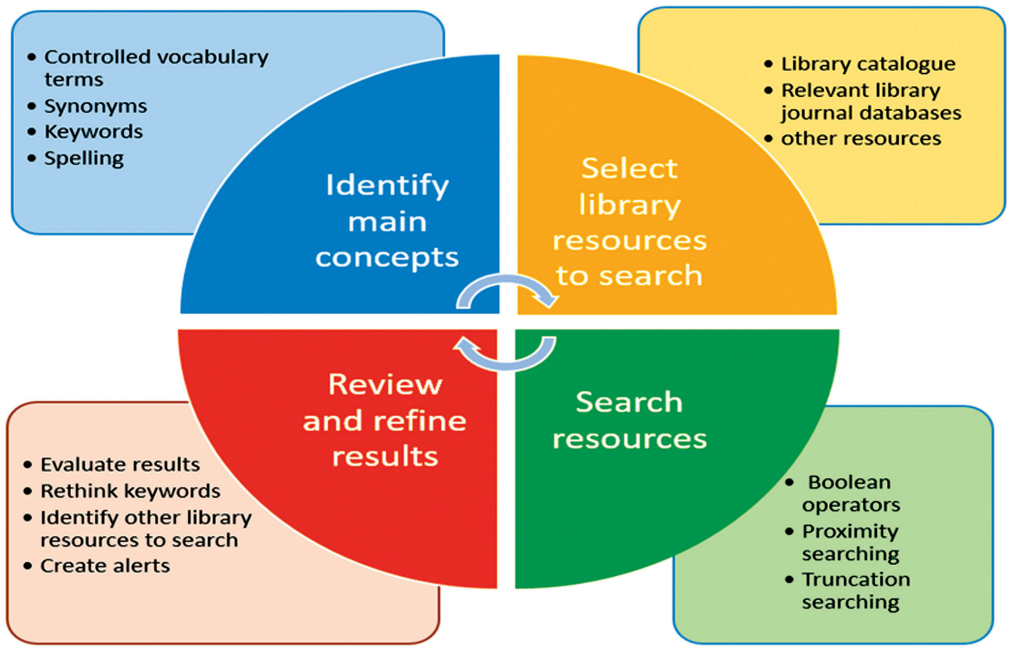

Figure 1: Literature search cycle

Source: https://libguides.csu.edu.au/review/Search_Strategies

implication of these changes to training and provides recommendations on what should be done to improve the performance of extension workers for the wellbeing of the extension system and the agricultural sector in general.

Results and Discussion

The information in this paper is discussed under the following major sections: changes that are taking place in the agricultural sector, changing roles of agricultural extension workers and finally the implications of identified changes to the training sector including institutions.

Changes taking place in the agricultural sector

Currently there are rapid changes that are taking place inside and/or outside of the agricultural sector. These changes affect performance of the agricultural sector and have implications to the agricultural extension service delivery in Tanzania. These include but not limited to changes in technology, climate, policy, emphasis on entrepreneurship and employment, emphasis on agricultural innovation system and value chain aspects, changes in consumer demand due to urbanization, shifting from subsistence to commercial farming, increase in economic growth occurring in most developing countries, including Tanzania, just to mention few (Tumbo and Sanga, 2015; Mwalukasa, 2020; Mkuki and Msuya, 2020; Davis *et al.,* 2010; Christoplos, 2010; Spielman and Birner, 2008; Klerkx *et al.,* 2010, World Bank, 2006; Sulaiman, 2015). The following subsections present the descriptions of some of these changes.

Technological changes

Technological changes or technological development can simply be defined as the overall process of invention, innovation and diffusion of technology or processes. According to Solleiro *et al.,* (2016) this is the systematic use of scientific, technical, economic and commercial knowledge to meet specific business objectives or requirements. Notable changes of technologies in the agricultural sector include the use of new agricultural technologies developed along the agricultural value chain. These include improved agro-mechanization like new irrigation technologies like drip irrigation; use

of greenhouses; improved crop varieties/animal breeds, agro-chemicals like improved chemical fertilizers, modern storage facilities like ware houses, agro-processing, proper presentation of produces to capture market and consumers' demands; food preparation technologies to meet nutrition and health demands, use of information and communication technologies (ICTs), just to mention few.

Since the extension services are provided in a technological changing landscape it is anticipated that any changes that occur in the agricultural sector would affect how these services are provided. For example, traditionally farmers' access to agricultural information is through various approaches and methods that required extension workers to be in direct contact with farmers. This is like when using approaches such as farmer field schools, training and visit, demonstration and meetings. However due to the problem of poor access to agricultural information and rapid changes in the agricultural sector in Tanzania and elsewhere in the world, ICTs have a very great potential and have been increasingly used in enhancing access to agricultural information hence improving the agricultural sector (Mwalukasa, 2020; Angelo, 2015; Nyamba, 2017; Martin and Kahamba, 2017; Nyamba and Mlozi, 2012).

ICTs like Newspapers, books, libraries, radio, television, fixed line telephones, and facsimile machines, have been in common use for several hundred years in the World (Thioune, 2003 as cited by Angelo, 2015). Currently, more advanced ICTs like computers, tablets, cellphones and the internet have been increasingly used to communicate agricultural information. For effective delivery and access to information by farmers and other actors in Tanzainia, use of ICT is inevitable for extension system to remain effective and efficient.

Climate change

Climate change is a global phenomenon which results from increasing concentration of Greenhouse Gases (GHGs) in the atmosphere emitted from burning of fossil fuels, deforestation and forest degradation (IPCC, 2007). The climate change among others has resulted into changes in the rainfall patterns, temperature fluctuations, unpredictable synchromesh and storms, rise of the sea level, which affect the agricultural sector and the environment in general. Agriculture and climate change are inextricably linked. Changes in the climate have had adverse impacts on the performance of agriculture. Although agriculture can contribute to the climate change problem by causing emission of greenhouse gases, yet it is also part of the solution as it offers promising opportunities for mitigating emissions through carbon sequestration, soil and land use management and biomass production (Kahimba *et al.,* 2015).

Literature show that the climate change is real happening and will continue to happen for the foreseeable future (Tumbo and Sanga, 2015). Generally, worldwide no country is free from the consequences of climate change though there may be variation across countries in the levels of the effects of climate change (Schimidt, *et al.,* 2013 as cited by Siyao, 2021). Climate change is one of the major changes that affect the agricultural sector in Tanzania because the majority of the population in the country and somewhere else in the third world countries depends on climate sensitive natural resources and in addition such countries have lower adaptive capacities (IPCC, 2007). In Tanzania the more obvious changes associated with climate change and which have affected the agricultural sector are weather unpredictability; change in rainfall patterns and amount which have led to frequent droughts, floods, erratic and outbreak and emergence of new pests and diseases. Some of the groups that are affected by these changes are the extension workers and the services they provide. For example, erratic weather conditions cause failure of some technologies, which negatively affect crop and livestock production and make famers loose trust in extension workers. This is especially when extension workers use technologies appropriate for a normal weather condition in unstable weather condition due to the lack of knowledge and skills on appropriate technologies to solved the problem in question and or unavailability of modern technologies to solve the problem.

Agricultural innovation system

In many years, research and extension

institutions were projected as the sole source of innovation/knowledge requisite to trigger development in the agricultural sector (Agwu *et al.,* (2008) through a tripartite famous known as research-extension-farmers linkage. Several other relevant macro-economic and meso-level factors such as policy and legislative framework and nature of human capital, physical infrastructure, finance and investment, climate and system for facilitating information and knowledge flows have not been considered important (Rivera, 2005; Wambura *et al.,* 2015). This situation has resulted to extension system receiving criticism for working mainly with researchers and farmers while paying less attention to other actors in the agricultural innovation system (AIS) in improving performance of the agricultural sector (URT, 2010; URT, 2011).

According to Spielman and Birner (2008) and Wambura *et al.,* (2015) the AIS approach is a collaborative arrangement bringing together several organizations working toward technological, managerial, organizational, and institutional change in agriculture. Such a system may include the traditional sources of innovations (indigenous technical knowledge); the modern actors (National Agricultural Research Institutes, international agricultural research institutes, and advanced research institutes); private sectors, including (local, national, and multinationals) agro-industrial firms and entrepreneurs; civil society organizations (NGOs, farmers and consumer organizations, and pressure groups); and those institutions (laws, regulations, beliefs, customs, and norms) that affect the process by which innovations are developed and delivered, as indicated in figure 1.

The emerging reforms and changes in knowledge structure of agriculture explicitly indicate that conventional agricultural research and extension system that have been used alone cannot sufficiently address the challenges of the new trends including in the agricultural sector. Innovation system approach offers a holistic and, multi-disciplinary approach to innovation and processes, incorporating emerging reforms and approaches for agricultural development (Tropical agricultural platform – TAP (2016) in https://tapipedia.org/framework; Sulaiman, (2015); Wambura *et al,.* 2015; Klerkx *et al.,* 2010). Therefore for effective performance of the extension workers and the extension system in general, in brining contributions in the agricultural sector in Tanzania and elsewhere, agricultural extension system should change and work with various actors in the AIS instead of focusing only on the tripartite that have been existing for many years (research-extension-farmers linkages).

Value chain development

For many years, agricultural sector in many developing countries including Tanzania has been bypassing other aspects of the value chain like storage, transportation, processing, marketing and consumption focusing much on improving agricultural production. One of the current changes in the agricultural sector stems on putting more emphasis on value chain development (Fig. 2) to enhance the performance of the agricultural sector.

Value chain and AIS are highly coinciding and complementary (World Bank, 2007). While value chain aims to have a set of interconnected activities connected in the most efficient way, the innovation system is concerned by how new ideas can be implemented or given obstacles be overcome through working together within the value chain. Some of the actors that are within the value chain are not automatically part of an innovation system. Research and development are two good examples of actors that do not produce, deliver or maintain products or services, but when involved in the value chain they can have a profound impact (RIU, 2009).

Use of value chain approach is among the changes in the agricultural sector that influence the performance of the agricultural extension system. As highlighted in the introduction part of this paper, for many years extension system has been focusing mainly in production aspects leaving other aspects of the agricultural value chain. This implies that for extension services delivery to remain relevant and effective should focus on all aspects of the value chain from input supply, production, transportation, storage, processing, marketing to consumption including various nutrition aspects.

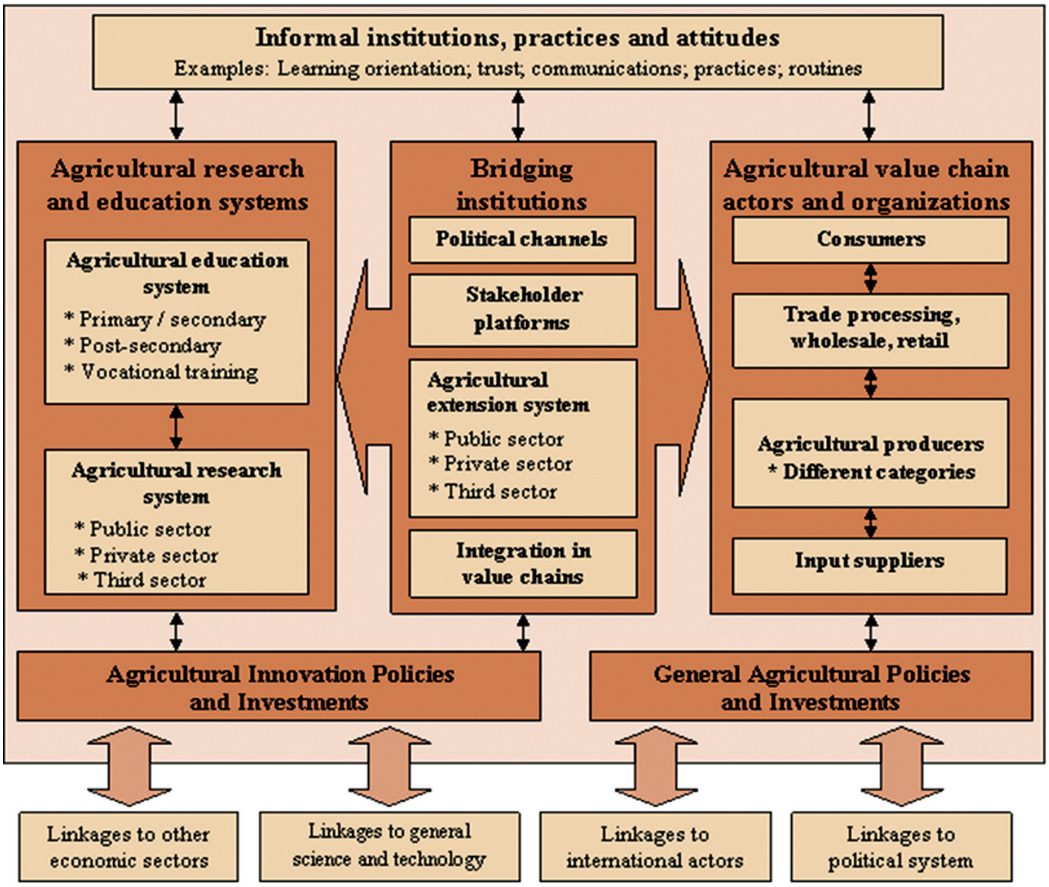

Figure 2: Agricultural Innovation Systems
Source: Spielman and Birner (2008)

Changes in policy

Policies are important in directing the way things should be done. Changes in policy will therefore lead to doing things differently. In this paper Agricultural Policy refers to as the guideline document of the Government, which states the objectives, strategies and methods to improve the agricultural sector in Tanzania (URT, 2009b as cited by Kagisa, (2013). The policy environment is the key to agricultural development. A study by Msuya *et al.,* 2018) indicate some of changes in policy that were mentioned by various stakeholders as having influence in the performance of the agricultural sector. These includes emphasis on Private-Public Partnership (PPP); decentralization of extension and other agricultural services to the local government authorities (LGAs); inputs subsidies for some crops; restriction on crop markets, that is banning of crop exports; market liberalization (free markets for farm produce); and emphasis on participatory and demand-driven extension services; emergence of new policies. Since agricultural extension does not exist in isolation, any policy changes that occur in the agricultural sector would also affect how extension services are provided by extension workers. For example decentralization of extension and other agricultural services to the local government authorities (LGAs), top-down policy planning and implementation and PPP may affect the extension workers' roles performance. For instance the PPP may require extension workers to acquire appropriate knowledge and skills on how to effectively partner with private sectors while they are executing their advisory roles.

Changing roles of extension workers

Agricultural extension system in Tanzania

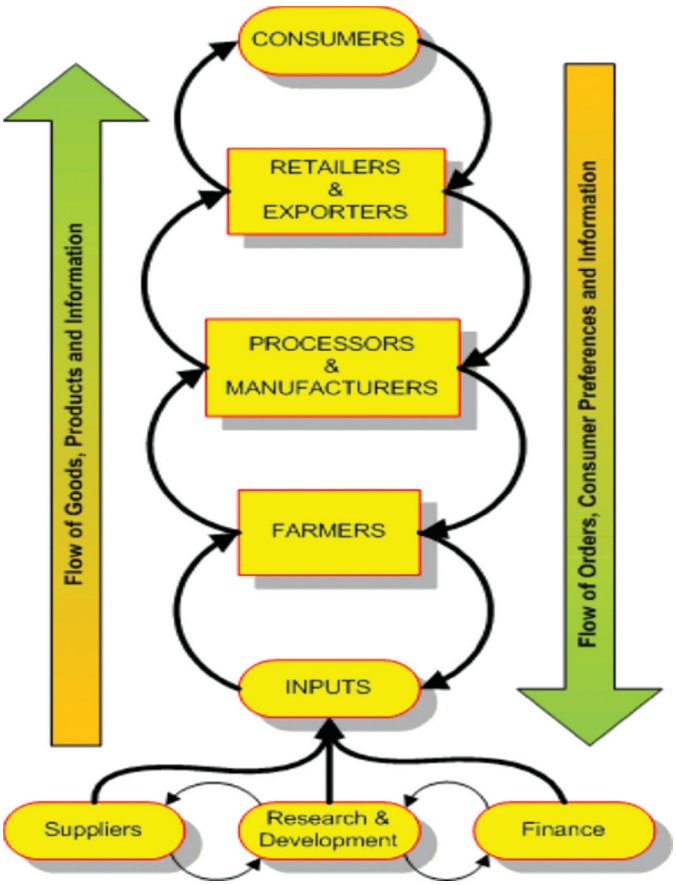

Figure 3: The relationship between the innovation system and value chain

Source: RIU (2009)

(and somewhere else in the world) is subjected to considerable transformation due to an altering context in which it is operating. These changes have also caused need for changes in agricultural extension workers roles to go hand in hand with the changes that are taking place in the world including in the agricultural sector as explained above.

Based on these changes agricultural extension workers are supposed to go beyond technology transfer to facilitation; beyond training to learning, dealing with all value chain aspects not only production including marketing, working with a broad range of stakeholders in the innovation system eg policy makers, financial institutions and other agencies (Davis *et al.,* 2010). This is in-line with Christoplos (2010) who contends that today's agricultural extension is viewed as a system that facilitates access of new knowledge, information and technologies to smallholder farmers and that promotes interaction with research, education agencies, agri-businesses, and other relevant institutions aiming at developing farmers' own technical, organizational, managerial skills and good agricultural practices. Furthermore, agricultural extension workers serves as an administrative leader and coordinator for formulating, developing, implementing and evaluating agricultural extension programmes as well as developing farmers in managing resources in the rural areas, they are supposed to perform negotiation role and mediating in conflict, advocacy and participate in policy process, strengthening producers' skills in business management, marketing, finance, work with various gender categories including women, youth and other vulnerable groups. Success of agricultural extension workers depends on their ability to optimize resources

and motivate farmers to acquire a positive desire for achieving the desired level of performance (Chimanikire *et al.,* 2007 as cited by Mbega (2015).

In realizing the increased roles in agricultural extension service delivery, in Tanzania agricultural extension workers are mandated to perform various roles as per their job description (URT, 2011). These include facilitating farmers group formation and advice in making better decisions to increase agricultural production; promoting collaboration in the implementation of a projects and programs; ensuring good relations/ communication between research centre and farmers; cooperating with non-governmental organizations and organizations involved in crop production, processing and marketing. Others include educating farmers on good agricultural practices and advice on the use of modern agricultural equipment/implements; identifying the sources of water and develop strategies for conservation in the community; providing advice on diversified agriculture and engaging researchers in conducting experimental plots, and participating in evaluating the performance for effective advice of farmers.

Msuya *et al.,* (2018) asserts that based on the changes that are taking place in the agricultural sector a list of 23 competencies needed by field extension workers to perform their roles effectively was compiled by a panel of experts from the Department of agricultural extension and community development (DAECD) in SUA, Ministry of Agriculture (MOA) and the Ohio State University in the United States of America. The authors add that the compilation went hand in hand with review of various literatures (Cochran, 2009; Landon and Whiteside, 2004; and McLagan, 1997) and discussions with panel members to ensure validity of the established list. The list of 23 competencies compiled include: general knowledge of extension, basic administration and management knowledge and skills, program planning, program implementation, program monitoring and evaluation, leadership skills, communication skills (oral and written), negotiation and advocacy skills. Others are interpersonal skills, professional ethics, Information Communication Technology (ICT), gender in extension, food processing/ preservation skills, health effects on labor and livelihoods and entrepreneurship. Other competencies include business skills, value chain, climate change, environmental conservation, livestock husbandry, crop husbandry, fisheries and resource management.

Implication of changes to training

Changes like new technical and social innovations which are being generated require extension workers to have enough knowledge and skills on handling them; new global, national and local policies, standards, regulations, which are emerging need to be understood including their application by various stakeholders, extension workers inclusive. Consumer demands which are changing with increasing affluence and urbanization need to be satisfied. On the other hand population is increasing (expected by 2050 to double) and more people will be living in urban areas and therefore new ways of production need to be put in place to feed them. There is shifting from subsistence to commercialized agriculture, which demands new ways of production. Climate change and environmental degradation demand knowledge and skills to mitigate against climate change impacts and to reduce environmental degradation, just to mention few.

Generally, all these changes require extension workers to perform their roles in a competent way in order to go hand in hand with these changes. This implies that for extension workers to be competent in performing these new roles, training institutions that offer long and short term training in agricultural related aspects including agricultural extension need to develop new capacity in terms of new knowledge, skills, and new ways of providing services.

This is due to the fact that some extension agents do not have enough knowledge and skills on these changes like new technologies for example use of greenhouses, climate change mitigation, value chain aspects, use of innovation system and others. This is in line with UNFCCC (2007) as cited by Siyao, (2021), who contends that developing countries, including Tanzania, are particularly vulnerable to extreme climate

events due to limited knowledge on climate change and limited capacity to mitigate the impacts of climate change. The author adds that in general, the state of preparedness of actors including extension workers against adverse impacts of climate change in Tanzania and other poor countries in general is limited.

On the other hand, the study conducted in Tanzania by Msuya *et al.,* (2018); Rodriguez *et al.* (2019) show that extension workers lack enough functional knowledge and skills on various areas like entrepreneurship, innovation systems, value chain, business skills, climate change, environmental conservation, fisheries, general knowledge on extension, ICT, communication skills, proposal writing and general practical-oriented skills. Also the experience show that extension workers have limited knowledge and skills in networking and partnering, coaching, negotiation and mediation, problem-solving, capacity to reflect, facilitation, just to mention few.

Furthermore on the study conducted to assess the impact of BSc. Agricultural Education and Extension (AEE)/ Applied Agricultural extension (AAE) Programme at SUA the following areas were identified by extension workers to have moderate to lower impact on their competencies as extension workers. These include use of ICT in extension work, food processing and storage skills, health issues as related to livelihoods, entrepreneurship skills and business skills especially in establishing viable economic projects, the concept of value chains and value additions to various commodities, climate change and its effects to agriculture, environmental conservation especially under rain-fed agriculture, livestock husbandry. This is due to the fact that some of these aspects like value chain and use of ICT were not covered in the curriculum that forced them to request professional development courses to fill the graduates' knowledge and skills gap (DAECD, 2018).

Farmers' success depends primarily on the extension workers level of competence to ensure a steady flow of appropriate information. Farmers depend on trustworthy and competent extension workers as a source of knowledge and information (Okwoche *et al.* (2011); Stevens and van Heerden 2016 as cited by Mkuki, 2020). Thus, extension workers are required to be competent on the mandated and emerging roles to improve performance of the agricultural sector for well-being of the farmers, community and the entire national in general. This will be addressed by imparting them with appropriate knowledge, skills and attitudes to work with changes otherwise they will become obsolete. This can be achieved through developing new programmes, curriculum review to improve old curricula as well as designing short courses to accommodate changes and new developments.

Conclusion and recommendations

Various changes are taking place in the agricultural sector. These include climatic, environmental, technological, political and social changes. it is obvious that such changes affect the performance of extension system, since it does not exist in isolation. Specifically, these changes affect extension service delivery and roles performed by the extension workers in particular. Therefore, for effective performance of the extension system and agricultural sector in general, these changes need to be communicated to farmers and other actors in the agricultural value chain and innovation system in general, through a well-established training or extension education programs by well-trained extension staff on the same aspects. Failure to do so will lead into producing unqualified or under-qualified graduates (extension workers) that will not be able to perform their job effectively and hence affect performance of the extension system and agricultural sector in general.

It is therefore recommended that since changes are taking place every day and training need is a dynamic factor that keeps on changing, for extension workers to perform their roles effectively, training needs require regular assessment. Thus, agricultural training institutions (and other organs including employers) need to conduct training needs assessment regularly for developing new programs, curriculum review or change to conform to the needs of the clients. For in-service extension workers (extension workers in the field who graduated from old curriculum) training needs assessment should be organized

by their employers (public and private) including responsible Ministries and NGOs. The needs assessment should focus on identifying the gaps for organizing short courses to fill the identified training needs. The identification of training needs for long and short term training should be done through participatory approaches with various stakeholders that will assist to come up with the relevant training areas.

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