Changes and Effects of Agricultural Extension on the Adaptation of New Practices by Farmers: A Geographical Study of Egra Subdivision, Purba Medinipur, West Bengal, India

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Abstract: Over the past four decades, agricultural extension services have improved considerably. What and why have the extension of agriculture changed? Will these developments affect farmers' adoption of innovations? What, if anything, particularly in developed countries, should policymakers and extension agencies do otherwise? In agriculture, new types of agriculture technology, tight public budgets, decentralization initiatives by the government and evolving technologies of information and communication (ICT), the extension of public and private funding structures and expansion of operations were pluralized and, in some instances, lowered in costs and advisory services combined. Farmersand virtual networks play an increasing role in the spread of technology, and extension services may use the new ICT methods to leverage these networks. This study focuses on the changes in farming activities in the area of Egra, WB, India due to weather conditions.

Keywords: Agricultural extensions, adoption of farming technologies.

1. Introduction

Agriculture has an important role to play in economic growth, strengthening food security, reducing hunger and rural development. For about 2.5 billion people in the developed world, it is the primary source of wealth (FAO, 2003). Smallholder farming is regarded as a crucial policy strategy for meeting the Millennium Development Goals, one of which is to reduce global poverty and hunger by half by 2015 (World Bank, 2008). The majority of smallholder farmers, however, rely on conventional production methods, and this has limited productivity levels. For example, in most developed countries, over 70% of maize production comes from smallholders using conventional production methods[2]. In general, these farmers achieve very low crop yields because the local varieties used by farmers have a low potential yield, much of the maize is grown under rain-fed conditions and irrigation is only used in restricted areas, little to no fertiliser is used and there is inadequate control of pests[2]. This has prompted much dialogue about the need to improve production and sustainability internationally in agriculture, but much less evidence is available about concrete methods of achieving this objective. Increasing agricultural production is crucial to satisfy the anticipated increasing demand, and it is instructive to analyse recent success in the case of modern agricultural technology[3]. All

sorts of improved techniques and practises that influence the growth of agricultural output[1] are included in agricultural technologies. According to [4], emerging varieties and management regimes include the most common fields of technological growth and promotion for crops; land and soil quality management; management of weeds and pests; irrigation and water management. New technology continues to increase productivity and decrease average production costs due to strengthened input/output relationships, which in turn leads to large increases in farm income[3]. Improved technology adopters increase their production, contributing to steady socio-economic growth. Improved agricultural technology adoption has been related to higher earnings and lower poverty; improved nutritional status; lower staple food prices; higher jobs and earnings prospects for landless workers[8]. It is assumed that the introduction of improved technology is a significant factor in the progress of the green revolution faced by Asian countries[7]. In the other hand, with socio-economic instability contributing to deprivation[1], non-adopters can hardly sustain their marginal subsistence. Therefore, modern agricultural technology that increases sustainable food and fibre quality are crucial for sustainable food security and economic growth. Since the early part of the twentieth century[4], this has rendered the complexities of technological transition in agriculture, an area of intensive study. These developments are of special interest to smallholder farmers in developed countries because they are in many respects, limited, making them a target for development efforts. For example, these farmers live and farm in areas where precipitation is poor and sporadic, and soils appear to be infertile. Moreover, facilities and organisations such as the irrigation, input and commodity markets, and credit and extension services seem to be underdeveloped[2]. Many surveys have been carried out over the years on innovation and the implementation of emerging innovations in developed countries. Besides, the mechanism of adoption and the effect on smallholder farmers of the adoption of new technologies have been observed. However, new agricultural technologies are always introduced slowly, and some **facets** of implementation remain poorly understood, despite being seen in most developed countries as a significant way out of poverty[5][6]. Therefore, this paper aims to examine numerous research carried out on implementing emerging technologies and variables responsible for the sluggish pace of adoption of technology. Nature, society and human activity are the three most important influences for the development and complex creation of capital day by day. Continuous dynamics in the study area[10] are the main economic activity dependent on agricultural capital and land use. Egra of Purba Medinipur (W.B.) is a coastal region where the everyday operation of cultivation and agricultural land use shifts rapidly[9]. Food crops are primarily extensively converted and dynamically turned into commercial crops.

2. Study area

Egra subdivision of Purba Medinipur, W.B is put under a 21°30'25"N-21°45'N latitudinal extension and an 86°45'E- 87°45'E longitudinal extension. Geomorphologically, this region is situated in a portion of the coastal plain of 'Digha-Contai', which lies below western Bengal's coastal track. This research region on the other side is based under the Dubda Basin on the lower portion of the Rasulpur Dam. Coastal alluvial and old alluvial plain covered by the allover region of the sample throughout the geological time era, sandy and sandy-loamy soils are created by the long-term phase of weathering, erosion, and deposit. The quality of

Egra block I consists of 8 rural panchayats and 8 rural gram panchayats consist of Egra block II. The overall geographical region of research is Hector 40106.1sq. (Figure 1).

2.1 Geomorphology and Geomorphic Aspect of Study Area

Geomorphological ally protects the research region with the coastal tract of Purba Medinipur. This field is covered by the coastal alluvial base and older alluvial floor, sandy, loamy land. The region protected and defined by the 'Dubda basin' is 75 percent. Surface height is between 0m and 10m above normal sea level and the most significant parameter is the shape of gentle pitches. This area is inhabited by other side seasonal floods. Thus the territorial subdivision of Egra territory morphology is defined by marine morphology and seasonal coastal base floods. Agriculture is the most popular economic operation in the country, but this agricultural base resource and the utilisation of land are mostly seasonal. This ensures that the individual adjusts his farming method and has a complex impact on agricultural land and agricultural services.

2.2 Resource Base Agriculture and Land Use Study:

Egra region is the marine resource region that develops coastal and alluvial land with sandy loam and loamy land. The whole geographical area is primarily covered by economic development linked to agriculture. This area is comprised of food crops, commercial crops, forestry, horticultural crops and aquaculture dependent on water. However, recent developments in agriculture are dynamically transforming food crops into industrial crops. Since the geological landscape, seasonal floods and soil structures are not conducive to the cultivation of rice (food crops). Environments are also quickly evolving (dynamic change) in their agricultural activities (Table 1 and Table 2).

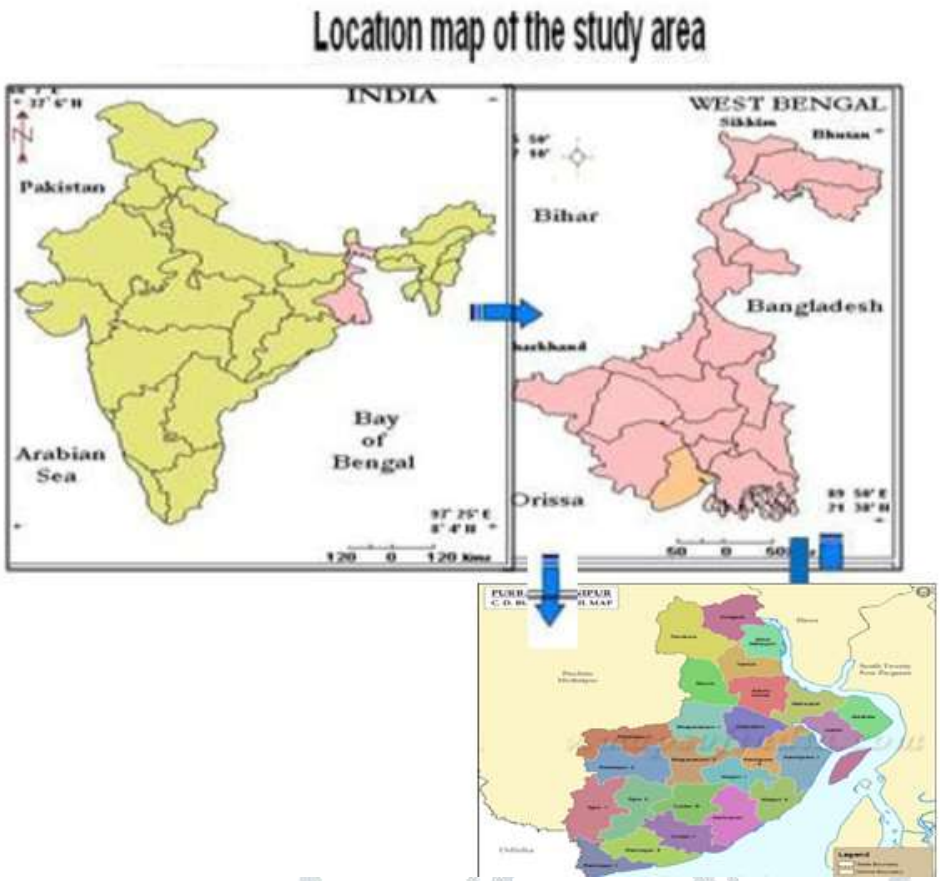

Figure 1: Location of the Study area (Egra subdivision)

Table-1
General land use and cropping pattern in study area-(Block-I) 2011-12

Jl. NO.	Gram Panchayat/ Municipality	Geographical Area in Hector	Net Cropped area(hector)	Agricultural resource and Land Situation (area in hector)			
				Plantation and Horticulture	Commercial crop area	Food crop area	Aqua culture and others
1	Barida	2856.8	2273.2	223.2	1676.0	302	72
2	Kosba Egra	784.0	477.6	0.6	347.0	125.0	25
3	Chhatri	2611.6	2206.0	66.0	487.0	1332.5	320.5
4	Jerthan	2677.6	1939.6	66.0	1642.2	189.6	41.2
5	Panchrole	2447.2	1955.2	110.2	1215.0	399.0	231
6	Sahara	2666.8	1860.0	63.0	1265.0	350.3	181.7
7	Rishi bankim chandra	2652.4	2085.2	80.2	1301.0	382.9	321.1
8	Junki	2871.2	2293.2	37.2	1041.0	1054	161
9	Egra Municipility	1911.6	1160.4	3.4	921.8	205.9	29.3

Source: Office of Asst. Director of Agriculture, Egra Block-I, Purba medinipur.

Table -2
General land use and cropping pattern in study area-(Block-II) 2011-12

SL NO	Name of G.P	Geographical area(hector)	Net crop area(hector)	Agricultural resource and Land Situation (area in hector)			
				Plantation and Horticulture	Commercial crop area	Food crop area	Aqua culture and others
1	Deshbondhu	2354.44	2215.67	319.5	831.6	939.7	124.87
2	Bathuary	2964	2258.71	271.6	753.7	1012.7	220.7
3	Vivekananda	2361.69	2143.90	166.5	910.5	996.5	70.4
4	Manjushree	2453.25	2317.22	115.0	1074.7	994.5	133.02
5	Paniparul	2579.75	2361.59	310.2	918.9	1075.7	56.79
6	Dubda	3129.34	2680.76	313.7	826.8	996.5	543.76
7	Sarbodaya	1356.00	1242.63	80.2	449.7	632.7	80.03
8	Basudev pur	1428.43	1398.84	91.8	539.5	710.7	56.84

Source: Office of Asst. Director of Agriculture, Egra Block-II, Purba medinipur.

3. The role of extension in climate change adaptation

Agricultural extension is a collection of embedded communicative measures that are intended to lead to the settlement of crisis scenarios. This concept provides agriculture with the mandate to accommodate the problem of climate change in its activities. However, in order to produce performance, functions and capability adjustments in the extension framework are required to take account of the new dimensions induced by climate change. The following is addressed in three areas in which extension will play a role in climate change adaptation: infrastructure and information capability growth, policy and programme facilitation and implementation.

3.1 Technologies and management information of villages under Egra I and Egra II.

Traditionally, the extension has been influential in supplying knowledge and encouraging emerging technology or new approaches to handle crops and farmland. The farmers here are using submersible pumps either individually or sometimes jointly for the purpose of irrigation. They often use high-pressure water pumps to supply water to land and thus manages to avoid draught. There has been a shift of crop cultivation from paddy to other crops which are sellable at higher rates in govt. established stalls and to the govt. They also buy powertillers and tractors at a highly subsidized rate with the help of agricultural dept of Egra. Usage of various types of micronutrient rich fertilizers is also adopted by them alongside the old NPK based fertilisers. Their knowledge have been much scientific and targeted by the help of block level trainings. The area of land, technology and types of crop have extended. The extension also connects farmers to researchers and other innovation device players. Farmers, expansion agents and experts can operate together in the fields of farmers, prioritising, researching and encouraging new crop varieties and management techniques. Although extension must now go beyond such approaches, easy technology transfer is also required to improve climate resilience.

Farmers today would need to be prepared to respond to climate change efficiently and handle threats sufficiently. This would be incredibly daunting in terms of expertise and information structures. Farmers must have access, by extensions and information networks, to all kinds of information, be it environment information, predictions, adaptive technology developments, or markets. Extension agents may incorporate locally suitable technology and management strategies that enable farmers to respond to climate change by, for example, disseminating local cultivars with crop knowledge of dry-resistant varieties. Additionally, extension workers may share their knowledge of crop and management systems with farmers which are resilient to evolving conditions such as inter-cropping, sequential crop development and non-cropping. Some of these activities provide the added value of better control of natural capital. It is essential to inform farmers how the different options will raise income and yields, maintain food security in households, improve soils, improve biodiversity, and generally help mitigate climate change. Simultaneously, extension workers may play an important role in transmitting indigenous technological expertise to assist farmers worldwide. The main obstacle for more progress in the future is to switch from the distribution of 'sets' of technical and management guidance to assist farmers in selecting the right approach for coping with climate instability and

fluctuations. In some places where climate change enviable their present agriculture structures, certain farmers may still need to access to new technology and management choices.

3.3 Capacity Development: IN EGRA I & EGRA II

One of the primary activities of extension over time is adult education and non-formal education. This task is continued today and in the light of the changing environment is much more significant. In the Egra I and II there have been attempts on the part of the government to teach the farmers in various ways using methods ranging from posters, radio signals and field presentations. Latest groundbreaking expansion programmes involve adult education and literacy methods in farmer field schools, an extension and education approach for growers currently focused on climate change concerns. Climate change is to cause catastrophic incidents such as unexpected floods and emerging vectors of human and animal diseases. In Egra it is often found among the farmers that they are using weather forecast news as their guidelines to time cultivation or harvesting. Evidence suggests that the largest impacts would be minor droughts, flooding and other phenomena that create significant difficulties but do not draw foreign interest. Farmers may be better able to deal with various types of danger and extension activities, so government agencies and private sectors must concentrate on teaching farmers about their choices to increase flexibility and responsiveness. Capacity is required to include new players, including humanitarian organisations. Therefore, education must go beyond professional training to improve farmers' capacity to plan, address problem areas, think strategically and prioritise, collaborate, develop cooperation and leadership skills, interact with various partners and eventually be probationary.

Capacity growth is also essential for expansion. Extension employees are typically only skilled in technological competence and sometimes lack "soft" skills such as networking, farmers' groups growth, systems thinking, information management and networks. To strengthen rural growth results, farmers and expanders need modern skills that include rural education and extension curriculums that provide the assessment and interpretation of rural people's awareness, perspectives and co-learning. There are numerous ways to advise and educate farmers regarding choices for adaptation.

3.4 **Facilitating and Implementing Policies & Programs**

Another essential function of extension for climate change transition is to pull together various rural players—traditional relations between farmers and transportation officers, markets and suppliers of inputs, among others. With climate change, the extension system would be increasingly critical in connecting farmers and other citizens in rural areas directly with public and private organisations that distribute adaptation technology and finance adaptation investment programmes. It would be imperative to improve access to meteorological knowledge.

Extension often poses a major obstacle in putting the interests of farmers and others together when they face environment and business uncertainties. The extension has the potential to make an important impact by better farmers' decision-making to address this void. Extension agents can also enable farmers to enforce climate change adaptation policies and programmes. Extension staff may, for example, be active in education

for farmers in their region, assisting in developing community associations, linking farmers to national and foreign governmental, non-governmental and private organisations, and maybe assisting in drafting initiatives or collaborating with other players.

4. **Suggestions for Policy Makers and Public Extension Agencies**

Tight government budgets, reform initiatives such as decentralisation and new ICT technology have contributed to pluralistic extension and advisory services in many countries, especially in industrialised countries, integrating public and private approaches to fund and enforce expansion. This pluralism allows versatility, supports demand-driven services and relieves some of the public sector's financial strain. But it also complicates cooperation to ensure that the needs of all growers, not just big business farmers, are addressed. It poses obstacles to ensure that extension services are responsible, economies of scale are understood, and money is not wasted or removed by the public sector extension service. Eliminating public enlargement may result in unmet demands from farmers with limited capital or for environmental change. In this organising phase the diverse positions of the various extension service suppliers, including public growth, private feedback and service providers, NGOs and user associations, have to be taken into account. Decentralization can help with transparency and serve the interests of heterogeneous consumers, but the tools available for tracking and, in particular, for assessment are needed. The evaluation may be used to evaluate what works, what doesn't and how cost-effective a strategy is in the region. Extension programmes also provide tracking and assessment units, but generally stress surveillance and may not measure what functions and what doesn't. Extensive learning or innovative thought on assessment and effect is very few.

Decentralizing programme preparation and administration with active input by stakeholders, which includes the expansion of the public into new sources, means making the structure just democratic enough to secure funding, but not so political, that those in control will seize it. Overly politicised networks lose legitimacy and lose funds as farmers see them simply as government eyes and ears rather than intelligence suppliers. The politicisation of public extension agencies in Ecuador and Honduras contributed many years ago to their dismantling. With the second-largest extension scheme in the world in India, in the 1970s the extension was moved from the unified T&V system to the late 1990s, partially because of T&V's financial pressure. ATMA is a multi-stakeholder independent organisation that includes agricultural organisations, NGOs, private groups and public expansion agents with ties to study through the Indian Council for Agricultural Research (ICAR). The jury is still not sure of the general performance of this decentralised pluralistic paradigm, while the interests of several smallholders remain uncertain.

The movement toward cost-sharing by stakeholders is likely to persist, and the model should represent farmers of all types if society is to gain in general. If budgetary problems with municipal extension programmes remain, private-public partnerships (PPPs) are one method for minimising their magnitude, whether knowledge on extensions is contained in goods or guidance. One approach to meet the smallholder farmers with the "last mile" of the extension service is to foster ties between extension groups and farmers. These relations can take several forms. In Colombia's coffee region, the National Federation of Coffee Growers transmits knowledge through daily meetings and demonstrations and using electronic media to

farmers groups in rural communities. In Niger, public extension communicates knowledge to smallholder farmers via rural farmer associations with village-level units. In Nepal, IDE, an international nongovernmental organisation, enabled rural societies to choose "Community Business Facilitators" (CBFs) from neighbourhood organisations. These facilitators obtain a short term education from public agencies and/or donors so that they can help to identify pesticides and other crop problems, but are connected to local input providers in an agreement which pays the CBFs a percentage of the sales price for goods which they buy and sell to other people in the town.

Public and private extension providers must thoroughly accept and leverage the new ICTs to encourage creativity. This emerging technology will improve the distribution of knowledge to farmers and supplement additional extension approaches, are cost-effective to introduce, help extension programmes understand what works and can help identify problems.

ICT-based information on expansion can mitigate gender bias by providing households with restricted resource headings in their homes with information if women have no less access to ICT than men. Women are always at least as concerned as men whether they have links to social networks online or offline. In technology diffusion farmers' associations and virtual networks play an extremely significant function. These networks must be utilised for extension providers. For example, also in developed nations, products such as WhatsApp, and other cell-phone networking and message applications are becoming popular and their extension to topics such as crop pest diagnosis and recommendations expands rapidly. Comprehensive decision-making skills can be shared by webinars and other resources for distance learning as farmer access to computers in developed countries is expanding.

For any extension service, good in-service training is necessary; however, significantly when ICT technologies are evolving as rapidly as agriculture technologies. Historically strong extension programmes such as the one operated by the Colombian national federation of coffee growers often provide instruction in service while maintaining demand is driven by the entire scheme. A good extension depends on retaining close relations with the new research-driven developments.

Conclusions:

Some development as well a holistic change is obviously noticed in the Egra I and Egra II. Farmers have been accustomed to using modern tools like a submersible pump, if necessary in a joint venture, cultivator machines for small lands and large harvester for bigger lands. There has been a thorough development in their understanding of the different needs of nutrition for different types of crops, and they have understood how to apply both micro and macronutrients accordingly. Another substantial change has been noticed among them that they have been able to understand types of land and are selecting crops that thrive well that specific type of soil and land. They have also learned to select different breeds of the same crop as per the elevation, slope and water retention capacity of the land. They have even discarded some

traditional crops like paddy and potato and undertaken more yielding and profitable crops like mustard, cucumber, cauliflower, peanuts and even to permanent plants like banana, cashew nuts. Some have changed their land for nurseries and fisheries. This paper explored the variables that affect the usage of agricultural technology in past research. Farmers' understanding of the latest technologies is a crucial prerequisite for acceptance. Other factors influencing the implementation of farming technology involve human, demographic, technical and institutional factors. The determinant of the acceptance of agricultural technology does not always affect the adoption, but the effect differs depending on the form of technology adopted. For example, farm size has been shown to be a mixed influence as a determinant of technology acceptance. Sizes of vast farms may have positive implications on the use of such methods, and they may also have detrimental effects on the use of other strategies, such as zero grazing. In the preparation and execution of technology-related projects to meet challenges in developed countries, it is essential to consider the factors influencing or hindering the acceptance of agricultural technology. Therefore, for policymakers and developers of digital technologies to increase farmers' technology acceptance, it is crucial for farmers to realise how they need and how they should use their technology to create the technology that fits them.

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