



Assessing the Impacts of Agricultural Extension Services on Technology Adoption and Productivity among Ethiopian Pastoralists

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ABSTRACT

In the context of Ethiopian pastoralists, this article explores the transformative impact of Agricultural Extension Services on technology uptake and productivity. The study examines the dynamics of behavioral changes necessary for sustainable agriculture practices, with a focus on changing mindsets. A thorough background is provided by the difficulty pastoral communities' encounter, which includes raising cattle and utilizing a variety of livelihood techniques. A pluralistic, multi-provider approach is called for in light of historical insights into the development of Agricultural Extension Services in Ethiopia, which point out certain limits. The favorable influence on technology adoption highlights the critical role extension services play in reducing poverty and generating money, particularly in Pakistan's rice, wheat, and laser leveling industries. The study's emphasis on ongoing improvement and its call for a more inclusive extension system, especially for small-scale farmers, are succinctly summarized in the abstract.

Key Words: Pastoralists, Agriculture, Extension, Technology, Adoption

1. Introduction

The term 'Agricultural Extension' is widely used to differentiate between extension services to rural people with emphasis on farming and farm living and extension of university teaching in other disciplines to those unable to attend institutions of formal education.

In this publication, the term 'Agricultural Extension' will often be shortened to 'Extension' for the sake of brevity. Both terms will be used to designate a system or service designed to help rural people improve their agricultural methods, incomes, and levels of living. As a representative of one developing country expressed it, if extension workers would devote more effort to creating a desire for information, farmers would come and ask for it rather than wait for it to be brought to them. Farmer motivation thus becomes a phase of extension work worthy of careful study in any area.

All definitions of extension education involve change; changes in the behavior of rural people presumably result

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in improved agricultural production, better living, and a strengthening of the national economy. But fundamental to any permanent behavioral change is that of attitude. This is especially relevant when working with traditional societies. One has often heard the expression "Farmers are conservative." They are inclined to trust the familiar and distrust the unfamiliar.

They judge any change or innovation in the light of their own experience and the principles taught them by their fathers and forefathers. They seldom question these principles but try to apply them to the specific problem at hand. Conformity is a mark of a traditional culture.

To change the behavior of many people extension must first change their attitude toward change, to cause them to question traditional practices, and to realize that they have the power to improve their own social and economic situation (Maunder et al., 1972).

Pastoralism is a cultural and economic system that is determined by social structure, resource management, productivity, trade, and social and welfare mechanisms in communities founded on livestock rearing as a primary economic activity (Nori et al., 2008). In Ethiopia, the livestock sub-sector accounts for 20% of Ethiopia's GDP, with the national herd inhabiting Ethiopia's vast lowland periphery covering 60% of the total land area. About 10 million pastoralists rely on animal husbandry as a key source of wealth and subsistence (Samuel, 2016). In different regions of the world, In the last three decades, pastoralism has faced processes of change that imply the declining ability of pastoral systems to absorb shocks they are facing and cope with changes. As a result of increasing destitution, there has been growing social differentiation and inequalities within the pastoral communities (FAO, 2018). Ethiopian pastoralists are mainly

found in four lowland regions, Afar, Oromiya, Somali, and the Southern Nations, Nationalities and People's (SNNP) regional states and partly in Gambella and Benishangul areas involved in various livelihoods systems (Mengistu, 2015). Livestock rearing is the dominant means of livelihood for pastoral communities (Solomon n.d., 2018).

Nationwide the livestock sub-sector accounts for 20% of Ethiopia's GDP, with the national herd inhabiting Ethiopia's vast lowland periphery covering 60% of the total land area. About 10 million pastoralists rely on animal husbandry as a key source of wealth and subsistence (Samuel, 2016). In addition to the dominant livestock sector, pastoral communities have long been involved in different economic activities and derive a significant portion of their subsistence from activities such as farming, migration to towns, petty trading, selling of charcoal and fuel wood wage labor, caravan trade, and crafts. This shows that there is a huge variety of non-livestock livelihood strategies practiced by pastoralists in different areas (Mengistu, 2015). Empirical evidence by (Kena et al., 2017) shows that Borena pastoralists of Yabello district derive 72.49% of their income from pastoral and dry land farming (cereal crop production, livestock, and livestock product sale), 21.30% from high return non-pastoral non-farm activities (livestock trade, opening bars at a local town, renting a house at the town, vehicles transportation) and 6.21% from low return non-pastoral non-farm activities which includes petty trade like shopping, handcraft activities, remittance, wood and charcoal sale and casual labor (Ayele et al., 2020).

Increasing productivity in agriculture depends on adopting production-enhancing technologies and the innovativeness of actors in the sector, particularly farmers. Because farmers' capacity and actors along the agricultural value chain innovate production activity depend on the availability of production technologies (Akudugu et al., 2012). Therefore, improved agricultural technologies are important for productivity growth, reducing poverty, and meeting food demands. According to (DFID, 2003), a 1 percent increase in agricultural productivity is estimated to reduce the percentage of poor people by 0.6 to 2 percent. There is no other economic activity that generates the same benefit for the poor. (De Janvry and Sadoulet, 2002) argues that poor farmers could benefit from technology adoption by increasing production for home consumption and increasing gross revenue from crop sales.

2. Literature Review

2.1. Agricultural Extension Services in Ethiopia

Agricultural extension service in Ethiopia is said to have started in 1953 with the establishment of the then Imperial Ethiopian College of Agriculture and Mechanical Arts (IECAMA), currently known as Alemaya University. IECAMA was established following the concept of the land grant system of the United States of America (USA) and was mandated to have three responsibilities: teaching, research, and extension.

The extension mandate of the college included transferring local research outputs and technologies to farmers, importing technologies and improved practices from abroad, and introducing them to farmers (Ibrahim 2004). The college was using graduates of the then Jimma and Ambo agricultural high schools as development agents (DAs) and was concentrating its efforts around the areas where it had agricultural experimental stations. The college started with only 2 extension agents; this number later increased to 132 agents operating in 77 extension posts.

The extension service of the college undertook demonstrations, regular visits of individual farmer's fields, and the organization of youth clubs. The youth clubs were used as entry (focal) points to disseminate technologies to the larger farm communities. Moreover, the extension service of the college focused on improved poultry production, horticulture, tree seedling production and distribution, improved wheat varieties, and agriculture. The coverage of the extension service of the college was minuscule compared to the needs of the country due to a severe shortage of manpower and limitations in new/improved technologies.

The lack of complementary institutional support services such as input supply and credit services was another major constraint of the extension service provided by the college. The fact that the extension service focused on training and knowledge transfer, with the responsibilities for input supply and rural credit being assigned to other bodies signifies the importance of treating the extension service only as a source of training and information. However, institutions to supply inputs and credit to farmers are necessary compliments to the extension service, and their absence hurts the effectiveness of the extension service.

The first comprehensive package extension program was the Chillalo Agricultural Development Unit (CADU), which later became the Arsi Rural Development Unit (ARDU), started in 1967 with financing from the Swedish International Development Agency (SIDA). It must be emphasized that the program was not just an agricultural extension program, but one that was aimed at bringing about an overall socio-economic development in the pilot area, and designed to draw lessons for scaling out to other parts of the country and scaling up to higher administrative bodies.

The package components included crop and livestock production, credit and marketing services, research and training, rural infrastructure development (roads, water, etc.), input supply (seeds and fertilizer), and home economics. The program used demonstration plots managed by development agents and used to train farmers organized through various field days. The program also used model farmers.

The current extension service is almost exclusively funded and provided by the government through its woreda level Offices of Agriculture and Rural Development (OoARD),³ with NGOs operating in limited and dispersed areas throughout the country. Full budget allocation from the public is a continuation of the tradition of supporting extension

services from the national budget that started in 1995 with the launching of PADETS.

The fact that the extension service is provided almost exclusively by the government indicates the urgent need to devise strategies to make the extension service pluralistic (multi-provider). Public funding of the extension services can go alongside the effort to develop pluralistic extension service provision. These woreda level offices are supported by regional level Bureaus of Agriculture and Rural Development (BoARD). In the regions of SNNPR and Oromiya, zonal level offices also exist to support the woreda level offices (Gebremedhin et al., 2006).

3. Issues and Challenges

3.1. Technology Adoption among Ethiopian Pastoralists

Agricultural research institutions have a key role in technology development and improving productivity. However, research is only one element in a complex of processes that lead to innovation and the adoption of new technology (FAO, 2010). Hence, it is critically important to facilitate the forging of collaborative partnerships among and between researchers, extension service providers, rural farmers, and producer organizations. This can reduce transaction costs of knowledge and information dissemination and also make for greater relevancy in technology generation (FAO, 2006).

The agricultural innovation systems (AIS) approach recognizes the role of the institutional and policy context in the adoption of agricultural technologies (Klerkx et al., 2012; Van Mierlo et al., 2010; Leeuwis and Aarts, 2011; Rajalahti et al., 2008). The AIS approach, however, has not been widely used to analyze the constraints to technological adoption in livestock production in the developing country setting. A holistic understanding of technology adoption by the smallholder requires a conceptual framework that allows the analysis of factors affecting technology adoption at different aggregation levels: farm households, value chain, and institutions and policies (Kebebe, 2015).

3.2. Impact of Agricultural Extension Service on Technology Adoption

The impact of agricultural extension services on the adoption of laser leveling technology is positive and significant at a 1 percent level of significance in all the four matching algorithms i.e. Nearest Neighbor Matching (NNM), Mahalanobis Metric Matching (MMM), Radius Matching (RM) and Kernel Matching (KM). The empirical results for the adoption of improved wheat varieties are nonsignificant in all four matching algorithms indicating that agricultural extension services need to be improved regarding the adoption of improved wheat varieties.

The results regarding the extension role in the adoption of improved rice varieties are positive although significant only in the case of RM. The impact of agricultural extension services on rice yield is positive, although significant only in the case of MMM and KM. The extension services impact

on wheat yields is positive and significant in all the four matching algorithms i.e. NNM, MMM, RM, and KM. The overall empirical results indicate that farmers having contact with agricultural extension services are more likely to adopt new improved agricultural technologies.

The most important and positive impact of agricultural extension services is on the yields of rice and wheat crops in Pakistan. Wheat is an important food crop while rice is an important cash crop in the study area. The increase in the yield of these crops directly can help in increasing household income and reducing the much-needed poverty levels in Pakistan. Overall the agricultural extension is playing an important positive role but still, a lot of improvement can be made. The probit estimates also indicate that mostly the large farmers currently benefit from agricultural extension services and the extension service to small farmers needs to be provided (Ali and Rahut, 2013).

4. Conclusion

This examination of Agricultural Extension Services' impact on Ethiopian pastoralists highlights the need for attitude change and innovation acceptance in traditional farming communities. The historical evolution of extension services and the significance of comprehensive socio-economic development, exemplified by the Chillalo Agricultural Development Unit, are emphasized.

Collaborative partnerships among researchers, extension providers, and farmers are crucial for technology adoption. The positive correlation between technology adoption and crop yields in Pakistan underscores the importance of extension services, but efforts should focus on reaching small-scale farmers and promoting equitable distribution of benefits. Ongoing refinement of extension strategies, collaborative innovation, and tailored approaches are essential for sustainable agricultural practices in Ethiopia.

5. Recommendation

- Awareness campaigning is to be given more priority to create awareness and to support good practices to be followed for better adaptation of technology.
- Government should explore more facilities for accessing extension services so that women farmers also can take part and productivity can be enhanced.
- NGOs/INGOs should be given more support to bridge the gaps between pastoralists and government agencies for a better way of adopting new technology.

Conflict of Interest

The author declares that they don't have conflict of interest.

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