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Research Article

KNOWLEDGE AND EXTENT OF USE OF INFORMATION TECHNOLOGY BY FARMERS OF KERALA

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A R T I C L E I N F O

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A B S T R A C T

Several Information Technology Enabled Systems (ITES) are available to support farmers for their day-to-day farming activities. This study focusses on the assessment of knowledge and use of selected ITES among the farmers of Kerala, for which 300 computer literate farmers were interviewed. It is revealed that knowledge on web browsing was comparatively better for farmers than other selected ITES such as agricultural portals, agricultural expert system, digitized databases and online trading. Almost 50 per cent of the farmers had utilized the web for agriculture and other purposes while 77 per cent farmers belonged to the low use category in the case of agricultural portals. The use of agricultural expert system, digitized database and online trading was found to be very poor where majority of the farmers fell in the low use category with 91 per cent, 87 per cent and 90 per cent farmers respectively. Thus, it is the responsibility of the agricultural e-extension/e-learning centres and agencies to provide relevant and up to date information to the farmers through web so as to enhance the frequency of web browsing. Further, new need based expert systems and databases for farmers need to be developed, awareness has to be created, and knowledge and skills have to be imparted amongst farmers to enhance the effective use of agricultural expert systems, digitized databases and online trading.

INTRODUCTION

Farming in the present era is not an activity undertaken amidst adhocism as in past, but is a more precision oriented and result oriented occupation. This has resulted in the total change in the approach and system of farming operations. In this context, the farmers require timely information on weather forecasts, availability of inputs, planting time, recommended dosage of various inputs, recommended crop cultivation practices, availability of finance, market information like forecasted demand for each kind of crops, expected price, quality specifications etc. *Vijayan et al. (2016) reiterates that farmers should be equipped more with information so as to enable them to be a part of ICT revolution.*

Information Technology (IT) has unmatched potential to assist and support farmers in their day-to-day farming activities like crop production, identification of pests and diseases, farm mechanisation, selection of cropping pattern, suitability of soil for different crops, fertilizer use, market intelligence and marketing of agricultural products and much more. In India, various IT projects and programmes have been designed and developed to meet all these requirements of farmers belonging to different parts of the country.

The Ministry of Agriculture, Government of India has set up 'Kissan Call Centres', a toll free service with the aim of providing answers to queries/problems of the farmers regarding crops, seeds, fertilizers, pesticides, horticulture, fisheries, forestry, veterinary animal sciences and allied areas. Still, only a very low percentage of farmers (14%) of Kerala were aware of the Kissan call centre (Koshy *et.al* 2015).Government of India with the assistance of National Informatics Centre (NIC) has also launched agricultural marketing information network (AGMARKNET) scheme in March 2000 which established a nation wide information network for speedy collection and dissemination of market information data for its efficient and timely utilisation. A project has been set up by Govt. of Kerala with the help of Indian Institute of Information Technology Management-Kerala (IIITM-K) entitled "KISSAN (Karshaka Information Systems Services and Networking)." Kerala Agricultural University (KAU) has launched a bilingual (English and Malayalam) agricultural information technology portal (www.celkau.in) targeting various stakeholders in agriculture, particularly farmers and extension workers. The portal covers agricultural technologies and package of practices of nearly 140 crops, information on animal husbandry and management, fish culture, agricultural machineries, and many other e-resources (Husain *et al*., 2016). Another project, 'Akshaya' has been piloted in Malappuram district by the Government of Kerala, wherein each Akshaya centre covers 800-1200 households to support the e-governance initiatives, e-commerce, continuing education etc. IT Kiosk is another advancement in IT. In this Kiosk, a PC is provided with Internet connection where the farmer can access databases and agricultural portals with the assistance of the operator at the

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Kiosk. "Expert System", which functions based on artificial intelligence is another novel Information Technology Enabled System (ITES) used by the farmers to diagnose problems and seek solutions and reach decisions regarding crop cultivation practices/pest and disease management etc. on an interactive mode. Batra *et.al* (2006) pointed out the importance of web based expert system which provides farmers, right information at the right time. KAU Fertulator (Fertilizer calculator for around 140 crops developed by KAU), KAU e-crop doctor (Medicine prescriber for various crops developed by KAU), Cassava Expert System (developed by Central Tuber Crops Research Institute (CTCRI), Thiruvananthapuram), Oushadham (Online diagnostic system for pest and disease management in cassava developed by CTCRI) are some examples of Decision Support Systems/Expert Systems presently operational in Kerala State. Thus, it is evident that at present several ITES are available for assisting, supporting and providing vital information and services to farmers in Kerala. With this backdrop, the present study was undertaken with the objective of assessing the knowledge and extent of use of various ITES among the farmers of Kerala

METHODOLOGY

For the purpose of the study, the state of Kerala was geographically divided into three zones viz., North, Central and South. The study was confined to three districts selected purposively to represent each of the zones. As such Malappuram, Thrissur and Idukki districts representing north, central and south zones respectively were selected. Malappuram district became the first e-literate district in India through the Akshaya project launched on 2002.Thrissur district houses the headquarters of the State Agricultural University of Kerala which had developed various IT tools and services for farmers apart from imparting trainings to farmers. Similarly, the farmers of Idukki district were engaged in online trading especially of pepper and cardamom. Thus these three districts were expected to have more IT orientation among the farmers. For sample selection, the list of computer literate farmers who were accessing ITES for agricultural and related purposes were collected from the website www.celkau.in, www.kissankerala.net and from the India Pepper and Spices Trade Association (IPSTA) for the year 2016. From the list so collected, 100 farmers were selected at random from each district, thus constituting a sample of 300 farmers.

Five platforms of ITES viz., web browsing, agricultural portals, agricultural expert systems, digitized databases, and online trading were assessed for their knowledge and use by the farmers of Kerala. The personal profile, farming profile, IT profile, social profile, knowledge and use of ITES were the major items of analysis. The respondents were categorized as 'low', 'medium' and 'high' based on the Mean and Standard Deviation (SD) as given below in the case of knowledge on ITES, extent of use of ITES and variables under social profile.

Category	Range of scores
Low	Below (Mean-SD)
Medium	Between (Mean-SD) and (Mean+SD)
High	Above (Mean+SD)

RESULTS AND DISCUSSION

Keeping the objectives in mind, a set of personal characteristics of farmers such as gender, language proficiency, age and educational status were analysed and the results are given in Table1

Table 1 Personal profile of farmers

Personal Profile				
Sl. No.	**Variables**	**Category**	**Number**	**Percentage**
1	Gender	Male	282	94
		Female	18	6
2	Language proficiency (English)	Read, Write and Speak	235	78
		Read and Write	41	14
		Read	24	8
3	Language proficiency (Malayalam)	Read, Write and Speak	294	98
		Read and Write	3	1
		Speak	3	1
4	Age	up to 35	42	14
		36-55	168	56
		>55	90	30
5	Educational status	PG	39	13
		Degree	117	39
		PLUS 2	42	14
		SSLC	87	29
		Upper Primary	12	4
		Lower Primary	3	1

Table 1 indicates that majority of the respondents (94 per cent) were males, which is in tune with the social system of Kerala. While examining the language proficiency of farmers, 78 per cent of them were able to read, write and speak English, 14 per cent were able to read and write English and 8 per cent were only able to read English. It shows that majority of the farmers who are IT oriented are well versed in English. In the case of Malayalam language, 98 per cent of the farmers were able to read, write and speak. Kerala is the highest literate state in India (Census of India, 2011), and this could be the main reason behind these results.

To understand the farming profile of the farmers under study, variables such as farmer category (based on land area owned), occupational status (main occupation/sub occupation), crops cultivated, farming experience and livestock possession were taken into consideration.

Table 2 Farming profile of the farmer respondents

SL.No.	Variables	Category	Number	Percentage
1	Farm size	Marginal Farmers (<=250 cents)	123	41
		Small Farmers (251-500 cents)	93	31
		Large Framers (>500cents)	84	28
2	Farming Occupational status	Farming as main occupation	180	60
		Farming as sub occupation	120	40
3	Farming experience	<5 years	24	8
		5-15 years	81	27
		>15years	195	65
4	Crops cultivated	Coconut	136	45
		Pepper	124	41
		Rubber	111	37
		Banana	98	33
		Cardamom	51	17
		Arecanut	42	14
		Coffee	41	13
		Vegetables	37	12
		Rice	36	12
		Tapioca	23	8
5	Livestock Possession	Nil	162	54
		Upto 5000	27	9
		5001-10000	6	2
		10001-15000	3	1
		15001-20000	33	11
		>20000	69	23

Among the farmers, 41 per cent were marginal farmers, 31 per cent were small farmers and 28 per cent large farmers. Exactly 60 per cent of the farmer respondents were fulltime farmers, having farming as the main occupation, while the rest 40 per cent were having farming as their subsidiary occupation. It is also evident from Table 2. that 65 per cent farmers were having more than 15 years of experience followed by 27 per cent farmers with 5-15 years of farming experience and the least 8 per cent farmers with less than 5 years of experience. The crops cultivated by majority of the respondent farmers were coconut (45% farmers) followed by pepper (41%), rubber (37 %) and banana (33 %) respectively. Majority of the farmers were not having any livestock, while 46 per cent farmers possessed livestock.

Since social profile of an individual plays an important role in knowledge empowerment, social variables such as innovativeness, extension agency contact, social participation and mass media exposure of farmers were analysed in the study.

Table 3 Social profile of the farmer respondents

Sl.No.	Variables	Category	Number	Percentage
1	Innovativeness	Low	9	3
		Medium	234	78
		High	57	19
2	Extension Agency Contact	Low	138	46
		Medium	129	43
		High	33	11
3	Social Participation	Low	177	59
		Medium	93	31
		High	30	10
4	Mass Media exposure	Low	42	14
		Medium	231	77
		High	27	9

It is seen that 78 per cent farmers belonged to medium category of innovativeness. Increase in innovativeness would increase their exposure to agricultural websites (Murali and Venkataramiah, 2008). Almost equal share of farmers (46 per cent and 43 per centrespectively) had low to medium level of extension agency contact, while only 11 per cent farmers had high contact with extension agencies. Regarding social participation, 59 per cent farmers fell under low category. Further, majority of the farmers (77 per cent) had medium level of mass media exposure.

The IT profile of the farmers in terms of their computeruse, mobile phone use, and trainings in IT is depicted in Table 4.

Table 4 IT profile of farmer respondents

Sl.No.	Variables	Category	Farmers	
			Number	Percentage
1	Computer Use	Self at home &café	27	9
		Self- at café	15	5
		Self at home	165	55
		At home &café with others' help	12	4
		At café with others' help	30	10
		At home with others' help	51	17
2	Mobile phone use	Smart phone	243	81
		Ordinary mobile phone	57	19
3	Training in IT	Attended Training in IT	93	31
		Not attended training in IT	207	69

From Table 4. it is clear that 69 per cent of farmers were using computer by their own while 31 per cent of them used it with the help of others. Though all the respondent farmers were computer literate, 31 percent of them depended others for using the computer, may be for searching relevant items and use of internet. However, majority (72 %) of the farmers were using the computer at their home itself. With respect to the use of mobile phones, it is seen that a good majority (81 %) of the farmers were using smart phones, while 19 percent of them were using ordinary mobile phones. However, it is to be noted that, 100 percent of the farmer respondents were using mobile phones. Regarding trainings attended in IT, 31 per cent of farmers attended such trainings.

Extent of knowledge of farmers on various ITES

The analysis of the knowledge on ITES was done based on the responses of those farmers who were aware of each of these ITES in agriculture. Thus the total respondents in this case varied for different ITES as follows: web searching/browsing-270; agricultural portals- 168; agricultural expert systems- 54; digitized databases- 114; online trading-210.The frequency distribution of farmers with regard to extent of knowledge of farmers on selected ITES is furnished in Table 5.

Table 5 Distribution of farmers based on extent of knowledge on various ITES

	Web Browsing		Agricultural Portals		Agricultural Expert System		Digitized Databases		Online Trading	
	No.	%	No.	%	No.	%	No.	%	No.	%
Low	32	12	89	53	46	85	96	84	82	39
Medium	78	29	39	23	5	9	15	13	113	54
High	160	59	40	24	3	6	3	3	15	7
Total	270	100	168	100	54	100	114	100	210	100

Table 5 reveals that 59 per cent of the farmers were having high knowledge about web browsing followed by 29 per cent with medium knowledge and 12 per cent with low knowledge. Thus, the knowledge of farmers on web browsing was found better. As already seen from IT profile of the farmers (Table 4), 69 per cent were using computer by their own, either at their home or at computer centres/internet cafes, and this might have resulted in their higher knowledge on web browsing.

Regarding agricultural portals,53 per cent of the farmers had low knowledge, 23 per cent of the farmers had medium knowledge and 24 per cent had high knowledge. As already seen in Table 4, 31 per cent of the farmers had attended IT trainings, and this might have imparted knowledge to those farmers on agricultural portals, resulting in a share of farmers having medium to high knowledge on these portals. Besides, availability of agricultural information at finger tips when they used agricultural portals might have generated interest among them to use it further and have enhanced their knowledge on portals.

The knowledge of the farmers on agricultural expert system as well as digitized databases was found to be very poor. The knowledge on agricultural expert system(of 85 % farmers) as well as digitized databases (of 84 % farmers) was found to be low. This may be due to the non-availability/inaccessibility of suitable agricultural expert systems and digitized databases for farmers in Kerala. However, the knowledge of farmers on online trading was comparatively better. Fifty four per cent of the farmers had medium knowledge on online trading while seven per cent had high knowledge on it. The online trading is part of marketing of agricultural produces that enables farmers to fetch attractive prices, and this might be the possible reason behind the better knowledge position of farmers on online trading.

Use of various ITES by farmers

The extent of use of the five selected ITES is depicted in Table 6.

Table 6 Distribution of farmers based on extent of use of various ITES

Knowledge category	Web Browsing		Agricultural Portals		Agricultural Expert System		Digitized Databases		Online Trading	
	No.	%	No.	%	No.	%	No.	%	No.	%
Low	138	51	129	77	49	91	99	87	189	90
Medium	73	27	27	16	4	7	13	11	19	9
High	59	22	12	7	1	2	2	2	2	1
Total	270	100	168	100	54	100	114	100	210	100

Exactly 22 per cent farmers were frequent web searchers, while 27 per cent fell in medium use category and 51 per cent in low use category. This shows that almost 50 per cent of the farmers have started utilizing the web for agriculture and other purposes. On the other hand, the extent of use of agricultural portals was seen lesser. Seventy seven per cent of the farmers belonged to the low use category while only 16 per cent of farmers had medium use, and the least 7 per cent were frequent users of agricultural portals. This is an indication towards the need for sensitizing farmers about various agricultural portals, especially in the context of availability of many agricultural technology portals suited to the state of Kerala like celkau.in (of Kerala Agricultural University), krishi.info (of Kerala State Department of Agriculture), and many such portals. The training need of farmers was also found very high on agricultural portals (Boniface *et.al*, 2019a)

The use of the three other components of ITES viz., agricultural expert system, digitized database and online trading were found to be very poor where majority of the farmers fell in the low use category with 91 per cent, 87 per cent and 90 per cent farmers respectively. There were a few expert systems developed in agriculture for the use of farmers. Many of these were made in CDs (eg.Agrex, Crop 9 DSS) and not available for use. However, some expert systems were available online, but except a few (eg. KAU Fertulator, KAU e-Crop Doctor), majority were not available in the vernacular. Almost similar is the case of digitized databases. There were many digitized databases in agriculture, but were not meant for farmers, but related to academics and research. Nevertheless, a very few digitized databases suited to farmers were there. These were utilized by some of the sampled farmers. Thus majority of the farmers were not using these IT enabled services. This is in conformity with the study of Kafura *et.al* (2016). The major constraints faced by the farmers in using the ITES were lack of awareness, cost of technology and lack of skill in using the systems (Boniface *et al*. 2019b).

CONCLUSION

The study revealed that knowledge on web browsing was better for farmers than other ITES such as agricultural portals, agricultural expert system, digitized databases and online trading. The knowledge onagricultural portals by farmers can be increased by briefing and exposing them on various agricultural portals, its contents, and the services and information available in each of the portals. Similarly by developing agricultural expert systems and digitized databases suited and useful to the farmers, their knowledge can be increased. The use of the selected ITES was found to be low among farmers. However, nearly half of the farmers were regular users of the web for different purposes. Thus, it is the responsibility of the agricultural e-extension/e-learning centres to provide relevant and up to date information to the farmers through web so as to enhance the frequency of web browsing. The extent of use of agricultural portals was alarmingly low wherein majority belonged to low category. This is an indication towards the need of sensitizing farmers on various agricultural portals and giving hands on training to use it to satisfy their information needs. To enhance the effective use of agricultural expert systems and digitized databases, awareness has to be created amongst farmers, knowledge and skills have to be imparted to use them, and new need based expert systems and databases for farmers need to be developed.

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