



Constraints Faced by Farmers and Agricultural Extensionists in Using Selected Information Technology Enabled Systems for Agriculture*

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ABSTRACT The study identifies the constraints faced by farmers and agricultural extensionists of Kerala, India, in utilizing selected Information Technology Enabled Systems (ITES) such as web browsing, agricultural portals, agricultural expert systems, digitized databases and online trading in agriculture. Altogether 300 computer literate farmers and 120 agricultural extensionists from the districts of Thrissur, Idukki and Malappuram have been sampled for the study. The major constraints faced by both farmers and agricultural extensionists are lack of awareness about ITES, cost of technology and lack of skill in using the ITES. These constraints still remain as the major hindrances in using various ITES. Hence trainings should be imparted to both the farmers and agricultural extensionists to create awareness and knowledge about the ITES, and it will ultimately lead to effective access to agricultural information.

INTRODUCTION

The use of Information Technology (IT) in the field of agriculture still remains as an innovation among many of the farmers and agricultural extensionists. IT can play a vital role in agricultural production and marketing (Thiruniraiselvi 2009). It can lead to agricultural development by providing crucial information on various agricultural activities starting from the pre-production stage to marketing stage. The most significant factor behind the empowerment of farmer is the use of e-Agriculture (Rashid et al. 2016).

In recent days, various information on package of practices (POP) such as Integrated Pest Management (IPM), availability of market and pricing trends are available through IT. This enables the agricultural extensionists and farmers to make use of the updated technologies and information and this, in turn increases the production and gross income of farmers. Even though these ser-

vices are available for many years, the usage rate of IT services are very limited among farmers (Kafura et al. 2016) and agricultural extensionists. The initiatives of governments to increase the use of IT for increasing agricultural production and farmers' income will be successful only if they adopt the technology.

Constraints will adversely affect an individual's performance in his profession. Likewise, farmers and agricultural extensionists also face constraints while using various IT tools.

Akpabio et al. (2007) revealed that important specific constraints in IT use include: poor Information and Communication Technology (ICT) infrastructure development, high cost of equipment, high operational charges, high cost of access/interconnectivity and electricity power problems. The use of factor analysis aided to crystallize the identified constraints into three factors of 'poor enabling environment', 'lack of access' and 'dissemination of unrelated information'. According to Samah et al. (2010), the social challenges in using ICT are technophobia, negative attitude about modern technology, lack of understanding about advantages and disadvantages of ICT, lack of social interaction, and prejudiced beliefs about advantage of ICT. Hinduja (2014) pointed out that lack of awareness about ICT tools and content related issues were the major constraints faced by the farmers. Khamoushi and Gupta (2014)

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pointed out that lack of grants for purchasing ICTs, lack of sufficient ICT tools and lack of familiarity and expertise were the major constraints faced by the agricultural extension officers. Kabir and Roy (2015) reported that lack of training in ICT, increased prices of ICT tools and the problem in loading data files were the major constraints. Thus researchers revealed varying constraints under different situations and locations. Nevertheless, if relevant and up-to-date information can be disseminated by enabling the users to access the information, and providing necessary back end facilities, it may lead to effective utilisation of ICT for agricultural information support. Coupled with this, the social constraints faced by the stakeholders should also be looked into.

Husain et al. (2016) reported that they developed an agricultural portal after refining the prototype based on the constraints and suggestions of the stakeholders. In a similar way, all the major constraints faced by farmers and agricultural extensionists have to be identified and mitigated for enabling them to effectively utilise various ITES for farming activities and agricultural knowledge dissemination. A comprehensive study of the constraints specifically focussing the selected ITES is missing, and hence is attempted here.

Objective of the Study

The present study has been undertaken to identify the constraints faced by farmers and agricultural extensionists in using selected Information Technology Enabled Systems (ITES) such as web browsing, agricultural portals, agricultural expert systems, digitized databases and on line trading in agriculture.

METHODOLOGY

The study is confined to three districts of Kerala viz. Malappuram, Thrissur and Idukki representing north, central and south zones respectively. Malappuram district is the first district in India that became e-literate through the Akshaya project launched in 2002. Thrissur district is the headquarters of the State Agricultural University of Kerala. KAU has developed various IT tools and services for farmers apart from imparting trainings to farmers. The farmers of Idukki district are often engaged in online trading of spices like pep-

per and cardamom. These factors have been taken into consideration while selecting these three districts for the study. Besides, these districts are expected to have more focus on different IT enabled services.

For the selection of farmers, the lists of computer literate farmers who have accessed ITES for agricultural and related purposes was collected from the websites www.celkau.in, www.kissankerala.net and from India Pepper and Spices Trade Association (IPSTA) for the year 2016. From the lists so collected, 100 farmers were selected at random from each district, to constitute a sample of 300 farmers.

For the selection of agricultural extensionists, the details of computer literate agricultural officers and agricultural assistants of the Krishibhavana (local agricultural extension units) of the three selected districts were obtained. From this list, 60 agricultural officers and 60 agricultural assistants were selected at random constituting a sample of 120.

Five platforms of ITES viz., Web Browsing, Agricultural Portals, Agricultural Expert Systems, Digitized databases, and Online Trading were selected for identifying the constraints faced by farmers in using ITES. Twelve constraints related to the use of ITES were identified by extensive review of literature, and discussion with non-sample respondents. Then the farmer respondents were asked to rate each of the listed constraints on a three point scale, followed by Husain and Sundaramari (2013), which is given in Table 1.

Table 1: The rating scale used for constraint analysis

Constraints	Score		
	Very important	Important	Less important
Constraint statement	3	2	1

Based on the responses so collected, total score for each constraint was calculated. Then Index was calculated for each constraint using the formula

$$\text{Index} = \frac{\text{Score obtained}}{\text{Maximum possible score}} \times 100$$

RESULTS AND DISCUSSION

The constraints of farmers and agricultural extensionists on selected ITES, have been anal-

ysed using index and the results are discussed below.

Constraints Faced by Farmers in Using Selected ITES

Twelve important constraints in the use of ITES, have been identified from non-sample respondents of the selected districts and ranked based on the severity and importance as opined by the respondent farmers at the results are depicted in Table 2.

Table 2: Constraints of farmers in the use of ITES

S. No.	Constraint	Score	Index
1	Lack of awareness	663	73.66
2	Cost of technology	636	70.67
3	Lack of skill	603	67
4	Not enough time to spend on technology	588	65.33
5	Non availability of information in the vernacular	579	64.33
6	No proper updation	573	63.67
7	Unavailability of ITES service nearby	567	63
8	Do not understand the value of ITES	540	60
9	Better alternatives	517	57.44
10	Unperceived economic or other benefits	513	57
11	Irrelevant information	507	56.33
12	Technophobia	438	48.67

Table 2 shows that lack of awareness of farmers about various ITES and the cost involved in accessing these ITES are the major constraints faced by the farmers in its use with indices, 73.66 and 70.67 respectively. The results are partially in conformity with those of Hinduja (2014), and Rebekka and Saravanan (2015). This is also in line with the study of Koshy et al. (2015), who has revealed that eighty-six percent of the farmers were unaware of Kissan Call Centres, another ITES used in agriculture. Further, this lack of knowledge on how to use ICTs may result in lack of confidence, leading to low utilisation of ICT tools (Rupender et al. 2017).

There are many facilities available in ITES in the field of agriculture. Different agricultural portals, expert systems, databases, digital materials etc. are some important features among them.

Most farmers are not aware of these electronic tools. As such, their lack of awareness and skill prevent them from entering into the highly beneficial system and utilize the digital tools and materials provided through ITES for better results. As far as the farmers are concerned, the lack of awareness about ITES is the major constraint and it has to be resolved giving the utmost priority.

It is very interesting to note that many of the respondent farmers in the study have some basic knowledge about computer and internet browsing. Some of them have even tried to avail certain IT services regarding agriculture through some portals. But many of them are not aware of various services available in the field of agriculture through it. Moreover, their non-acquaintance with the different portals meant for agriculture and the systems like agricultural expert systems/decision support systems and digitized databases has transformed itself into a major constraint in accessing and utilizing the digital tools.

The second important constraint is the cost of technology (index- 70.67). The IT infrastructure, in general, demands high initial cost. Further, the price fluctuation and low market price for agricultural produces cause problems. Many often, the farmers do not get remunerative price for their produce. This may be the reason why farmers feel that they cannot afford the cost involved in the technology. The finding of Adams et al. (2016) also highlights this constraint.

Lack of skill is ranked as the third important constraint by the farmers (index of 67). Though the respondent farmers are computer literate, majority of them are not aware of many ITESs. They do not possess the required knowledge and skill to operate them. Even the farmers who have the knowledge of web browsing and of agricultural portals, do not have the skill in using them effectively. This lack of competency has to be redressed through training and capacity development.

Lack of time to spend on technology is the next major constraint with an index of 65.33. Since the farmers are regularly occupied in activities related to farming, they cannot find much time to access and use ITESs. But, once the farmers start using the ITESs properly, this constraint can be mitigated. Their proficiency in ITES can be their strength.

Non-availability of information in the vernacular is perceived as another important constraint.

Khamoushi and Gupta (2014) have also identified lack of sufficient ICT tools as a constraint. But, in this study, the constraint is with reference to availability of the tools in vernacular. Shanthya and Elakkiya (2017) has found that 90 percent of the farmers encountered problem of foreign language in ICT utilisation. This is true to some extent. But this has become an important constraint, because of the lack of awareness of farmers about various agricultural ICT tools in local language, rather than its non-availability. However, the organisations/ agencies involved in developing ICT tools in agriculture should develop more of them in vernacular, which in turn would help the farmers.

The other important constraints identified are 'lack of proper updating of the ITES' (index: 63.67), 'unavailability of ITES service nearby' (index: 63), and 'lack of understanding of farmers about the importance and value of ITES' (index: 60). Technophobia among the respondents is found least indexed (index of 48.67). Still, it is not an insignificant figure. It shows that even technophobia exists among computer literate farmers, which may hinder progress in the use of ITES, unless addressed properly through capacity development and confidence building.

Constraints Faced By Agricultural Extensionists in Using Selected ITES

Similar to the conditions of farmers, agricultural extensionists also face certain constraints in using the ITES. As in the case of farmers, the twelve important constraints in the use of ITES have been ranked based on the basis of its severity and importance, as perceived by the agricultural extensionists and indices have been calculated and the results are presented in Table 3.

Table 3 reveals that lack of awareness is the most severe constraint of agricultural extensionists with an index of 75 followed by cost of technology (index: 72.22) and lack of skill (index: 60.55). Only these three constraints registered an index of more than 60. The results are partially in conformity with those of Khamoushi and Gupta (2014) and Kabir and Roy (2015).

It is evident from Table 3 that lack of awareness of various ITES plays a crucial part in hindering its use. Even among the respondent agricultural extensionists who are educated and computer literate, lack of awareness is felt, espe-

Table 3: Constraints of agricultural extensionists in the use of ITES

S. No.	Constraint	Score	Index
1	Lack of awareness	270	75
2	Cost of technology	260	72.22
3	Lack of skill	218	60.55
4	Technophobia	198	55
5	Not enough time to spend on technology	192	53.33
6	No proper updation	178	49.44
7	Non availability of information in the vernacular	172	47.77
8	Do not understand the value of ITES	158	43.88
9	Unperceived economic or other benefits	158	43.88
10	Better alternatives	156	43.33
11	Unavailability of ITES service nearby	154	42.77
12	Irrelevant information	148	41.11

cially with regard to agricultural expert systems and digitized data bases. Hence the agricultural development/extension departments should give trainings on the availability and use of IT enabled services in agriculture to the agricultural extensionists so as to mitigate this constraint effectively. Kabir and Roy (2015) reported that lack of training in ICT, increased prices of ICT tools and the problem in loading data files were the major constraints.

As shown in Table 3, the second important constraint is the cost involved in the technology (index of 72.22). Verma et al. (2014) also revealed the same results stating that the major constraint in application of ICT by the extension personnel in agriculture was the lack of knowledge about computer applications in agriculture, followed by high cost of computer and devices, and high charges for internet use for accessing information. It is a known fact that the initial investment in establishing the necessary paraphernalia is high and the agricultural extensionists too find it unaffordable to own it personally. However the agricultural department in Kerala has now started to provide the necessary infrastructure (computer and internet) in their various offices. This in turn, has reduced the second constraint considerably. This practice will help them master the possibilities of ITES and digital tools.

The next important constraint is the lack of skill to use various ITES. This could be the reason why Verma et al. (2014) and Agha et al. (2018) had recommended skill oriented training on ICT to agricultural extensionists. The lack of skill of agricultural extensionists in Kerala can be attributed to the non-availability of skill/practical oriented courses on the use of ICT in their curriculum at Vocational Higher Secondary Education level and at degree level. This is in conformity with the result of Ravikishore (2014), who reported that the major constraint faced by the extension personnel of Kerala was lack of proper training. Chitra (2015) also revealed that majority of agricultural extension personnel in Kerala (75%) had not undergone training on ICT. Thus, this constraint can be overcome by providing relevant trainings on the use of ICT in agriculture. Technophobia is rated as the fourth important constraint (index of 55). This might be due to the change resistance as well as the high workload in office which prevent them from using technology including ITES. This can also be addressed through the training programmes.

When the constraints faced by both farmers and agricultural extensionists are compared, we find that in both cases the lack of awareness of ITES comes into prominence. The second and third are the cost of technology and the lack of skill. Technophobia is present in the category of agricultural extensionists even if they are highly educated and computer literate. Their reluctance in adopting IT enabled technologies may be the outcome of confusion and fear of failure. It can be cured through proper and adequate training programmes.

Further, it can be seen that in the case of farmers, eight constraints out of the 12 constraints registered an index of 60 or more, and 11 of the total 12 constraints registered an index above 50. At the same time, there were only three constraints, out of the twelve that registered an index of more than 60, and five out of the twelve with an index of more than 50, with respect to agricultural extensionists. Thus it can be inferred that farmers face comparatively more constraints than those of agricultural extensionists.

IT plays numerous roles in agricultural production such as expanding outreach to a large number of farmers, improving information flow and connecting people within the rural areas (Adams et al. 2016). The challenges that the farmers

and agricultural extensionists faced were insufficient knowledge on IT and inadequate capital. It is recommended to support these farmers financially and create more awareness by giving training to both farmers and extensionists.

CONCLUSION

Information and Communication Technology has significant role in providing right information at the right time, which would enable adoption of scientific agricultural technologies leading to increased agricultural production. The constraints and challenges faced by farmers and agricultural extension workers are to be identified and addressed properly. The major constraints faced by both farmers and agricultural extensionists are lack of awareness, cost of technology and lack of skill. Lack of awareness acts as the major hindrance in using ITES. Technophobia also exists to some extent among farmers and agricultural extensionists. It is found more severe among agricultural extensionists. Lack of proper and regular updating of information through ITES, non-availability of information in the vernacular are other significant constraints which need to be addressed for better utilization of IT Enabled Systems, in turn resulting in agricultural development.

RECOMMENDATIONS

Since lack of awareness, lack of skill and technophobia are some of the key constraints, trainings and capacity building programmes should be organised for both farmers and agricultural extensionists to create awareness and knowledge and give hands-on training on ITES in agriculture, which would enable them to receive updated information at the right time leading to agricultural development. The focus of the training content should be the availability of various ITES, including web browsing, agricultural portals, agricultural expert systems, digitized databases, on line trading, Kissan Call Centre, mobile apps in agriculture, social media etc. and their effective use in agriculture for information retrieval, information dissemination and advisories. Technophobia can also be reduced through such capacity building training programmes. As far as Kerala is concerned, the Central Training Institute and the Centre for E-learning of Kerala Agricultural Uni-

versity, SAMETI (State Agricultural Management and Extension Training Institute) and RATTCS (Regional Agricultural Technology Training Centres) of the Department of Agriculture, Kerala State can take a lead role for such trainings.

Though initial investment in establishing the ICT infrastructure is high, the agricultural department has now provided computer, internet and necessary accessories in their offices which could be utilised by the Agricultural Extensionists, if sufficient knowledge and skill in the use of ITES is created among them. Similarly farmers may be guided and motivated to utilise the IT infrastructure in Akshaya Centres (Kerala Government supported e-literacy centres), which are available in almost all village panchayats of Kerala.

Further, the agricultural e-extension tool developing agencies should strengthen their ITESs, by updating the information regularly and by developing more e-tools in local language, which would be easily comprehensible to farmers, so that the ITES in agriculture would become highly useful and popular.

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