CHAPTER 1

INTRODUCTION

1.1 Background

Since the agriculture sector is the backbone of Indian economy and about 52 percent of the total work force is still employed by the farm sector which makes more than half of the Indian population dependent on agriculture for sustenance (NSSO 66th Round). The contribution of agriculture sector to Gross Domestic Product (GDP) has fallen from 30 percent in 1990-91 to less than 15 percent in 2011-12 (CSO) having a growth rate of 2% (2006-09) (IMF 2006). Though food grain production has touched a new peak of 250.42 million tons in 2011-12, growth rate in agriculture in Eleventh Plan (2007-12) is about 3.3-3.5 percent per year (Planning Commission, 2011) against a target of 4 percent during the XIIth Plan (20012-17) (CSO). But significant improvement in productivity is yet to be witnessed.

After independence the government has taken several steps to increase production level in agriculture sector of the country and to make agriculture sector more sustainable. To make our country self sufficient in food grain production and to reach the point where we can have surplus food, Green revolution came into existence in the mid 1960s, which was the breakthrough in planned agriculture development. Broadly we have witnessed two challenges related to agriculture, the first one was to increase production and productivity, and the second was the volatility of food product prices. These interconnected combination of steps could help make sure that the most vulnerable countries and people get the nutrition they need.

To cope up with these issues, the government made significant changes in technological and policy packages to help the farmers. Technological changes occurred in a much diversified manner covering seeds, adequate artificial fertilization, improved irrigation, pesticides, machines etc. under the green revolution strategies, high yielding varieties (HYV) and hybrid varieties alerted the agriculture sector. Farmers adopted this change

that increased both area as well as production in the context of HYV. In India the percentage of high yielding varieties area to the total area under wheat increased from 3.9 percent in 1966/1967 to 90 percent in 1992/1993 (Government of India, 1993). In rice too, new varieties have spread rapidly (Barker et al., 1985). In India alone the percentage of area under HYVs grew to 68 percent (Government of India, 1993). By 1993 the area of rice under HYVs had grown by more than 50 percent since the mid-1960s. In India the percentage of area under HYVs grew to 68 percent (Government of India, 1993). In India, wheat production grew more than six fold between 1961 and 1998 (FAO, 1961-1998).

The government also directly supported farmers by initiating some policy packages such as subsidized farm inputs (fertilizers and irrigation etc.), support pricing and support for agriculture research in India. But these subsidy based interventions such as fertilizer subsidies reduced prices to 25 percent of their world market price but put a heavy burden on government budgets and also caused detrimental effects that led to misuse and soil degradation. This increasing resource degradation could effectively be tackled by appropriate and scientific use of natural resources, resulting in the yield enhancement to achieve accelerated agricultural growth.

However, failing to achieve sustainable growth in agriculture in the 1970s and 1980s as major food crops showed stagnation in the output production and in some cases have even declined. Major reasons for fall in growth are many but the prominent one was the lack of appropriate information and services that attracted major attention of the policy makers in the last decade.

Rapid advancements and changing needs of the farmers in respect with technology and research paradigms necessitate the focus on agriculture extension. Firstly it was driven by a community development approach in 1952 in parallel with major government policies to strengthen the agriculture system in India. The major leap was high yielding variety program in 1966-67 and small and marginal farmer's development program in 1969-70. But the most significant development program was Training and Visit (T&V) extension management system started in the mid 1970s. It focused on disseminating green revolution technologies for cereal crops and so far the major parts of extension activities were carried out by the State Department of Agriculture, especially public sector and so many others. But for various reasons these initiatives failed to achieve the required extension goals due to lack of infrastructure, trained personal and resources and lack of reach. A steady decrease in public investment in agriculture was observed. During the

Sixth Five Year Plan period (1980-85) the agricultural sector was allocated only Rs 64,012 crore which came down to Rs 42,226 crore during the Ninth Five Year Plan period (1997-02) in real terms. It has resulted in an unfortunate trend over the years to cut back on essential staff, particularly in extension departments. As a result, extension wings across the country are severely understaffed (Planning Commission, 2008). To cover 600,000 villages across the country, there were roughly over 1, 10,000 extension workers engaged to cater to the needs of the farm families (Rasheed & van den Ban, 2000).

Also, T&V system is generally operated with low level of involvement of farmers by providing generalized information rather than specifically oriented needs of the region, target group requirements etc. and the system was not adequately developed according to farmers and natural resource management, suitable agricultural practices such as IPM etc. and subsequently agricultural diversification such as high value agriculture was not served by T&V extension. The inherent problems in the T&V model were only fully acknowledged in the 1990s. In 1990, to meet the above challenges. India's extension system has experienced major changes (Sharma, 2002).

Though, agricultural extension systems in India are barely functioning and comprise some major barriers in effective working especially to small holder farmers (Parikh, T. S., 2007). Some of them are of limited reach to farmers because of geographically dispersed areas, low motivation and accountability of field level staff, limited logistics, sheer numbers and difficulty faced in building rapport with farmers etc. leading to information asymmetries to farmers (knowledge gap) (Aker, 2011).

Information and communication have always mattered in agriculture to overcome the existing knowledge gap. Updated information allows the farmers to cope up with and even get benefit from recent changes in modern agriculture. This technological advancement and changing farmer's needs can be met through various media by transferring information and knowledge in an efficient way (Birkhaeuser et al., 1991). National Commission on Farmers has noted that knowledge deficits hindered the agricultural productivity in India. In keeping with this view, Government of India has recommended that there is a need to take effective measures against the emerging challenges in the agriculture sector by strengthening information dissemination to farmers with the help of ICTs and to turn agricultural extension into more diversified, knowledge intensive, and thus more effective tool in meeting farmers' information needs (Zijp, 1994).

Traditional media known as mass media played an important role in creating awareness about new agricultural technologies among farmers. The mass media were spreading agricultural technologies to the farmers at a faster rate than personal contact (Butt et al., 2008). It contains both electronic and print media such as television, radio and newspaper and provide frequent contact with most farmers and economically viable to all sects of people. Hence, ease and accessibility make them efficient dispensers of information (Wilkening, 1956).

Several programs were initiated by the government of India to cater day to day seasonal needs for the farming community and provide latest information on latest technologies. Since 2004, AIR has been broadcasting daily market rates and weather reports to farmers through a network of 94 FM stations. In addition, non formal educational programs known as "Farm School on Air" are also broadcast by AIR. Doordarshan started telecasting agricultural programs (Krishi Darshan) for farmers on an experimental basis in 1966. At present, these programs are broadcast in half an hour slot for five days a week. Mass media broadcasts supported by trained agricultural extension personnel at the field level shaped the backbone of the agricultural extension system in India. All India Radio (AIR) started broadcasting for the farming community in the late 1950s. These programs cater to the day to day seasonal needs of the farming community and provide information on latest agricultural technologies. These programs are broadcast for a duration of 60 to 100 minutes every day (Ali, 2011).

But these mass media messages are too broad to be of much use and usually serve only as an aide memoir for regular field operations (Gandhi et al., 2007). Although mass media enabled agriculture extension somehow reduced the information gap but the problems exist as the agriculture sector becomes more complex in view of emerging agricultural trade and organized food retailing, efficient forward and backward linkages and the involvement of private agribusiness players.

With the opening of Indian economy in 1990 and in the post WTO era, the agriculture has turned into a highly diverse industry. Planning commission (2002) of India recommended planned interventions at all links in agricultural supply chain such as delivery of farm inputs and its use, increasing production through efficient management at the farm level, lowering post harvest losses in handling and storage by providing storage and transportation infrastructure and processing farm outputs into higher value foods are the primary factors for agricultural development.

The prospective decisions to be made by farmers lie in the diversified ranges from choice of inputs (crop varieties and seeds, water, power, fertilizers and pesticides) and market transactions related to them, farm operations (tillage, sowing, water management, fertilizer management, pest management, harvest), post-harvest operations and transactions (storage, transport, marketing, processing, etc.) and many others. Several other nonfarm decisions which impacted farm operations include savings, investments, education, health, etc. and information accessed and supported through various organizations (e.g., input suppliers, rural credit agencies, extension services, NGOs) (Rao, 2007).

Information required in this vast agribusiness perspective, generally comes from research organizations, government and private sector, NGOs, and institutional establishments. This information can be enhanced by using broad spectrum of communication systems and activities through the integration of multimedia mechanism into daily processes. The information problem and knowledge gaps generally faced by the farmers in their livelihood activities and investment decisions can be overcome effectively by utilizing aforesaid measures. (Chapman & Slaymaker, 2002).

Improving the quality and quantity of information available is necessary but not sufficient for improved decision making. Overall improvement requires active stakeholder participation to better defend their interests and articulate their needs. There is a need to understand how to convert this information into knowledge by acquiring, transmitting, altering and integrating it into conceptual systems among individuals and groups. Apart from the occurrence of the technological transformation in the world, the power of knowledge (technical knowledge and information gaps arisen from the unequal distribution of technical knowledge and information) can be greatly enhanced by ICTs if they are harnessed to improve and break down both these barriers of knowledge and information exchange (World Development Report (WDR), 1999).

To tap the potential of new technologies, its adaptation merely depends on innovations (technological, institutional and entrepreneurial) to create low cost, easy handling of devices and to set up access through public or market centers with affordable products. But the information flows are generally top down in nature with less of local relevance to farmers who are not able to avail the question and answer services or supply feedback to the extension services and research centers. These constraints of knowledge creation and knowledge sharing have led extension services to focus on the importance of

two way flow of information with a shift towards a more participatory approach. Participatory approach can be achieved by improving and enhancing two way flow of information (Zijp, 1994), instead of the outdated mode of one way information delivery mechanism, although it is also necessary (Chapman & Slaymaker, 2002).

Information is at the core of the information exchange processes in agricultural information system. To make sure that the information can be understood by local people, the sharing of knowledge should be available in local context or content specific and relational in nature. There is a vast amount of literature recommending approaches to design information content locally in context of language; culture, information delivery channel and information format (Batchelor et al. 2003).

The recent advances in ICTs have proved to be a great boon for the agriculture sector in general and for making the extension services effective in particular, by speeding up and managing information flows at various levels (Jones & Garforth, 1996). The use of ICTs is innovative if its use along with farmer's participation can be the best solution to make decisions more effective. It also covers all the dimensions of information accessed to meet the demands that farmers face during their decision making process.

The role of ICTs in such a scenario is to provide timely information, increase choice, reduce transaction costs, and to improve the efficiency of decision making that can result in enhancing production, improving the quality of life and income of the farmers (Rao, 2005). Innovations have been taking place in the form of multi-purpose information kiosk, telecenter, mobile based applications etc. and a number of initiatives are in progress in India. Some of the known initiatives are e-choupal, Tata Kisan Sansar, Warana model, Eid parry project, M S Swami Nathan project, Gyan Doot, I kisan etc. The government of India has also formulated an ambitious National e-governance Plan (NeGP) which identifies 25 mission mode projects to be implemented through different ministries at the center as well as the state levels.

There are over 200 ICT-enabled development interventions in various stages of implementation across the country; most of them include some component related to agriculture (Kameswari et. al, 2011). In India there are approximately fifty grassroots level ICT projects, some are running quite successfully, whereas others have a long way to go. However, integration of Information and Communication Technologies can disseminate the agricultural information to fulfill the existing gap. So, ICT models give a

new concept of business process handling among farmers. Studies have been done in taking a review of these models about the information disseminated to the farmers. That gives the concept of new models on agricultural decision making process in developing countries including India.

Most of the ICT models including both the private sector as well as public sector have been launched with agricultural applications as their prime focus. There also exists public-private partnership (PPP) and cooperatives involvement in launching ICT models. These models are providing a range of services to overcome the information deficit situation which our farmers are facing in agricultural production, input supply, agricultural extension, market information/ intelligence and price discovery (Narula & Sharma, 2008; Narula, 2009).

In spite of all these initiatives, it has been felt that there exists a huge gap between what is being offered and what is being demanded, (Cecchini & Raina, 2004; Saith & Vijaybhaskar, 2008). Hence, there is a strong need to explore important issues pertaining to this gap such as assessing the information-supply gap, the impact of information modules to target beneficiaries, to explore the farmer centric needs etc.

This study has examined the impact of ICTs in strengthening agribusiness in India. Due to the degradation in natural resources, improved agricultural technologies and market led development, agriculture has transformed from the traditional state into modern one and it is embedded with vast information and knowledge as needed by the farmers. Primarily public extension services were the most common means for dissemination of information to farmers which failed to respond to their changing needs, mainly due to poor implementation, lack of staff accountability and limited reach among the targeted population. ICTs can play an important role in making effective decisions by ensuring real time information and availability of scientific and technical information. This may lead to development of innovative information delivery mechanism in the form of information delivery models which came into existence for providing the content of information in a better way. This study has evaluated the four information delivery models, as how these models could be better implemented in achieving their goals.

In this study efforts have been made to analyze different information delivery models on the basis of their functioning which are broadly categorized as informational, transactional and e-governance models. This study gives a clear view about the relevance,

objectivity, effectiveness and the performance of innovative information delivery models which are providing information regarding farmers' needs in their agricultural decision making process through the stages of planning, input, cultivation, post-harvest operations, marketing and distribution. The study is basically exploratory in nature, specifically concerned with user and non user group of respective models and the data has been collected through the primary survey. The study area includes different zone of U.P. viz. western, eastern and southern U.P. (Bundelkhand). Selective statistical tools and techniques have been applied using SPSS 13.0 and E-Views software to draw the conclusion of the study. This study gives the recommendations for the implementation of innovative information delivery projects to reduce the knowledge gap among farmers and to provide them with relevant information regarding the whole agricultural value/ supply chain.

1.2 Structure of the Thesis

This thesis is divided into 10 chapters. Chapter 1 presents the background and interest of the research. It critically gives an idea about the challenges faced by Indian farmers and the transformation of agriculture extension from traditional to modern one (through innovative information delivery models) in acquiring information related to agricultural activities.

Chapter 2 provides a review of literatures relevant to the research objectives containing the three main research areas. Firstly, it traces the agricultural problems, technology adoption role and issues through extension services particularly in India and in the world in general. Secondly, by finding the factors that are affecting the extension services through proper use of ICTs or determining the factors of transfer of technologies, this chapter helps build the fundamental concepts of ICT and decision making at all levels of agricultural decision making process. Lastly, it presents a comprehensive review of previous research work on information delivery models involved in facilitating the information content concerned with farmers in their decision making process.

Chapter 3 introduces the conceptual framework of supply chain management in agriculture and discusses the formulation of hypothesis. The factors such as socio-demographic profile, farm characteristics and business characteristics of farmers, which are affecting ICT use in agriculture decision making processes are predicted. Chapter 4 provides a description of the research methodology used in this study. Briefly, it discusses

about the sampling procedure for data collection, survey instrument, and techniques of data analysis employed in the study.

Chapter 5 describes the present situation of agriculture in India and develops a theoretical framework to explain the relevance and importance of sources of information in the agriculture decision making process using secondary data of NSSO (2005). Lastly, it sketches the changing face of agriculture supply chain. Chapter 6 provides the theoretical background to explain the need of ICT models. It also discusses the development of information delivery models and institutional structure, functioning and operations of four models selected in our study. Chapter 7 analyses the importance of various sources of information in decision making processes.

Chapter 8 compares the strength of four models across the stages of agriculture supply chain and also performs the user and non-user analysis of these models. Chapter 9 identifies the factors affecting adoption of ICTs at different stages of agricultural supply chain. Finally, Chapter 10 draws the conclusion and suggestions of the research, and also hints the future directions for further research.