



**INFORMATION AND COMMUNICATION  
TECHNOLOGIES (ICTs) FOR STRENGTHENING  
AGRIBUSINESS IN INDIA**

**ABSTRACT OF THE THESIS**

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## Abstract

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 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. Multi stage stratified sampling has been used for the study. Firstly, Uttar Pradesh is divided into three parts viz. Eastern, Western and Southern to homogeneously cover the geographical location of the state. The second stage includes the selection of information delivery models. Three ICT based models and one Non-ICT based model have been selected for the study to make a comparison of effectiveness and efficiency of information delivery provisions among them. The three ICT based models namely 'Lifeline'; 'E-choupal' and 'CSC' were selected on the basis of their service provisions, categorized as informational, transactional and e-governance models respectively. These

models show heavy presence in the four cities such that Life Line initiative is located in Jhansi district, E-choupal in Hathras, TKS in Aligarh and CSC initiative in Gorakhpur. In addition Gorakhpur represents for CSC initiative which was selected on the ground of a government plan to make this totally e-governance district among the six districts in Uttar Pradesh. Third stage stratification was done on the basis of population covered by the respective models; the selection has been made for the survey in the initiative centers location. Users/non users were randomly selected for different initiatives. A total of 290 farmers' responses have been collected. Three hypotheses were formulated in this study.

The percentage, Mean, ANOVA and Chi-square analysis was done by using SPSS 13.0 and regression analysis by E views software to draw the conclusion of the study. Analysis of variance (ANOVA) was used to analyze the effect of land holding size, education and social category of respondents regarding user and non user groups of four models. By using chi-square test, the study has analyzed the difference of decision making qualities between four models and also established the relationship between users and non users of respective models. Negative Binomial Regression Model was employed to analyze the factors affecting adoption of information using ICTs for better agricultural decision making among farmers and also for five specific stages of agricultural supply chain. 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 agriculture value/ supply chain.

Our study found that overall users and non users of models showed distinct behavior in quality of agricultural decision making. The user group farmers got improved quality of information on all the aspects of supply chain decisions related to planning, input, cultivation, post-harvest, marketing and distribution decisions. Farmers using any model were more planned in their farming practices in comparison to non user group. User group farmers organized their farming practices from the initial level, they were less cautious about cultivation decisions, more inclined to save their post harvest losses, well informed about market prices, more concerned about marketing and channelizing their produce in local or distant markets. Information and services delivered by models for decision making at different levels of agricultural supply chains were far better than those used by farmers who applied traditional sources of information. This strongly recommends the need of information to be delivered in appropriate manner and to be

prioritized according to agricultural supply chain stages which ultimately will lead to increase production and income of the farmers.

The study found that the farmers using ICT models made better quality decisions in comparison to those using non-ICT models. E-choupal users made better quality decisions than lifeline. Lifeline (an informational model) provided better information (on 18 activities) than TKS (on 5 activities). Lifeline users made better quality decisions across the whole supply chain except for planning decisions. Users of CSC model (kiosk-based internet) were making better decisions for planning, input, post harvest, marketing and distribution as compared to TKS model except for some of the activities. While on comparing users of e-choupal with TKS we found the huge difference in quality of information as TKS model lagged at all the stages of agricultural supply chain. The above results conclude that ICT models are far better in delivering services and information than a non-ICT model.

E-choupal users adopted more planned decisions than lifeline users. Both the set of users were on same status for cultivation decisions whereas rest of the results with significant difference favoured e-choupal users. The above results interpret that the transactional model has an edge on informational model by not only delivering information but also by providing the relevant solutions regarding seeds, weeds, markets etc. i.e. providing information as well as facilitating transactions related to these activities.

Users of e-choupal performed better than the users of CSC model on 28 activities though both are of transactional type and using internet technology but the first one covers the whole agricultural supply chain and the second one only facilitates e-governance transactions like electoral identity cards, driving licenses, passport, certificates etc. These findings suggest that by embedding agricultural information services with the CSC model, farmers could be facilitated with more enhanced and useful information/knowledge on most of their agricultural decisions. CSC being a government initiated model of wide coverage area and population it would fill the void space with latest agricultural technologies and services.

Comparison between informational model (Lifeline) and e-governance model (CSC) illustrated mix results. 'CSC model' was efficient in input and marketing level information and deprived in cultivation decisions whereas 'Lifeline model' provided better quality of information regarding planning and post harvest decisions. All the above

findings concluded that there is a need to review and revisit the model's approaches toward service provision and make necessary changes so as to provide services in holistic manner by controlling weak aspects regarding the whole agricultural supply chain activities. In the light of above findings we can say that farmers would get enhanced production, increased income and bargain price for their surplus produce that will align them with mainstream development of the nation and will recognize them to be an important player in the agriculture value chain.

The above findings brought to light important results by comparing all the models on the basis of their functioning. Transactional model (E-choupal) has emerged as the most successful model on comparing with other three types of models. This clearly indicated that e-choupal user group farmers were making better decisions right from planning to marketing and distribution stages than those of all the three models.

Informational model (Lifeline) of service provision appeared to be the second most effective model for cultivation, post harvest and marketing stages but partially abortive for planning and input decisions in comparison to non ICT model (TKS). Users of e-governance model made better decisions for planning, input and marketing while users of informational model performed better in cultivation and post harvest decisions. E-governance model (CSC) has been recognized as the third most effective model in delivery of information to farmers. Generally CSC users were getting better information than TKS users for planning, input, post harvest, marketing and distribution but for cultivation both the users were similar in decision making.

Lifeline model did not significantly improve the performance of users as a very less number of activities were better informed for decision making. The findings showed that the farmers with low level of education were not able to make proper use of information and knowledge being provided to them. Farmers having moderate education level made significant impact on the quality of decision making on most of the activities across the agriculture supply chain.

Users of e-choupal farmers made planned decisions at all stages of agricultural supply chain. The results indicated that the user group farmers of higher education level (graduate and above) showed much better quality of decision for planning level activities. User farmers educated up to secondary and senior secondary level showed significantly different results for input decisions. While the user group having education up to

moderate level significantly impacted on the quality of decision at cultivation processes. The results also indicated the importance of post harvest decisions, when the education level was moderate and higher. It implied that users were seriously concerned about the activities like cleaning, sorting, grading and weighing in particular. The same justification is for moderately educated user group at marketing level. According to land holding size, medium landholding farmers were more concerned about planning activities than large farmers. However as we move up the hierarchy of social category from OBC to General the impact on quality of decision making between user and non user group improved significantly.

In CSC model, categorical analysis related to socio demographic variables indicated that highly educated users' preferences shifted towards input, post harvest, marketing and distribution activities. It strongly pronounced the reason that less educated farmers were not familiar with the technologies like internet and computer, as they lack in trust of information being delivered to them. Land holding pattern also showed similar results as in the case of e-choupal model. OBC users made better quality of decisions and were frequent users of CSC kiosks to transact e-governance related activities. In TKS analysis, farmers up to junior level of education showed significant decisions giving the perception that information content is more relevant to this group. According to land holding size, medium farmers made more significant decision at different levels of agricultural supply chain. Socially higher class farmers often made more informational and transactional exchanges in comparison to other social groups, the justification is same as in the case of e-choupal model.

The findings conclude that the socio demographic factors such as education, landholding size and social groups are important factors affecting the usage of ICT in making decisions for the whole agricultural supply chain. The above analysis postulates some recommendations for designing the information delivery models. The services and information content should be in fragmented form according to the social characteristics, education status and land holding size. Integrating ICT components would impact better in service provision to farmers as the farmer groups consist of different levels of understanding of the information content through the medium by which they accessed. Information and knowledge delivery should be tuned with different modes of ICTs by presenting in easy, understandable and reliable format.

Locally interpreted and easily understandable information must be offered which is a prime task of ICT enabled models. The socially higher class generally made transactional and informational processing but the resource poor farmers often lack in reaping these benefits. Resource constraint may be the major barrier to these groups. ICT interventions need to take holistic and integrated approach for the socially lower class to use the available information with a particular attention of financial services provision.

The public-private partnership could enhance the usage level of the models by covering different levels of agricultural supply chain. To make it a success, educating the farmers (especially the small and the marginal ones) is the need of the hour. Proper training is to be imparted to make them understand how to use the applications of ICTs. This is the onus of the government to make optimal use of ICT by formulating a policy on the same. The study strongly recommends that ICT models embedded with transactional, informational and e-governance services greatly cater to the needs of all sects of agrarian community.

The major part of farmer's income coming from the farming sector is more likely to influence the adoption of ICTs based decisions. The disadvantaged farmers and poorer communities (socially deprived people) gained 57% more from the ICT-assisted interventions than those who belonged to socially higher class.

Age factor analysis showed that the older farmers were less likely to adopt modern agricultural planning decisions as the age coefficient was significantly negative. The farmers having income less than Rs. 5000 were more likely to adopt technological information as 77 % for planning, 71 % for input and 63 % for cultivation decisions. Farmers who possessed leased land of greater than 5 ha were more likely to adopt technological information and the large landholding size as such also significantly influenced the adoption. The business characteristics of farmers such as awareness of government subsidies influenced input decisions 2.5 times more as compared to those who were unaware.

The farmers who availed demonstration facilities regarding agricultural decisions were 164% more likely to adopt ICT based information for overall agricultural decisions whereas planning, input and cultivation decisions were also better adopted. Personalized technical assistance such as expertise provided by crop consultants and input suppliers appears to have the greatest impact on adoption. The study found that the farmers having

mobiles as an asset are 96 % more likely to use this for information dissemination for agricultural decisions and 211% & 147% for planning and cultivation decisions respectively.

The study demonstrated that a single information delivery system could not optimally benefit the farmers. The study strongly advocated that the mixed delivery approach of services comprising both ICT and demonstration facility (informal interaction and formal training) would enhance farmer's capacity to use agriculture information more efficiently. This type of support would be much more expensive to afford than the generic information programs but could be administered through cost-sharing or other incentives which would encourage farmers to utilize ICT technologies in information processing.

As evident from the recent IT development mobile accessibility has increased enormously; the potential of it could be exploited using different features of mobile delivery mechanism like SMS, Voice call etc. This has sketched a blueprint for the ongoing ICT projects run through public, private and NGOs initiatives in delivery of information content.

These findings have implications not only for India but for all developing countries having similar structure of agrarian community. Because of cost, resource and time constraints the scope of the study was kept limited to only one state of India by covering only four districts. It should be expanded to more geographical locations and environmental conditions to get more results which could be generalized for the whole country.

Further the study could be extended to cover up more models according to the way of dissemination of services like SMS based, video based and telecenter based to view an integrated ICT model. Additional explanatory variables such as psychological traits could be added to further research in order to enhance the predictability of models and to offer an improved understanding of farmer's adoption behavior in using ICT based interventions.