

Assessment of Information Technology Enabled Systems by the Agricultural Extensionists

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ABSTRACT

Agricultural information plays a crucial role in the overall development of agricultural sector. The information passed on to the farmers by agricultural extensionists will help the farmers in various agricultural work, thereby improve the livelihood of farmers. The study analyses the information needs of agricultural extensionists to be made available through selected information technology enabled systems (ITES) namely web browsing, agricultural portals, agricultural expert systems, digitized databases and online trading in agriculture and to study the level of satisfaction of agricultural extensionists in meeting information needs through ITES. Computer literate agricultural extensionists from the districts of Thrissur, Idukki and Malappuram of Kerala consisting of 120 agricultural extensionists were the respondents of the study. Based on the information, needs identified through review of literature, ranking was done on a five point scale and it was found that agricultural extensionists were more in need of plant protection followed by organic farming. Regarding satisfaction level, the agricultural extensionists were satisfied with information on crop production and moderately satisfied with rest of the variables. It is recommended to develop farmer centred ITES and update them regularly for efficient management.

Keywords: *Agricultural expert systems, Agricultural portals, Information needs, Online trading, Web browsing*

Information Technology (IT) plays an important role in assisting farmers in their day-to-day farming activities like crop production, pests and diseases identification, farm mechanisation, to select the cropping pattern, to select the suitability of soil for different crops, fertilizer use, market intelligence and much more. Information technology (IT) also plays an important tool in agricultural production and marketing (Thiruniraiselvi 2009).

Agricultural extensionists resort to the ITES for agricultural technological information including package of practices of various crops, plant protection, marketing information, weather information and so on, which is delivered to farmers. Relevant, authentic and up-to-date information should be provided to the end user through different ITES. Mishra and Pant (2008) opined that huge amount of valuable information regarding agriculture can be obtained by the appropriate use of Information technology and one can boost the productivity, production and profitability by marketing their produce at better price. Chitra (2015) revealed that majority of agricultural extension personnel in Kerala (75%) had not undergone training on ICT and according to Ravikishore (2014), the major constraint faced by the extension personnel of Kerala was lack of proper training. Agricultural portals are a category of ITES which assist agricultural extensionists in advising farmers on their agricultural production, marketing and other farming activities. However, the agricultural extensionists are rarely using the ITES for

their information requirements. Hence, the training need of agricultural extensionists was found very high on agricultural portals (Boniface et.al, 2019). Husain et. al (2016) concluded that whenever agricultural portals and websites are developed, they should be based on the needs of the intended users and stakeholders. Ganeshan et al. (2002) developed an agricultural expert system software AGREX and states that this software package provide up-to-date precise information and also give advises to the farmers about different diseases and pests affecting plants and also provide control measures against them. Such type of software will act as a support to agricultural extensionists to deliver valuable advices to farmers. Sivakamy and Karthikeyan (2008) studied the impact of expert system on the decision making skills of extensionists. It was found that after using expert systems extension workers showed an enhancement in the decision making and work performance skill.

The present study was undertaken with the objective of identifying the information needs of agricultural extensionists to be made available through selected ITES and the satisfaction level of agricultural extensionists in meeting the information need through selected ITES.

MATERIAL AND METHODS

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 during 2002. Thrissur district houses the headquarters of the State Agricultural University of Kerala which had developed various IT tools and services for farmers and agricultural extensionists apart from imparting trainings to farmers and agricultural extensionists. Similarly, the farmers of Idukki district were engaged in online trading especially of pepper and cardamom which made the involvement of agricultural extensionists too in online trading. Thus these three districts were expected to have more IT orientation among the agricultural extensionists.

The present study was focussed on the grass root level agricultural extensionists of the Department of Agriculture, Kerala State, and includes both agricultural officers and agricultural assistants of Krishibhavans (grass root level agricultural extension unit) of Kerala. For the selection of agricultural extensionists, the list of computer literate agricultural officers and agricultural assistants in the Krishibhavans of the three selected districts were obtained. From this list 60 agricultural officers and 60 agricultural assistants were selected using simple random sampling constituting a sample of 120.

Five platforms of ITES viz., web browsing, agricultural portals, agricultural expert systems, digitized databases, and online trading were taken to find out the satisfaction level of agricultural extensionists with the present ITES in meeting information needs.

For the purpose of the study, nineteen information needs were identified from reviewing relevant literature, and they were rated on a five point scale (Very much essential, Essential, Needed, Somewhat needed, Not needed with scores 4,3,2,1 and 0 respectively) Based on the scores obtained the indices were calculated by multiplying the score obtained by each item with 100 and then dividing with the total possible score for that item. The one with the highest index represents the most important need. Level of satisfaction of individual agricultural extensionist was scored on a five point scale (ranging from highly satisfied to highly dissatisfied with a score range of 4 to 0) with respect to the currently available ITES in satisfying each of their identified information needs.

RESULTS AND DISCUSSION

The information needs of agricultural extensionists to be made available through ITES were

collected, analysed and the results are given in Table 1.

It can be seen from Table 1 that the agricultural extensionists were in highest need for plant protection (index: 90.18), followed by organic farming (index: 89.12), weather forecasts (index: 87.02), input supply and services (index: 82.46), post-harvest techniques (index: 80) general agricultural information/statistics (index: 76.14), crop production (index: 71.58), and marketing information (index: 70.88). These are the information needs which can be considered as essential to the agricultural extensionists. Nevertheless, the other needs such as information on agricultural schemes/programs, specialized vocations in agriculture, and on training services/schedule were also found to be the information needs, though not considered by them as essential. Of the 14 information needs, information on indigenous technologies, information sources in agriculture and exchange of farmers' experiences were found to be of the lowest information need.

Agricultural extensionists, as experts in scientific agriculture are expected to answer queries of farmers, and since one of the major problems faced by farmers in their farming is pests and diseases, which form a major share of their queries, the agricultural extensionists have to equip themselves with it, for which information on plant protection aspects is very much essential. Organic farming, as mentioned earlier has gained importance in Kerala, and Government of Kerala has announced organic farming policy, and has already declared one district in Kerala (Kasarcode) as organic district. Since the government is for organic farming, again the agricultural extensionists have to equip themselves with information on organic farming practices. All the information needs prioritised by the agricultural extensionists would be based on the expected queries from farmers, as well as to efficiently carry out the professional work the agricultural extensionists have to do as an agricultural expert. Helen and Kaleel (2009) in their study pointed out that high degree of information efficiency was observed due to the combination of Agricultural Expert system and human expertise. The extensionists said that irretrievability of information from Agricultural Expert system was least. The users and extensionists need an orientation in using Agricultural Expert Systems.

Thus, the highest information needs of agricultural extensionists to be made available through different ITES were information on plant protection, organic farming, weather forecasts, input supply and services, post-harvest techniques and general agricultural information/statistics.

Under each of the above information needs, sub components were identified and their indices were

Table 1. Information needs of agricultural extensionists to be made available through ITES

S. No.	Information needs	Total Score	Index	Rank
1	Plant protection	2056	90.18	1
2	Organic farming	2032	89.12	2
3	Weather forecasts	1984	87.02	3
4	Input supply and services	1880	82.46	4
5	Post-harvest techniques	1824	80.00	5
6	General agricultural information statistics	1736	76.14	6
7	Crop production	1632	71.58	7
8	Marketing information	1616	70.88	8
9	Agricultural schemes/programs	1128	49.47	9
10	Specialized vocations in agriculture	1088	47.72	10
11	Training services/schedule	944	41.4	11
12	Indigenous technologies	800	35.09	12
13	Information sources in agriculture	736	32.28	13
14	Exchange of farmers' experiences	304	13.33	14

calculated as mentioned earlier and the results are furnished in Table 2 based on priority of the information needs.

In case of plant protection, agricultural extensionists were more in need of diagnosis of the problems of their crop (index: 79.38), followed by its control measures (index: 67.5). Under the category of organic farming, higher index was registered for organic plant protection (index: 56.88), and registration of organic farm (index: 55.63). Though agricultural extensionists had knowledge on scientific agriculture, most of them did not study the principles and practices of organic agriculture during their course of study or later. Still they had a general idea about organic agriculture. That is how organic farming became an important information need. From the extension point of view, organic plant protection, and registration of organic farm are the most needed information to suggest recommendations and to answer farmer queries.

In case of weather forecasts, almost similar priorities were recorded with rainfall topping the list followed by drought and temperature. Here, rainfall forecast registered a very high index of 94.38, showing the utmost priority and importance assigned by agricultural extensionists to rainfall predictions. This was a very significant information for farmers and if rainfall forecast is available, the agricultural extensionists can advise farmers to adjust their cropping practices and cropping management accordingly, leading effective agricultural extension work and agricultural development of their jurisdiction. Scientific prediction of drought would also help the extensionists in the same way to a certain extent. Temperature, flood and humidity recorded comparatively lesser indices of 58.75, 41.25, and 40.63

respectively, as forecasts of these items cannot be used to that level as in the case of rainfall.

Under input supply and services, need for information on seeds (index: 78.75), plant protection chemicals (index: 78.13), and bio-fertilizers (index: 76.66), were found highly important by the agricultural extensionists. It is on these inputs, the agricultural extensionists have to give information and advise to farmers, and hence the higher indices. Fertilizers were available in almost all grama panchayaths (village panchayaths) through private depots and/or service co-operative banks, and hence queries in this regard would be limited, which led to comparatively lesser index for fertilizer.

In case of post-harvest techniques, product diversification was found with slightly higher priority (index: 60.63), followed by value addition (index: 60), and processing (index: 59.38). However, all the three information need items registered almost equal indices, showing the equal importance of these items to the agricultural extensionists.

In case of general agricultural information statistics, the agricultural extensionists were keen in knowing general data on agriculture (index: 70.63), followed by problems and prospects of agriculture (index: 65.63), and agricultural scenario (index: 60.63). These data may be useful to them to know the latest trends in agriculture, pros and cons of new areas, and to have strategic interventions.

Under crop production, agricultural extensionists were in high need for information on farm equipment (index: 65.63), followed by crop varieties (index: 63.13), and crop cultivation practices (index: 60). The crop cultivation practices and cropping pattern are in general better known to agricultural extensionists, while the new agricultural equipment and new varieties

Table 2. Information needs (sub components) of agricultural extensionists to be made available through ITES

S. No.	Information need	Information need item	Total score	Index
1	Plant protection	Diagnosis	381	79.38
		Control measure	324	67.50
		Prophylactic measures	267	55.63
		General idea about pests and diseases of crops	246	51.25
2	Organic farming	Organic plant protection	273	56.88
		Registration of organic farm	267	55.63
		Organic cultivation practices	195	40.63
3	Weather forecasts.	Rainfall	453	94.38
		Drought	291	60.63
		Temperature	282	58.75
		Flood	198	41.25
		Humidity	195	40.63
4	Input supply and services	Seeds	378	78.75
		Plant protection chemicals and other bio control measures	375	78.13
		Bio-fertilizers	368	76.66
		Fertilizers	216	45.00
5	Post harvest techniques	Product diversification	291	60.63
		Value addition	288	60.00
		Processing	285	59.38
		General agricultural information statistics		
6	General agricultural information statistics	General data on agriculture	339	70.63
		Problems and prospects of agriculture	315	65.63
		Agricultural scenario	291	60.63
7	Crop production	Farm equipment	315	65.63
		Crop varieties	303	63.13
		Crop cultivation practices	288	60.00
		Cropping pattern	273	56.88
8	Marketing Information	Price of commodities	417	86.88
		Demand for commodities	393	81.88
		Available markets	330	68.75
		Export/import data	273	56.88
		Export/import procedures	186	38.75
9	Agricultural schemes/programme	Availability of schemes/programmes	330	68.75
		Procedure to become a beneficiary	276	57.50
10	Specialized vocations in agriculture	Nursery management	198	41.25
		Apiculture	162	33.75
		Landscaping	153	31.88
		Cultivation of medicinal plants	153	31.88
		Food processing	135	28.13
		Mushroom cultivation	117	24.38
11	Training services/schedules	Training institutions	312	65.00
		Training schedules	264	55.00
12	Indigenous technologies	ITK on uses of plants	270	56.25
		ITK on crop protection	261	54.38
		ITK on crop production	252	52.50
		ITK on value addition	240	50.00
13	Exchange of farmers experiences	Success stories	378	78.75
		New initiatives	375	78.13
		Failed cases	252	52.50

Table 3. Satisfaction index of agricultural extensionists in meeting information needs

S. No.	Information Needs	Satisfaction Index
1	Crop production	63.16
2	Specialized vocations in agriculture	59.47
3	General agricultural information /statistics	59.21
4	Plant protection	58.42
5	Input supply and services	51.58
6	Marketing information	50.53
7	Post-harvest techniques	49.47
8	Organic farming	48.94
9	Weather forecasts	47.11
10	Agricultural schemes /programs	46.84
11	Information sources in agriculture	45.79
12	Indigenous technologies	41.58
13	Training services/schedule	41.05
14	Exchange of farmers experience	40.00

necessitate the agricultural extensionists to perceive these items as more important.

Under marketing information need, the agricultural extensionists were more concerned towards price (index: 86.88), followed by demand(index: 81.88),and available markets (index: 68.75). It is quite logical that these are the most important aspects of marketing, which are needed to support farmers in marketing and selling their produces. At the same time, the agricultural extensionists were less concerned about export and import procedures, since this information is less demanded by most of the farmers. Mabe and Oladele (2012) reported that majority of the extension officers access market information and information about new technologies via ICT.

Analysis of the information needs on agricultural schemes/programmes shows that the agricultural extensionists were more interested in getting information on the availability of the schemes with an index of 68.75. This would help the agricultural extensionists to guide farmers and support farmer development. Procedure to become a beneficiary (index: 57.5) is mainly the concern of farmers, and the agricultural extensionists are generally well aware of the procedures on the schemes implemented by them.

Under specialized vocations in agriculture, it is observed that the all the information need items registered low indices. Comparatively higher index was recorded for nursery management (index: 41.25), followed by apiculture (index: 33.75)..Nursery raising is done for many of the crops, and hence it gained comparatively higher importance.

Under training services/schedules, agricultural extensionists were in need of both information about various training institutions and the schedules of training

organised in these institutions. Higher need was noticed in the former case.

With respect to the Information need on indigenous technologies, it is found that all the items were needed by agricultural extensionists, though they cannot be regarded as very important. Among these, ITK on use of plants registered higher index (index: 56.25), followed by ITK on crop protection (index: 54.38), ITK on crop production (index: 52.5), and ITK on value addition (index: 50).

Regarding exchange of farmers' experience, it is found that the agricultural extensionists were in higher need of success stories of farmers(index: 78.75) closely followed by their new initiatives (index: 78.13). These two are key in propagating new technologies, and motivating and convincing farmers to adopt scientific agricultural practices.

Satisfaction of agricultural extensionists with the present ITES in meeting information needs

Level of satisfaction of agricultural extensionists were scored on a five point scale and analysed . The sample size for this analysis was restricted to 114, because those agricultural extensionists who used at least one of the selected five ITES, viz., web browsing, agricultural portals, agricultural expert system, digitized database and online trading, only were considered. The satisfaction indices are given in Table 3.

It is found from Table 3 that agricultural extensionists were satisfied with one variable viz., information on crop production (index 63.16), and this is because majority of the available ITES provides information on crop production and are available in sufficient quantity to satisfy their needs. The agricultural extensionists were moderately satisfied with the rest of the variables viz., specialised vocations

in agriculture (index 59.47), information on general agriculture and statistics (index 59.21), plant protection (index 58.42), input supply and services (index 51.58), marketing information (index 50.53), post-harvest techniques (index 49.47), organic farming (index 48.94), weather forecasts (index 47.11), agricultural schemes/programmes (index 46.84), information sources in agriculture (index 45.79), indigenous technologies (index 41.58), training services/schedule (index 41.05), and exchange of farmers experiences (index 40). All these items are available in one or more of the selected ITES, but this does not match with the expectations of the agricultural extensionists, and need to be further updated, upgraded and strengthened.

This study analysed the association between level of satisfaction of agricultural extensionists and their information needs and found that there is no significant relationship between level of satisfaction of agricultural extensionists with the ITES and their information needs” and the correlation coefficient was found to be -0.061 and not significant (0.508).

CONCLUSION

The present platforms of ITES are serving the agricultural extensionists with various sources of information and data which enable them to provide relevant and up-to-date information to farmers. However, the present study attempted to improvise the present ITES by probing into the need for information and data to be included in the ITES platforms for the benefit of the stakeholders.

The results of the study inferred that the highest need of information was for plant protection followed by organic farming, weather forecasts, input supply and services, post harvest techniques, general agricultural information/statistics, crop production, marketing information, agricultural schemes/programs, specialized vocations in agriculture, training services/schedule, indigenous technologies, information sources in agriculture and least preference was for exchange of farmers experiences.

Similarly the satisfaction of agricultural extensionists with the present ITES was also examined with 14 variables and it was found that they were satisfied with one variable viz., information on crop production, and were moderately satisfied with the rest of the variables. Hence, efforts should have to be made to develop ITES which satisfy agricultural extensionists and update the same regularly to satisfy their information needs.

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