Challenges and Future Prospects of Agricultural Extension

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I. Introduction

Today's planet is plagued by a number of pressing issues, including poverty, hunger, economic expansion, the production of food, and the depletion of natural resources. At least 800 million people worldwide experience chronic hunger as the world's population exceeds 8,000 million by 2025. The majority of those living in poverty will still be in rural areas even while urban populations increase throughout that time. In order to combat poverty, provide food security, and sustainably manage natural resources, it is essential to maintain a robust agricultural sector. In developing nations, more than 60 per cent of people work in agriculture, and farm families make up 80 per cent or more of the population in several of these nations (World Bank, 1990). Due to the fact that agriculture has already reached the limits of the land and water resources available, future gains in food production must take advantage of biological yields on currently cultivated land (World Bank, 1997). Due of this technical difficulty, agriculture is under crisis in many developing nations. Asia's growth pace has slowed since the green revolution's inception. Since 1970, Africa's annual per capita food output has generally decreased, leading to recurrent famine. In many areas of Latin America and the Caribbean, intense agricultural and population growth pose serious environmental challenges (World Bank, 1990). As a result of issues like animal rights, worries about GE goods, and water and land contamination, opposition to high input agriculture is expanding in the industrialised world.

Agricultural extension has a number of challenges as the world struggles with these problems. Prioritising organisation and information is essential in the agriculture sector. To create agriculture that can satisfy complex demand patterns, reduce poverty, and maintain or improve ecological resources, those working in agriculture need better skills, information, and ideas. Extension plays a significant role. Challenges to extension funding and delivery include the size of the task, reliance on broader policy and other agency functions, difficulties proving the cause and effect required to win support from politicians and donors, liability for public service functions beyond the transfer of agricultural knowledge and information, fiscal sustainability, and interaction with knowledge generation. Numerous observers worry that public extension does not sufficiently address these issues, does so inadequately, and is not always pertinent. Low performance and erratic relationships with client farms and the research industry in underdeveloped nations are the results of bureaucratic inefficiencies and poor programme design and implementation. In the 1980s, donor financing for large-scale public-sector recurring expenditures declined along with support for extension, which led to underfunding, staffing shortages, and a drop in extension services (Amanor and Farrington, 1991).

II. Challenges in Agricultural Extension

The goal of agricultural extension is to close the knowledge gap that currently exists between farmers and scientists by providing farmers with information, technology, and innovations. In addition, agricultural extension also plays a major role in successful implementation of programmes related to agriculture and rural development. Despite these huge responsibilities there are many problems faced by extension that limit its capability and performance acts as hindrance in achieving its objectives. These challenges can be understood from different perspective and can be grouped into following major categories:

- Institutional challenges,
- Technological challenges,
- Technical and communication challenges,
- Challenges in Pluralistic extension
- Challenges in Market oriented extension
- Challenges in use of Mobile Applications in Extension

A. Institutional Challenges

Various methods can be used to facilitate and manage agricultural extension. In India, the state Department of Agriculture (DoA) is the main extension organization for the topic of agriculture. The majority of states maintain a separate division or department dedicated to horticulture, watershed development, and soil and water conservation (within the Department of Agriculture). The Department of Agriculture is the principal line department with the most field personnel for extension. There is a separate Division of Extension inside the Department of Agriculture and Cooperation of the central Ministry of Agriculture. Principal policy guidelines for extension concerns are established by the Extension Division, and specific programmes and initiatives are carried out by the Directorate of Extension. For the transfer of technology, this department employs a top-down, centralized structure. The issue with this strategy is that when knowledge and agricultural technologies are transferred using top-down command and recommendations, demand-driven and participatory planning are disregarded, which leads to inappropriate technology use that is out of step with various production systems. Poor feedback has also been the result of the top-down promotion of agricultural technologies and knowledge transfer mechanisms. Due to the poor level of outreach offered by public extension agencies, access to extension is another issue. The implementation of centralized and state policies, which are also challenging to adapt to local needs and circumstances, has put a strain on public personnel, which contributes to this problem (Sulaiman *et al.*, 2005). Finances for operational expenses, training, and capacity building are frequently insufficient, which restricts extension staff operations and ongoing development (Swanson, 2009).

B. Technological Challenges

Demand-driven, relevant, cost-effective, and technically viable technologies significantly improve the great majority's quality of life through boosting agricultural productivity. The needs for agricultural technologies are a result of the farmers' complaints about production issues with their crops and livestock. Before assessing the current technology, it is crucial to consider the limitations on crop and livestock output. Furthermore, one of the biggest obstacles to providing extension services is the restricted supply of inputs like better seeds and fertilizer as well as their high cost, notably the inflated price of fertilizer. Additionally, the public sector, which continues to rely on conventional technology transfer approaches, has limited use of technological incentives and ICT in the provision of extension services.

C. Technical and communicational challenges

For the promotion and spread of the technologies, technical and communication abilities are crucial. As a result, the provision of effective, efficient, and high-quality agricultural extension services is largely dependent on the knowledge, abilities, and attitudes of the extension specialists. Farmers need to see agricultural technologies in action before they accept them, not just hear about them. But the adoption of it is strongly impacted by the weak interactions between farmers and service providers. Numerous line departments at the state level have come under fire for working alone, with sluggish connections and little partnerships, restricting information flow (Sulaiman et al., 2005). The partnership between research and extension has also come under fire for not taking suggestions from farmers and extension staffers into account and using them. Farmers and extension agents have a passive role, while scientists have little real-world experience. Programme overlap without convergence affects the different components of the public-sector extension system.

D. Challenges in Pluralistic Extension

The difficulty with pluralistic approaches is figuring out the combination of options that is beneficial for the farmers (Anderson et al., 2006). These solutions must be economical and consider the contribution of farmers to innovation. According to Suleiman and van den Ban (2003), the success of private extension varies greatly since it tends to concentrate its services in regions with ample resources and is constrained to a small number of crops and locations with predictable revenue streams. Additionally, social capital is not developed while the private sector collaborates with farmers individually to serve corporate goals. Furthermore, for the private extension to be effective, farmers must be able and willing to pay for it. Swanson (2009) proposed the idea that the private sector may meet the needs of medium-sized and commercial farms while the public sector might operate in remote locations that are currently underserved. This type of system would require a public-private partnership, which is not the case in India at the moment. It would mean changing how the public sector views and engages with the private sector. Relying on the public sector may be difficult for rural and resource-deprived farmers given the problems already in place and their restricted access to it.

E. Challenges in Market-oriented extension

Market-oriented extension is important in expanding economies because consumer preferences are changing and opening up new markets for high-end goods. Rapid expansion in non-agricultural industries has increased consumer demand for high-value goods, opening up new business prospects for farmers. If extension staff are not trained in marketing, agricultural and post-harvest management, or financial services, they suffer. This makes the "market-driven" strategy difficult for both farmers and extension personnel. Also, lack of training and access to market intelligence for extension service providers further increases the problem of extension delivery. Another big challenge faced in the implementation of marked oriented extension is the poor linkage between different stakeholders which makes it difficult to provide end to end services to the farmers as demanded by market-oriented approach of agricultural extension.

III. Future Prospects of Extension

In the coming years, there will probably be an increase in the need for information and consulting services that are specific to agricultural and rural settings. Agriculture faces the issue of keeping up with rapidly rising populations in many parts of the world, where there are only limited reserves of land that may supposedly be cultivated. The need for increased productivity and specialised knowledge among farmers is inevitable. Today, the organisations comprise a varied diversity of activities that have been socially sanctioned and are acceptable. These activities strive to enlarge and strengthen the capabilities of rural inhabitants to incorporate more suitable and novel practices and to adjust with the changing demands.

From a governmental standpoint, extension will continue to be a crucial tool for encouraging environmentally and socially responsible farming practises, regardless of how high a focus is placed on productivity. Some of the most promising recent advancements in extension methods have taken place where equality or the environment are the primary agendas, as in the case of the necessity of integrated pest management and the combined management of forests by professionals and local forest users. The fundamental shift in the responsibilities of extension agents and clients is a recurring topic in the cutting-edge methods being employed, such as participatory rural evaluation (Chambers, 1993). The client's expertise and creativity, both individually and collectively, are acknowledged as a major resource, and solutions to local problems are to be produced in partnership between agent and client. The agent is no longer viewed as the expert who has all the pertinent information and technological solutions. As a result, the scale at which extended help is needed is frequently greater than that of a single farm, necessitating the development of new negotiating, conflict-resolution, and community organization-building abilities in extension workers (Garforth, 1993).

Future developments are also likely to see a reversal of current bureaucratization trends within hierarchical extension services as well as a decrease in the amount of public financing allocated to them. In addition, a sharp rise in information technology utilisation in support of extension is anticipated. In these domains, there will be four key drivers driving change (Rivera & Gustafson, 1991).

A. Economic and Policy Climate

The (dominant) position of the government sector in national economies has been under scrutiny following the collapse of socialist systems of economic organisation during the previous ten years, with a growing trend to cut back on public spending. Public extension agencies and those that receive a substantial portion of their funding from the public are therefore under pressure now and are going to be in the future to increase their efficiency, cut expenses and staff, and pass some of the costs of providing on to their clients who will directly benefit. This is especially true in nations where the number of farmers makes up a tiny minority and food production is surplus. In less developed nations where farming households make up a significant fraction of the overall population and where growing food for consumption is still crucial, the justification is weaker but not non-existent. As a result, charging customers for services is expected to spread, and governments will find it appealing to hire the private or nonprofit sector to run their operations.

B. Social Context in Rural Areas

Rural communities will surely become more educated in the future, while their exposure to the media will keep reducing their isolation and detachment from knowledge and ideas as well as their understanding of their condition in relation to national and international issues. However, this exposure will not make extension less necessary. The more knowledgeable farming community will need different sorts of extension services because of the shifting demands on agricultural producers brought on by population expansion, more urbanisation, alterations to the law, and market needs (Hayward, 1990). As a result, monolithic government extension agencies will need to be replaced by more highly skilled, specialised, and technically competent workers who also know where to find pertinent information and solutions to problems as well as a variety of provision and organisational forms (Moris, 199). These organisations will need to identify and cater to various customer types, who are not

necessarily classified into "adopter categories" but rather according to their market access, level of commercialization, and degree of reliance on agriculture for survival.

C. Systems Knowledge

The pressure for the debureaucratization and devolution of extension services is in large part due to the realisation of the location-specific nature of farming systems and the agricultural information systems that support them. This acknowledgement also suggests that extension workers and farmers work together to verify and adopt new technology. As a result, extension workers should respect farmers as technology experimenters, developers, and adopters and focus more of their efforts on local communication. A logical result of this is the decentralisation of extension services into local organisations. This localization of extension effort will be supported by advancements in mass media technology, which were already perceptible more than 10 years ago (Garforth, 1986).

D. Information Technology

The most significant driver of change in extension, as well as one that will support and reinforce other changes, is likely the ongoing, rapid expansion of telecommunications and computer-based information technology (IT). The method has a wide range of possible uses in agricultural extension. Farmers will have considerably more control over new information services brought by IT to rural regions than they do over the current information channels (FAO, 1993; Zijp, 1994). Even if not every farmer has a computer terminal, they might be easily accessible at neighbourhood information resource centres, equipped with computers running expert systems to assist farmers in making decisions. However, it will not eliminate the need for extension personnel. Instead, they are going to be able to focus on services and operations where human connection is crucial, such as assisting farmers one-on-one as well as in small groups with problem diagnosis, data interpretation, and application (Leeuwis, 1993).

Future extension workers will need to be more competent, independent, and client-focused. Instead of the flow of "messages" via a hierarchical system, the focus will be on the efficacy of the interaction between the agent and the client.

E. Paradigm Shifts in Agriculture & Agricultural Extension

The following paradigm advances in agriculture and agricultural extension have significant impact on those who provide agricultural extension services to the farmers:

 Green to Evergreen Revolution
India's ability to balance agricultural and human development has been shown through the green revolution. Inequality in social, economic, and environmental spheres has also resulted from it. Agriculture is currently at a crossroads. Agriculture is not only important for the production of food in emerging nations like India and Africa; it also forms the basis for the majority of people's security of livelihood. As a result, efforts must be made to produce food, fodder, fibre, and other goods using sustainable methods, involving both large and small-scale farmers in rain-fed regions. The evergreen revolution is crucial for secure nutrition and sustainable food.

 Commodity approach to Integrated Farming System Approach
India and other emerging nations have mostly adopted the commodity method, where one commodity is grown across a large area of land. Due to internal as well as external risks brought on by pests and illnesses, the whims of the monsoon, market volatility, and GATT and WTO, the total revenue from the crops was negatively impacted. The people most impacted by this process were the small-scale farmers in rainfed areas. Therefore, in order to maximise profit from a given parcel of land, it is now advised to adopt a farming system approach that involves intensification, diversification, and value addition. This could be accomplished by combining livestock with crop combinations, border crops, intercropping, etc. Farming system research and farming system extension both need more focused efforts.

 Mono disciplinary to Interdisciplinary approach
The study on extension has been concentrated on a single discipline approach with a team of experts advising and coaching farmers at various times based on their specialty, squandering both the time and money of farmers. It is currently recommended to take an interdisciplinary approach, in which a team of specialists from several fields visit the farmers and offer comprehensive guidance. Currently, research is proceeding in a similar manner.

 Technology-crop technology Eco-technology and Biotechnology
While the Crop technology has received significant attention from Research and Extension in recent years the current requirement for an extension worker is that they must also possess knowledge about new interventions such as biotechnology, which farmers are catching up to quickly and which has changed the cotton sector (by introducing Bt Cotton), as well as technologies connected to cattle and other agricultural operations. The promotion of sustainable agriculture, agriculture that is climate resilient, organic farming, and natural farming depends largely on biodiversity and environmental technologies.

 Supply driven approach to demand driven approach
As of now, a supply-driven strategy has been used, which has led to an excess of production and the exploitation of farmers in the hands of middlemen, resulting in poor pricing for the farmers' output. Thus, there is a trend more towards a demand-driven approach and market-led extension, where farmers are encouraged to cultivate commodities that are both suitable for their regions and in-demand for both domestic and foreign markets. This necessitates the dissemination of market intelligence and marketing data. The extension must be prepared to fulfil this function.

 Farm employment to off-farm employment
Since our country's independence 75 years ago, extension has focused more on raising productivity while advocating for lower production costs in order to create jobs on farms. However, there is dissatisfaction among farmers about the viability of farming as a means of enhancing living. Farmers and young people are moving from rural to urban regions as a result of this. Extension work should concentrate on developing sustainable off-farm jobs in industries like dairy, poultry, sheep and goats, fisheries, nursery management, high value crops, and other viable businesses that can generate money and give gainful employment in order to stop these phenomena.

 Self-reliance to Self-sufficiency
In the recent past, we have seen a self-reliant society where farmers managed their own farms using their own skills, judgement, and resources. The term "self-sufficiency" currently refers to the ability of farmers to meet their own requirements through production while also selling their products on the open market. For extension, this needs a fresh direction and a great deal of change in strategy to meet this changing trend.

 Agricultural Development to Sustainable Agriculture Development
Development of agriculture in a sustainable manner that satisfies current demands without jeopardising the capacity of future generations to satisfy their own needs is the need of the hour. Development is largely influenced by economic, ecological, equitable, and social aspects. Earlier agriculture development was input-intensive, undermining the protection of human safety and health as well as the deterioration of natural resources.

 Knowledge and Skills to Empowerment
Earlier, the extension strategy for farmers focused on imparting knowledge and skills with the objective to affect desired behavioural changes. This occurrence hasn't led to a ripple effect or increased motivation to use technology to connect with other farmers. On the other side, the empowerment approach is predicated on the notion that providing farmers with knowledge, skills, resources, and opportunities will motivate them and hold them accountable for the results of their actions. This will boost one's confidence and sense of accomplishment, which will inspire other farmers and encourage farmer-to-farmer extension and a multiplier effect.

 Agriculture to Agribusiness
Agriculture has historically been a means of subsistence; today, it is viewed as an Agribusiness. Moving from traditional farming to contemporary agriculture is part of the process of changing agriculture into an agribusiness. The secret to agricultural production is agribusiness. The farmer must raise crops and businesses that are driven by market demand, manage the farm to cut expenses along the value chain, keep track of farm operations, boost productivity, and add value to the product that will bring in more money. The Extension Advisory services need to take these tendencies into account.

 Productivity to profitability
Small-scale farmers need to be educated on the importance of lowering expenses, particularly those associated with input consumption, increasing production, monitoring quality, and adding value to boost profitability while also preserving and protecting natural resources including land, water, and the environment.

 Equity and Sustainability
All extension initiatives must prioritise equity issues and inclusive growth. Equal effort should be put forth by women, small-scale, marginal, rainfed, and other deserving farmers, among others. Ecological issues must also

be emphasised in order to improve sustainable growth in the context of livelihood. There is a need to close the wealth disparity.

 Single Extension Approach to Pluralistic Extension Approach

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 Public Extension to Private – Public – Partnership

Extension is unable to reach the neglected farms and locations due to inadequate resources and manpower. Extension needs to address issues with markets, value chains, and profitability. Both the public and private extensions have their own advantages and disadvantages. However, a collaboration between the public and private sectors in extension can close the gaps and enable more farmers to get assistance while maintaining responsibility and openness. A distinct separation of responsibilities and allocation of resources is required for this.

IV. Conclusion

In the near future, there will certainly be a greater need for information and consulting services related to agriculture and rural areas. In many parts of the globe, agriculture struggles to keep up with the population growth due to a lack of arable land reserves. Farmers will need to become more specialised and efficient. No matter how high a priority the government places on output, extension will continue to be a crucial tool for advancing environmentally and socially responsible agricultural practises. In a growing nation like India, where roughly half of the country's population depends on agriculture for a living, this problem is much more serious. The problems of new world such as rapid urbanization, industrialization, population growth, pollution, climate change and economic imbalances calls for a new solution. Hence, it is imperative that extension adopts these extra responsibilities and works in a holistic manner to support the changing needs of farmers and agriculture sector as a whole while also keeping in view the issue of Sustainability. This asks for a shift in both the approach and policy of existing Extension Service mechanism. In order for public extension system to sustain in this rapidly changing world scenario, it is important that it realises the changing needs of client and other stakeholders, forms a partnership with private sector and shift its approach from centralised, supply driven & top down to localised, market driven and bottom up.

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