

Use of e-resources by farmers in Coimbatore district of Tamil Nadu

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ABSTRACT

A study was conducted in Thondamuthur block of Coimbatore district of Tamil Nadu, where the use of e-resources is substantial. A total number of 60 farmers were selected purposively for the study from six villages. Among 60 samples, 30 were e-resources users (ERU) and the remaining were non-users (ERNU). The study used various statistical tools such as Garrett's ranking technique, logistic regression, scaling technique and percentage analysis. The result showed that majority of the e-resource users (46.67 %) were in the age group of below 35 years and non-users, (70 %) were in the age group of more than 55 years of age. About 53 per cent of e-resource users had higher secondary school education while 60 per cent of non users had primary level education. The Garrett's ranking technique was used to rank the various reasons that hindered the usage of e-resources. This results revealed that majority of the farmers (91.44 %) reported lack of awareness and it was the main reason for not using the e-resources. The age was negative with regard to the extent of usage of e-resources, the results also showed that 43 per cent of the respondents used e-resources to access crop protection aspects. The perception of the respondents showed that about 83 per cent were highly satisfied with the availability of the information that too in required form. A comparative analysis on net profit of e-resources users and non-users showed that the net profit of e-resource users was comparatively higher than the non users.

KEY WORDS : Farmers, E-resource, Garret ranking

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Information and communication technology (ICT) refers to the broad range of hardware, software, network infrastructure and media that enable the processing, storage and sharing of information and communication to the humans by electronic resources locally and globally. E-resources are increasingly used in rural areas to disseminate daily prices of agricultural commodities. Timely price

information improved the welfare of small farmers in different ways. First, better information may lead farmers to make allocation of production factors efficiency. When the farmers receive appropriate production related details, they can capture improved market opportunities and make adjustment in production plans. Second, information can develop the bargaining strength of the producers, particularly small and marginal farmers and improve competition among traders. Thirdly, given the provision of nearby markets, farmers can use the information to switch between end markets and finally farmers can use the information to make choices on the timing of marketing. The various ICT (Information and Communication Technology) tools used to access the farm related information like TNAU e-radio, farm radio, television programmes and Kisan Call Centre (KCC) are being promoted heavily to deliver real-time information on agriculture issues.

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The farm technology and the dynamic market information (DMI) are available to various websites and the SMS based agricultural information are available to various ICT tools viz., the TNAU with C-DAC (Centre for Development of Advanced Computing), Nokia life tool, IFFCO-Airtel and Thompson-Reuters (2011) to distribute agricultural information to farmers.

Problem focus :

The farmers are mainly depending on neighbourhood and other sources for receiving agricultural information. In some areas farmers are not having awareness regarding when, where and how to sell their produces. Lack of timely availability of agricultural information such as production, crop protection, and marketing and value addition aspects prevail in many of the villages. Hence, it is necessary to study the usage of e-resources to deliver the information to all the farming communities effectively without losing or distortion of information. It has an added advantage which resolves the limited staff crisis in the department. This study focuses on the impact and use of e-resources, identify the factors influencing the usage of e-resources and users’ perception about the validity of the information.

Objectives :

The overall objective of the study was to find out the impact of e-resources to the farmers on crop production, crop protection and market information. The specific objectives of the study were :

- To study the user profile of the e-resource users,
- To determine the extent of usage of e-resources by the sample farmers,
- To identify the factors influencing the usage of e-resources, and
- To analyze the users’ perception about the validity of the information available in e-resources.

METHODOLOGY

Thondamuthur block in Coimbatore district of Tamil Nadu was purposively selected for this study. From this block, six villages viz., Devarayapuram, Madampatti, Narasipuram, Thennamanallur, Jagir Naickan Palayam and Vellimalaipatinam were randomly selected for the study. From the selected villages, 60 sample farmers were selected of which 30 samples were e-resource users and the remaining were non-users. The primary data were collected from sample farmers through pre-tested interview schedule by personal interview method.

Measurement of variables :

The selected variables were operationalized and the measurement procedures followed are presented in Table A.

Table A : Distribution of farmers based on age

Sr. No.	Categories	Age
1.	Young	Up to 35
2.	Middle	36-55
3.	Old	>55

Source : Sindhudevi (1994)

Age was operationalized as the number of completed years of the respondents at the time of enquiry and the chronological age was taken as a measure. The respondents were classified into three age groups viz., young, middle and old age following the procedure adopted by Sindhudevi (1994).

Table B : Size of land holding

Sr. No.	Categories	Farm size (ha.)
1.	Marginal	<1
2.	Small	1-2
3.	Semi-medium	2-4
4.	Medium	4-10
5.	Large	>10

Source : Subba Reddy (2006)

The sample farmers were categorized as marginal, small, semi-medium, medium and large farmers (Table B). This study used the following tools of analysis so as to present the results in a cogent manner and to draw the meaningful conclusions.

Conventional analysis :

Percentage analysis was done to study the general characteristics of the farmers like age, education, farming experience, level of knowledge about e-resources etc.

Garrett’s ranking technique :

This technique was used to rank the reasons that hampered the use of ICT tools by the non-users of e-resources. Garrett’s score technique has been widely used to rank the important cause based on the sources. The respondents were asked to rank the reasons in order of importance and these ranks were converted into per cent position by using the following formula :

$$\text{Per cent position} = \frac{100(R_{ij} - 0.5)}{N_j}$$

R_{ij} = Rank given for i’th reasons by j’th individual

N_j = Number of reasons ranked by j’th individual

By referring the table given by Garrett, the per cent positions estimated were converted into scores. Then for each reason, the scores of various respondents were added and mean was calculated. The reason with highest score was considered the most important factor.

Logistic regression analysis :

In the present study, logistic regression model was

employed to study the various factors influencing the usage of e-resources. In choice one has to make is either use of e-resources or not. Thus, the observation lies between one and zero. In such cases, ordinary least squares (OLS) do not give sufficient estimators. The simplest form of the commonly used qualitative response models involves the dependent variable assuming a binary response which takes the values of 1 and 0. Some models used in such cases are linear probability model, the logit model and probit model. The purpose of these models is to determine the probability that an individual with a given set of attributes will choose one or the other alternative. The model was used to estimate the co-efficient because in order to find out the significant variables which influence dependent variables. The list of variables used in the study is listed in Table C.

Sr. No.	Name of the variables	Explanation
I	Independent variables	
1.	Age	Number of calendar years completed by the respondents at the time of interview.
2.	Education	Number of years of education
3.	Farming experience	Number of years of farm experience
4.	Training	Number of trainings attended
5.	Motivation	Self-motivated, motivated by others
II	Dependent variables	
1.	Adopters	1 if e-resource users (ERU)
2.	Non-adopters	0 if e-resource non users (ERNU)

It determines the estimation of the values of the regression co-efficient (slope) and the regression equation (intercept) to minimize the sum of square of residuals. The estimated values of the regression co-efficients were tested for statistical significance with help of 't' ratio. The entire tests were conducted at five per cent and one per cent levels of significance.

Scaling technique :

In this approach, the sample farmers were asked to give their extent of usage of e-resources as they were evaluated on three point continuum as mostly used (3), moderately used(2) and least used (1). The views of the sample farmers were recorded and the score was given to each factor, then scores were added to obtain the total score of their usage about e-resources. The mean score was used for simple comparison of level of usage of e-resources.

Period of study :

The collection of data from the sample respondents were taken up during the months of October - November, 2012.

ANALYSIS AND DISCUSSION

The data collected for the study were subjected to statistical analysis taking into consideration the objectives of the study so as to draw meaningful inferences. The findings of the study are presented and discussed under the following headings.

- General characteristics of the sample farmers.
- Awareness of ICT -tools for e-resource users.
- Factors influencing the usage of e-resources.
- Extent of usage of e-resources by sample farmers.
- Comparison of net profit between users and non users.

General characteristics of the sample farmers :

The general characteristics of the sample farmers and farm details would help in understanding the nature and behaviour of the respondents. The characteristics of the sample farmers such as age, education, farming experience were analysed and the results are furnished in Table 1.

Sr. No.	Age (years)	Number	
		ERU (30)	ERNU (30)
1.	Young (up to 35)	14(46.67)	2 (6.67)
2.	Middle (36-55)	12 (40.00)	7 (23.30)
3.	Old (More than55)	4 (13.33)	21 (70.00)
Total		30 (100.00)	30 (100.00)

Figures in parentheses indicate percentage to the total

Distribution of farmers based on age :

Age of the farmers influence decision-making and it could be a critical factor in adopting new technologies such as ICT in agriculture. The sample farmers were classified into three categories *viz.*, young age, middle age and old age groups as discussed in methodology chapter. The results are furnished in Table 1.

It could be inferred from Table 1 that majority of the ERU belonged to the age group of less than 35 years and it accounted for 46.67 per cent followed by middle age group with 40 per cent whereas 70 per cent of the ERNU were old age group. From these data, it could be concluded that most of the young farmers were using the e-resources.

Educational status :

Education is an important component for agricultural development. Educational level of the farming community is expected to play a significant role on the use of e-resources, adoption of new technologies and better understanding of recent advances in agricultural technology. The selected farmers were categorized based on their educational status into six groups namely, illiterate, primary level, middle level, high school level, higher secondary level and graduate level. The results are presented in Table 2.

Table 2 : Distribution of farmers based on their education

Sr. No.	Education	Number	
		ERU (30)	ERNU (30)
1.	Illiterate	–	4 (13.33)
2.	Primary	–	18 (60.00)
3.	Middle School	3 (0.00)	5 (16.67)
4.	High School	5 (16.67)	1 (3.33)
5.	Higher Secondary School	16 (53.33)	2 (6.67)
6.	Graduate	6 (20.00)	–
Total		30 (100.00)	30 (100.00)

Figures in parentheses indicate percentage to the total

It could be revealed from Table 2 that among the sample farmers about 53 per cent of e-resource users had higher secondary level education while 60 per cent of the ERNU had only primary level of education. It could be implied that those who are having higher education had access to the e-resources.

Size of land holdings :

Adoption of new technologies and use of e-resources involve additional costs to farming. Hence, it has to be examined whether it is scale neutral. The sample farmers were categorized as marginal (less than 1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4-10) and large farmers (more than 10 ha). The data were analysed and the results are presented in the Table 3.

Table 3 : Distribution of farmers based on land holding

Sr. No.	Farm Category	Numbers	
		ERU(30)	ERNU (30)
1.	Marginal	2 (6.67)	4 (13.33)
2.	Small	4 (13.33)	11 (36.67)
3.	Semi-medium	7 (23.33)	9 (30.00)
4.	Medium	14 (46.67)	6 (20.00)
5.	Large	3 (10.00)	-
Total		30 (100.00)	30 (100.00)

Figures in parentheses indicate percentage to the total

Data presented in Table 3 show that among the sample farmers, majority of the ERU were medium farmers accounting for 46.67 per cent while majority of the ERNU were small farmers (36.67 %). Hence, it could be concluded that most of the users were of large holdings cultivating high value commercial crops and hence they were using e-resources for accurate and timely information related to farm activities.

Experience :

Impressive and sustained growth could be achieved through better farming experience, since it greatly influences the knowledge and ultimately the efficiency and competency of the farmers. The sample farmers were categorized based on

their farming experience and the details are reported in Table 4.

Table 4 : Distribution of farmers based on their farming experience

Sr. No.	Experience (years)	Number	
		ERU (30)	ERNU (30)
1.	< 15 years	9 (30.00)	1 (3.33)
2.	16-30 years	16 (53.34)	5 (16.67)
3.	31-45 years	4 (13.33)	7 (23.33)
4.	> 45 years	1 (3.33)	17 (56.67)
5.	Total	30 (100.00)	30 (100.00)

Figures in parentheses indicate percentage to the total

It could be observed from Table 4 that among the sample farmers about 53 per cent of ERU were having 16-30 years of experience. In case of ERNU about 57 per cent were having more than 45 years of farming experience. Hence, it could be concluded that relatively young farmers were using e-resources. So, the efforts should be made to motivate old farmers; so that they may be satisfied to adopt innovative farm practices like ICT.

Possession of modern electronic gadgets :

The distribution of the respondents based on the possession of modern electronic gadgets is furnished in Table 5.

Table 5 : Distribution of farmers based on the usage of modern electronic gadgets

Sr. No.	IC Tools	Number	
		ERU (30)	ERNU (30)
1.	Radio	-	-
2.	Radio + TV	-	6 (20.00)
3.	Radio + TV + Mobile	27 (90.00)	24 (80.00)
4.	Radio + TV + Mobile + Computer	3 (10.00)	-
Total		30 (100.00)	30 (100.00)

Figures in parentheses indicate percentage to the total

It is understood from Table 5 that 90 per cent of the respondents were using e-resources like radio, television and mobile while 80 per cent of the non-users had electronic gadgets but they did not use to access farm related information due to lack of awareness about the e-resources.

Awareness of ICT -tools for e-resources users :

Awareness is the first stage in the use of e-resources, wherein the farmers would come to know about the e-resources and their importance in farming. The details of the awareness level of sample farmers about e-resources are presented in Fig. 1. It could be inferred that all the e-resource users in the study area were aware of the various ICT tools like Kisan Call Centre(KCC), Farm radio programmes, television programmes and mobile telephony etc. The awareness level of other ICT

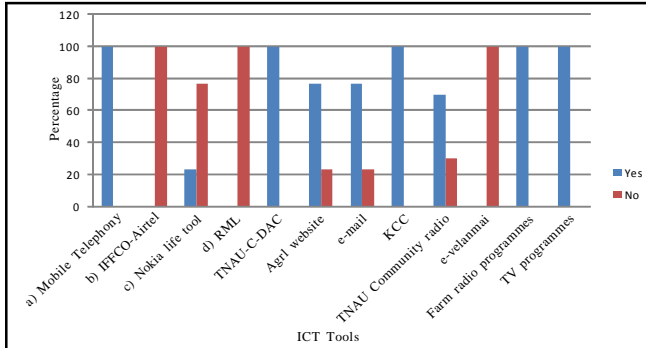


Fig. 1 : Awareness of ICT tools.

tools such as Nokia life tool ,e-mail and agricultural websites was reported to be poor.

Logistic regression co-efficient of factor influencing the usage of e-resources :

In the present study, logistic regression model was employed to study the various factors influencing the usage of e-resources. This analysis was performed by taking age of the farmers, education, farming experience, training and motivation as independent variables and adopters of e-resources as dependent variable. In case of dependent variables, the score 1" was given if the farmers adopted the e-resource; otherwise the score 0 was given" if the farmers did not adopt the e-resource tools for farm related information.

From Table 6, it could be observed that the model fit well to the data as indicated by the observed significance of log likelihood ratio test. The results of logistic regression model suggested that most important factor that determined the usage of e-resources was education. The training had positive influence whereas the age had negative impact on the usage of e-resource. The result of the logistic regression suggested that education and training had significantly and positively influenced the usage of e-resources. For instance, one unit increase in level of education would result in the probability of increasing the usage of e-resources by 0.20 units. Similarly, one unit increase in training would result in the probability of increasing the usage of e-resources by 0.67 units. The factor age was significant and had a negative impact on the usage of e-resources. It could be concluded that age and education influenced the adoption of e-resources significantly.

Extent of usage of e-resources :

There were four dimensions that were taken into consideration for assessing the extent of usage of e-resources. They were classified into four categories viz., i. Crop protection, ii. Crop production, iii. Crop management and iv. Crop improvement. The details of the distribution of factors on the extent of usage of e-resources are reported in Table 7.

Table 6 : Results of logistic regression model

Sr. No	Factors	Co - efficient	t-ratio	Odds ratio	Probability
1.	Intercept	12.56	3.26	0.540	0.35
2.	Age of the farmers	-0.617*	-1.37	1.164	0.53
3.	Education	0.152**	1.71	0.263	0.20
4.	Farming experience	1.335	0.54	0.64	0.39
5.	Training	2.437**	1.64	2.064	0.67
6.	Motivation	0.236	0.21	0.13	0.11
7.	Log likelihood		18.241		
8.	No. of samples		60		

*and** indicates significance of values at P=0.05 and 0.01, respectively.

Table 7 : Distribution of factors based on extent of usage of e-resources

Sr. No.	Factors	Mean score	Rank
1.	Crop protection		I
	Pest management practice	1.7	
	Disease management practice	1.5	
	Weed management	0.1	
	Average	1.10	
2.	Crop production		II
	Weather and climate	0	
	Fertilizers management	1.5	
	Cropping pattern	1.2	
	Average	0.90	
3.	Crop management		III
	Precision farming	1.1	
	Cropping system	0	
	Agricultural implements	0	
	Market information	1.3	
	Govt subsidies & loans	0.2	
	Average	0.52	
4.	Crop improvement		IV
	Advanced cultivation practice (System of rice intensification, system of sugarcane initiative)	0.8	
	Recent varieties and hybrids	0.2	
	Average	0.50	

Among the four dimensions, it was found that majority of the e-resource users used ICT for accessing the information about crop protection related details and the average mean score was 1.10 followed by crop production (0.90), crop management (0.52) and crop improvement (0.50).In crop protection, majority of the e-resource users accessed the information on pest management practices (1.7) followed by disease management practices (1.5).

Perception about validity of the information available in e-resources :

The perception about validity of the information provided by e-resource users were considered as different factors. The list of factors and the level on satisfaction are reported in Table 8.

The details on perception of e-resource users about the validity of the accessed information were gathered and the results are furnished in Table 8. From the table it could be concluded that the 83.33 per cent of the e-resource users were highly satisfied and perceived that the information was in suitable form, followed by about 80 per cent of users who were highly satisfied with the credibility of information followed by selection of appropriate market (53.33 %) and so on. It could also be a matter of the fact that e- resource users were moderately satisfied with accessibility of the information. About 23 per cent of the e-resource users were not satisfied with the availability of the information. To find out the economic viability of the usage of ICT, an analysis was done between the farmers using e-resources and the non-users. For this comparison, two vegetable crops viz., tomato and brinjal were selected since the use of ICT plays a significant role in enhancing yield and farm profitability.

It could be concluded from Table 9 that no significant variation was observed in the cost of field preparation and planting. However, e-resources users spent Rs. 15000 towards drip fertigation and got the yield of 26 mt/ha. From the result it was understood that an additional yield of 3.5mt/ha with the increase net return of Rs. 18400 and 3.0 mt/ha with the increased net return of Rs. 11500 were obtained by farmers who used e-resource users in brinjal and tomato crops, respectively. So, the yield increase was significant result from timely and precise application of inputs and market information. The increased yield was up to the expected level and still there are chances for increasing the yield by adopting e-resources by the farmers in the study region.

Table 9 : Comparison of net profit between e-resource users and non-users

Activities	ERU (n=10)		ERNU (n=10)	
	Brinjal/ha	Tomato/ha	Brinjal/ha	Tomato/ha
Cost of cultivation				
Field preparation	6200	6200	6200	6200
Planting	2500	2500	2500	2500
Insecticides	8500	8200	10200	10200
Fertilizers	250	200	-	-
(Azospirillum)				
Fertilizers	-	-	8500	8500
Labour wages (weeding)	6800	7000	10000	10200
Plant growth regulators	2500	2500	-	-
Drip fertigation system (5years)	15000	5000	-	-
Water soluble fertilizer	17000	17000	-	-
Total	58750	48600	37400	37600
Yield (MT/ha)	26	19	22.5	16
Market price (Rs./kg)	8.5	7.5	8.5	7.5
Net income	162250	83900	143850	72400

Table 10 : Reasons for not using the e-resources

Sr. No.	Reasons	Garrett's score	Rank
1.	Lack of awareness	91.44	I
2.	Technical problem in using the e-resources	80.38	II
3.	Illiteracy	38.48	III
4.	Non-reliability	28.11	IV
5.	Lack of interest	16.82	V

Table 8 : Perception about validity of the information available in e-resources

Sr. No.	Factors	Highly satisfied	Moderately satisfied	Not satisfied	Total
1.	Need based technology	22 (73.33)	8 (26.67)	0	100.00
2.	Understandability	21 (70.00)	9 (30.00)	0	100.00
3.	Accessibility	9 (30.00)	21 (70.00)	0	100.00
4.	Timely availability	20 (66.67)	3 (10.00)	7 (23.33)	100.00
5.	Availability of the information in required form	25 (83.33)	5 (16.67)	0	100.00
6.	Credibility of the information	24 (80.00)	6 (20.00)	0	100.00
7.	Language	18 (60.00)	12 (40.00)	0	100.00
8.	Valid information	24 (80.00)	6 (20.00)	0	100.00
9.	Price information	22 (73.33)	8 (26.67)	0	100.00
10.	Selection of the market	16 (53.33)	14 (46.67)	0	100.00

Reasons for non usage of e-resources :

The various reasons expressed by the non-users for not using e-resources were analysed by using the Garrett's ranking technique.

From Table 10, it is evident that among the reasons, lack of awareness was the most important reason attributed for the non-use of e-resources followed by technical problem, illiteracy, non reliability and lack of interest. Hence, the above issues must be looked into to make the non-users into the beneficiaries of ICT.

Conclusion :

Even though many of the non-users were aware of the information and communication technologies, they were not using them for agriculture related activities. Hence, they may be taught the relevance and importance of ICT and their impact on crop yield, market and farm income. Among the various applications and advantages, the price information is expected to improve farmers' ability to negotiate with buyers and to enable them to arbitrage better across sales outlets. Weather information would also help farmers reduce crop losses from natural calamities. Crop advisory information should induce farmers to adopt new crop varieties and improve cultivation practices. The State Agricultural University and State Department of Agriculture

should take maximum effort in conducting the training related to use of e-resources for the betterment of farmers, particularly the small and marginal farmers to become price markers in the market economy.

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