

Farmers' Willingness to Pay (WTP) Behaviour for ICT Based Extension Approach

Shanthinichandra¹, Karthikeyan² and Mohanraj³

1. PG student, 2. APRO and Professor, 3. Ph.D. Scholar, Department of Agricultural Extension and Rural Sociology, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu State, India.

Corresponding author e-mail : shanthinichandra43@gmail.com

ABSTRACT

The study was undertaken to analyse farmer's behaviour of willingness to pay for agricultural extension service through e-Velammai in India. Proportionate random sampling procedure was adopted to select a sample of 120 farmers who availed e-Velammai mode of extension. Results showed that no farmer was willing to pay annually for accessing the extension services offered by the state department of agriculture but majority of the farmers (91.67%) were willing to pay to access extension services through e-Velammai. The significant attributes that have contributed to the farmers' behaviour of willingness to pay for e-Velammai model of agricultural extension were age, educational level, farm size and income.

Key words : Willingness to pay; Behaviour; ICT; Extension approach; e-Velammai.

Agriculture is an important sector with a majority of the rural population in developing countries depending on it. The sector is confronted with major challenges of enhancing production in a situation of dwindling natural resources necessary for production. The growing demand for agricultural products, however, also offers opportunities for producers to sustain and improve their livelihoods. Information and Communication Technology (ICT) play an important role in addressing these challenges and uplifting the livelihoods of the rural poor (Stienen et al., 2007). ICT is any device, tool, or application that permits the exchange or collection of data through interaction or transmission. ICT is an umbrella term that includes anything ranging from radio to satellite imagery to mobile phones or electronic money transfers. Second, these ICTs and others have gained traction even in impoverished regions. The increases in their affordability accessibility and adaptability have resulted in their use even within rural homesteads relying on agriculture. New, small devices (such as multifunctional mobile phones and nanotechnology for food safety), infrastructure (such as mobile telecommunications networks and cloud computing facilities), and especially applications (for example, that transfer money or track an item moving through a global supply chain) have proliferated (Mcnamara, et al., 2011).

It is believed that ICT-based agricultural extension brings opportunities and has the potential for enabling the empowerment of farming communities. And hence, extension practitioners are interested in experimenting with innovative e-agriculture initiatives in India (Saravanan, 2010). Saravanan (2012) classified e-agriculture initiatives implemented in India into four major categories. They are web portals: aAQUA, KISSAN Kerala, TNAU AGRITECH Portal, AGRISNET, DACNET, e-Krishi, ASHA, India Development Gateway (InDG) portal, Rice Knowledge Management Portal (RKMP), Agropedia,

AGMARKNET, ITC-e-Choupal, EID Parry-Indiagriline, Indiancommodities.com, Mahindra Kisan Mitra, IFFCO Agri-Portal, Agrowatch Portal, iKissan, etc., knowledge centres/tele-centres: Village Knowledge Centres (VKCs) of M.S. Swaminathan Research Foundation (MSSRF) & others, Village Resource Centres (VRCs) of the Indian Space Research Organisation (ISRO), Community Information Centres (CICs), Common Service Centres (CSCs), etc., telephony/mobile telephony (m-agriculture initiatives): Farmers Call Centre (Kissan Call Centre), Lifelines India, IFFCO Kisan Sanchar Limited (IKSL), Fisher Friend, Reuters Market Light (RML), etc. and hybrid projects (ICTs with traditional extension elements): e-Sagu, Digital Green, e-AgriKiosk, e-Villages, Knowledge Share Centres, etc. e-Velammai is also an ICT based agricultural extension approach which was implemented in Tamil Nadu.

e-Velammai: An ICT based agricultural extension approach : e-Velammai means electronic agriculture is a World Bank sponsored project being operated in Tamil Nadu Agricultural University since July 2007. e-Velammai is an ICT based demand driven and participatory technology transfer model in agriculture to provide timely agro advisory services by a multidisciplinary team of agricultural scientists to the farmers using ICT tools (Digital camera, computer, internet, mobile phone etc.) through a Field Coordinator (FC) on need basis (Karthikeyan, 2011a). It is a sustainable approach of technology transfer for enabling scientific farming and enhances farm productivity. It is referred as demand driven and participatory technology transfer model because:

- Farmers paid membership fee based on the farm size owned by them to avail the extension services under e-Velammai as an indicator of their participation in the system of technology transfer.
- Scientists attend the farmers queries based on their call (demand) or need and hence, it is demand driven for technical advice or scientific farming.

- It is also believed to be sustainable approach of extension as it facilitated the farmers to adopt the 'e-Velanmai' model for technology access in the long run even after the project period. The membership fees collected will be utilized for managing the sustainability of the process (www.evelanmai.com).

The 'e-Velanmai' model of extension was evolved from a pilot tested public model initiated during July 2007 to a paid model or private model during October 2008. In order to enhance the participation of farmers in scientific farming and to have sustainability of the scheme, paid model of e-Velanmai was conceived and introduced in three sub basins namely, Palar, Aliyar and Varahanadhi through Water User Association functioning in these command areas. (Karthikeyan, 2011b). In e-Velanmai scheme farmers need to pay considerable amount to become a member in this scheme and also to get information. So, there is a need to study the farmer's willingness to pay (WTP) behaviour. This study won't be fulfilled if it does not identify the profile of the users of e-Velanmai. Hence, this study was undertaken to ascertain farmers' willingness to pay behaviour for the ICT based extension approach in Tamil Nadu. The objectives of study are

- To study the socio-economic profile of the farmers who had accessed agricultural advices through e-Velanmai.
- To analyse the 'willingness to pay' behaviour of farmers for the ICT based extension approach.
- Identify the factors influencing farmers' willingness to pay for extension service.

METHODOLOGY

Coimbatore district lies in the Western part of Tamil Nadu, part of the Kongu Nadu region. Coimbatore district is located in the northern region of Tamil Nadu state which is exactly located in between 11°15' North latitude and 77°19' East longitude (www.coimbatore.nic.in). 'e-Velanmai' model of Agricultural extension was initially pilot tested in Palar sub basin of Coimbatore district from July 2007-2011. Based on the World Bank expert comments on the performance of the project, it has been up scaled in 19 sub basins covering 14 districts of Tamil Nadu during April 2011- March 2012. Hence, Palar sub basin of Coimbatore district was selected as the locale for the study. The e-Velanmai project was pilot tested in Sultanpet block of Coimbatore district and hence, the project implemented areas of the block was considered as the study locale. During 2007-2011, there were 941 farmers enrolled in the e-Velanmai project operated in the Sultanpet block. Proportionate random sampling procedure was adopted to select a sample of 120 farmers who availed e-Velanmai mode of extension to solve their farm problems. Here the sample size was fixed at 120, considering the manageable limit to collect data for the study. In Palar sub basin, the e-Velanmai project was implemented in three Water User Associations (WUAs) covering 45 villages spread over Sultanpet block of Coimbatore district. In Sultanpet block all the three WUA namely Kumarapalayam, Senjeriputhur, and J.Krishnapuram were selected for the study. Each WUA comprised 15, 14 and 16 villages, respectively and the WUA wise villages covered under the implementation of e-Velanmai scheme is given in Table 1.

Table 1
Selection of respondents

Sr. No.	Kumarapalayam WUA			Senjeriputhur WUA			J.Krishnapuram WUA		
		1	2		1	2		1	2
1.	Karaiyampalayam	69	9	Vadavedampatty	61	8	Moongiltbolovu	46	6
2.	Pachgoundanpalayam	65	8	Senjeriputhur	36	5	J.Krishnapuram	45	6
3.	Senjeri	64	8	Karumpucavipalayam	35	4	Chickanuthu	40	5
4.	Kumarapalayam	59	8	S.P. Vadugapalayam	34	4	Amanthakadavu	23	3
5.	Malaipalayam	56	7	P.Kammalappatty	30	4	Kosavampalayam	6	-
6.	Senjerimalai	51	7	C. Kammalappatty	20	3	Valasipalayam	3	-
7.	Sultanpet	50	6	Manthiripalayam	17	2	Vanjipuram	3	-
8.	Thazhakarai	50	6	Selliyagoundanputhur	8	-	Sethampalli	1	-
9.	S. Iyyampalayam	49	6	Salaiyur	6	-	Vagaitholuvu	1	-
10.	Pacharpalayam	25	3	Iyyampalayam	3	-	C.N.palayam	1	-

Table Cont.

11.	Poorantapalayam	11	2	Salaiputhur	1	-	Kuppampalayam	1	-
12.	Munthiripalayam	8	-	T. Vadukapalayam	1	-	Mugavanur	1	-
13.	Aranganpalayam	7	-	Chinnaputhur	1	-	T. Vadukapalayam	1	-
14.	Oodakapalayam	7	-	Appulipatty	-	-	Nandipuram	-	-
15.	Jakarapalayam	1	-				Arasar	-	-
16.							Maanampalayam	-	-
	Total	572	70		254	30		176	20
								Grand Total	128

Source: www.lamwarm.gov.in/dpr-pdf/Palar.pdf

1. Number of farmers enrolled in e-Velanmai scheme 2. Number of farmers selected

RESULTS AND DISCUSSION

3.1. Socio-economic characteristics of farmers : Results in the Table 2, revealed that majority of them were old age (69.17%), followed by middle age (25.83%), and young age (5.00%). The farmers of old age group had more participation in the e-Velanmai due to their progressive involvement in agriculture than the youth and the middle aged farmers. The reason attributed for less involvement of youth might be most of the youth were employed in other professions such as engineering, business, teachers, etc. which normally pulls them away from agriculture and hence, the result. It could be concluded that majority (69.17%) of the people were old aged. Majority of members in e-Velanmai were old aged and they had shown great interest towards getting technical advices from reliable source namely Tamil Nadu Agricultural University. The findings were similar to that of Dipeolu, et al. (2009) who have also reported that majority of the respondents belong to old age group. Majority of farmers (95.00%) who were heads of their families were men whereas 5.00 per cent were women. Majority of members in e-Velanmai were male. This showed that farming in the study area is dominated by men. It is well known that, in our rural society, male had relatively higher exposure to external situations than female. Even though female have more involvement in agriculture and allied fields now-a-days, male always preferred to utilize new innovative approaches in transfer of technology due to their exposure with outside world. In other words, the information need with regard to agriculture and allied fields is more for male groups because of the decision making power vested with them. The findings were similar Abu et al. (2011) and Ozor et al. (2011). They have also reported that the majority of the respondents belong to male.

More than one-third of the respondents had their education up to middle school (35.83%), 35.00 per cent of people had their education up to primary school, 12.50 per cent are functionally literate, 11.67 per cent of people had their education up to high school and 5.00 per cent were collegiate. From the above findings it

could be seen that a majority of the respondents were educated. This implies that majority of the farmers in the study area were literate and can easily adopt new technologies to improve their farm production. This finding is similar to that of Abu, et al. (2011) who had reported that majority of the respondents were educated up to secondary level. Majority of the farmers (71.67%) had 2.5 to 5 acres of land, 10.83 per cent of the respondents had 5 to 10 acres of land, 12.50 per cent of the respondents had above 10 acres, followed by 5.00 per cent of the respondents had land less than 2.50 acres. Small farmers had relatively lesser holding, so they were interested in adopting new technologies to improve their farm production. This finding was similar to that of Ajayi (2007).

One-third (37.50%) of the farmers had earned Rs.75001-100000, followed by more than Rs.150000 (30.83%), Rs.100001-125000 (15%), Rs.50000-75000 (11.00%) and Rs.125001-150000 (7.50%). Majority of the respondents are in marginal and small farmer's category and their main occupation is agriculture their income level would also be low. More than half (51.67%) of the members of e-Velanmai were members in the social organisations and 15.00 per cent of them were office bearers in the social organization. This could be attributed by the fact that more number of respondents being literates. It was found during the survey, that a majority of the respondents were members of co-operative society and farmers' association at their locale and some of them were office bearers in WUA at their places and hence the result. Nearly half (52.50%) of the members had contacted the e-Velanmai Field Coordinators for more than 5 times for getting advices on agriculture, followed by medium level contact (46.67%) and low level contact (0.83%). The reason attributed for this result as expressed by most of the farmers during survey was the technologies given by e-Velanmai was very effective and useful to solve their farm problems and hence, they contacted the FC of e-Velanmai more frequently. Moreover farmers had grown either vegetables or other cereals in addition to Coconut crop in their farm. Hence, they had frequent

Table 2
Farmer's socio-economic characteristics

Sr. No.	Variables	Frequency (N=120)	Percentage
I.	Age(years)		
1.	Young(up to 35yrs)	06	05.00
2.	Middle(36-45yrs)	31	25.83
3.	Old(>45yrs)	83	69.17
II.	Gender		
1.	Male	114	95.00
2.	Female	06	05.00
III.	Educational status		
1.	Illiterate	0	-
2.	Functionally literate	15	12.50
3.	Primary school	42	35.00
4.	Middle school	43	35.83
5.	High school	14	11.67
6.	Collegiate	06	05.00
IV.	Land holding		
1.	Below 2.50 acres	06	05.00
2.	2.51 to 5.00 acres	86	71.67
3.	5.01 to 10.00 acres	13	10.83
4.	Above 10.00 acres	15	12.50
V.	Annual income (Rs.)		
1.	50000-75000	11	9.17
2.	75001-100000	45	37.50
3.	100001-125000	18	15.00
4.	125001-150000	09	07.50
5.	>150000	37	30.83
VI.	Social participation		
1.	Office bearer	18	15.00
2.	Member	62	51.67
1.	Neither member nor office bearer	40	33.33
VII.	Frequency of contact		
1.	Low (up to 2 times)	01	0.83
2.	Medium (3 to 4 times)	56	46.67
3.	High (> 5times)	63	52.50
VIII.	Time of awareness		
1.	2007		
2.	2008	07	05.83
3.	2009	40	33.34
4.	2010	67	55.83
5.	2011	06	05.00

contact with the e-Velanmai for advices. More than half (55.83%) of the users were aware about e-Velanmai during the year 2010 followed by 2009 (33.34%), 2008 (5.83%) and 2011 (5%) in that order. This implies that, maximum number of respondents got aware about e-Velanmai during 2010. It was learnt that the respondents had got aware from sources like e-Velanmai meetings, progressive farmers, and opinion leaders. At initial stage, the farmers were unaware about this e-Velanmai scheme, later the progressive farmers adopted the technologies and they achieved fruitful results. By the opinion given by these progressive farmers about their success achieved, other farmers had joined in the e-Velanmai scheme. The paid model of e-Velanmai was introduced during October 2008 and thereafter limited awareness meetings were conducted to farmers.

It was found that before the introduction of e-Velanmai, nearly one-third (35.00%) of the respondents regularly contacted agricultural input dealers to access extension service and 5.83 per cent contacted occasionally followed by 23.33 per cent of the respondents contacted agricultural officers regularly and 2.50 per cent contacted occasionally, 11.67 per cent had regular contact with progressive farmers to get agricultural news and 6.67 per cent

occasionally contacted the progressive farmers, 10.00 per cent of the respondents had regular contact with TNAU scientists to access extension advices and 4.17 per cent contacted occasionally, 5.83 per cent of the respondents occasionally contacted private farm consultants and 2.50 per cent of the respondents got access from the neighbours and relatives (Table 3). The reason behind this result was the agricultural input dealers provided agricultural services for less credit, so many of the farmers had accessed agricultural input dealers for accessing extension services before the initiation of e-Velanmai. This implies that maximum number of farmers contacted agricultural input dealers to get agricultural information before the initiation of e-Velanmai scheme. After the initiation of e-Velanmai more than half (51.67%) of the members had accessed extension services from e-Velanmai regularly and 10.83 per cent had accessed extension services from e-Velanmai occasionally followed by 37.00 per cent of the members accessed occasionally from the agricultural input dealers. This implies that maximum number of farmers had contacted e-Velanmai regularly due to the reason that the field coordinator visited their farms by the field coordinators, and they are solving their farm problems.

Table 3
Distribution of respondents according to their access to extension service

Sr. No.	Sources	Before e-Velanmai						After e-Velanmai					
		R		O		N		R		O		N	
		F	%	F	%	F	%	F	%	F	%	F	%
1.	Private farm consultants	-	-	7	5.83	-	-	-	-	-	-	-	-
2.	Scientist from TNAU	10	8.33	5	4.17	-	-	-	-	-	-	-	-
3.	e-Velanmai	-	-	-	-	-	-	62	51.67	13	10.83	-	-
4.	Agricultural officer/AAO	28	23.33	3	2.50	-	-	-	-	-	-	-	-
5.	NGOs	-	-	-	-	-	-	-	-	-	-	-	-
6.	Other developmental officials	-	-	-	-	-	-	-	-	-	-	-	-
7.	Agricultural input dealers	35	29.17	7	5.83	-	-	-	-	45	37.50	-	-
8.	Opinion leaders	-	-	-	-	-	-	-	-	-	-	-	-
9.	Progressive farmer	14	11.67	8	6.67	-	-	-	-	-	-	-	-
10.	Neighbours/Relatives	-	-	3	2.50	-	-	-	-	-	-	-	-

R – Regularly; O – Occasionally; N – Never

Farmer's willingness to pay (under existing system) : The Willingness to pay is the maximum amount a person would be willing to pay, in order to access scientific advices in agriculture through state department of agriculture. The Willingness to pay behaviour of farmers to avail extension services from state department of agriculture were analysed and given in the Table 4. It clearly shows that none of the farmers were willing to pay annually for accessing the extension service offered by the state department of agriculture. From the finding we could conclude that no farmer was willing to pay annually for accessing the extension services offered by the state department of agriculture. Since the existing mode of technology transfer followed by the state department of agriculture was not done at farm gate level as per the individual farm specific needs, at appropriate time, none of the farmers were willing to pay for such service. This findings was similar to that of Anbarasan (2010) who also reported that none farmers were not willing to pay for the services availing the extension offered by the state department of agriculture.

Table 4
Distribution of respondents according to their willingness to pay (under existing system) (N=120)

Sr. No.	Category	Frequency	Percentage
1.	Willing to pay	0	00
2.	Not willing to pay	120	100.00

Farmer's willingness to pay (under e-Velanmai mode) : The Willingness to pay is the maximum amount a person would be willing to pay, in order to access scientific advices in agriculture through e-Velanmai mode. The Willingness to pay behaviour of e-Velanmai beneficiaries in future were analysed and given in the Table 5. It showed that about (45.83 %) of the farmers were willing to pay Rs.100-200 for accessing the extension service through e-Velanmai, followed by Rs.201-300 (16.67%), Rs.401-500 (11.67%), more than 500 (10.83%), Rs.301-400 (6.67%) and 8.33 per cent of farmers were not willing to pay for accessing the extension service through ICT based extension method. From the findings it can be stated that most of the farmers were willing to pay for accessing the extension services through ICT based extension method e-Velanmai. Through e-Velanmai, the farmers were able to access advices at their farm gate and it also reduced farmers risk and saved their time and money. Besides they also provided useful advices to solve their farm problems. Some of the farmers had low income, so they are not willing to pay for e-Velanmai. This result is similar to that of Abu, et al. (2011) and Ozar, et al.(2011) who also reported that more than three-fourth of the farmers were willing to pay for soil management information services in

Nigeria. From the findings it could be concluded that most of the farmers were willing to pay for accessing extension services through e-Velanmai in future.

Table 5
Distribution of respondents according to their willingness to pay (N=120)

Sr. No.	Category	Frequency	Percentage
1.	Rs.100-200	55	45.83
2.	Rs.201-300	20	16.67
3.	Rs.301-400	8	6.67
4.	Rs.401-500	14	11.67
5.	More than 500	13	10.83
6.	Not willing to pay	10	8.33

Factors influencing farmers' willingness to pay for extension services through e-Velanmai : In order to find out the factors that influenced the farmers willingness to pay for the extension services, an econometric model known as probit function analysis was used and the results of the same is presented in Table 6. The probit model was used because the willingness to pay (Y) had two outcomes (2-willing, 1-not willing). The attributes taken for the analysis variables were: X1= age in years, X2 = dummy variable for gender (Male =1, Female = 0), X3 = educational level (1= illiterate, 2 = if the farmer had primary educational level, 3 = if the farmer had middle school education, 4 = if the farmer had high school education, and 5 = collegiate), X4 = farm size in ac and X5 = annual income in rupees.

$$Y = 1.347 + 0.643X_1 - 0.401X_2 + 0.215X_3 + 0.856X_4 + 0.448X_5$$

From the results of the probit function analysis, it could be observed that four variables were statistically significant. The significant attributes that have contributed to the farmers' behaviour of willingness to pay for e-Velanmai model of agricultural extension were age (t = 2.17), educational level (t = 1.55), farm size (t = 1.91) and income (t = 3.38). The variable income was found to be significant at one per cent level. Farm size and age were found to be significant at 5 per cent level. Education was statistically significant at ten per cent level.

For an unit increase in age, the z-score increases by 0.643, for an unit increase in gender, the z-score decreases by -0.401, for an unit increase in education, the z-score increases by 0.215, for an unit increase in farm size, the z-score increases by 0.856, for an unit increase in income, the z-score increases by 0.44803. This implied that as the farm size increases, the income generated will also get increased and the farmers tend to be willing to pay in order to avoid any risk in agriculture. This directly influenced the farmers'

Table 6
Factors influencing farmers' willingness to pay for ICT based extension services

S. No.	Variables	Estimated Coefficients	Standard Error	T-Ratio
1.	Constant	1.347	1.370	0.984
2.	Age	0.643**	0.296	2.172
3.	Gender	-0.401(NS)	0.484	-0.829
4.	Education	0.215 *	0.138	1.555
5.	Farm Size	0.856 **	0.448	1.912
6.	Income	0.44803***	0.1323	3.385

***Significant at 1 per cent level; ** Significant at 5 per cent level; * Significant at 10 per cent level

willingness to pay for agricultural services through e-Velanmai. It could also be observed that relatively the old aged farmers were willing to pay for e-Velanmai. As age increases, access to information decrease due to decline in mobility for technical advice. This revealed that old aged farmers accessed the advices timely at their farm gate level and were ready to utilize the services. Higher the education level, among farmers, the more the willingness to pay for e-Velanmai. The Willingness to pay was found to have significant and positive relationship with age, education, farm size and annual income of the farmers. Hence, the Null Hypotheses framed in the study is rejected.

CONCLUSION

The study determined farmers' willingness to pay for agricultural extension service through e-Velanmai in India. The study showed that majority of the respondents were old aged, male, educated at different levels, operated small/marginal land holdings, had income of Rs.75001-100000, members in social organizations. Regarding the frequency of contact, majority of respondents contacted e-Velanmai Field Coordinators for more than 5 times. Half of the users got aware about e-Velanmai during 2010. Before initiating e-Velanmai, farmers contacted agricultural input dealers to access extension services but after initiation of e-Velanmai more than half of the members

had accessed extension services from e-Velanmai. No farmer was willing to pay annually for accessing the extension services offered by the state department of agriculture. More than three-fourth of farmers of e-Velanmai were willing to pay for the extension service attempted through ICT based extension method and very few farmers were not willing to pay for accessing the extension service through ICT based extension method. The willingness to pay was found to have significant and positive relationship with age, education, farm size and annual income of the farmers. Most of the farmers were willing to pay for any ICT projects like e-Velanmai, some of them were willing to pay as per the need basis. Hence, farmers were ready to pay for immediate and quality advices from experts. Most of the respondents were rejecting government officials to carry out any kind of farming activities, since mode of technology transfer by the state department of agriculture has technical problems in accessing the farm technologies. Likely if the e-Velanmai scheme is being implemented by the state department of agriculture, some of the people do not believe the state department officials due to various reasons such as credibility of the information.

Paper received on : July 14, 2013

Accepted on : September 15, 2013

REFERENCES

1. Abu, G.A., T. E. Taangahar and I. D. Ekpebu. 2011. Proximate Determinants of Farmers WTP (willingness to pay) for Soil Management Information Service in Benue State, Nigeria. *African J. of Agric. Res.* 6 (17): 4057-4064.
2. Ajayi, A.O. 2007. An Assessment of Farmers' Willingness to Pay for Extension Services Using the Contingent Valuation Method (CVM): The Case of Oyo State, Nigeria. *The J. of Agric. Edu. and Exten.* 12 (2): 97-108.
3. Anbarasan, P. 2010. Evaluating the Effectiveness of 'e-Velanmai': An ICT Based Technology Transfer Model in Agriculture. *Unpub. M.Sc. Thesis*, TNAU, Coimbatore.

4. Dipeolu, A.O., B.B. Philip., I.O.O. Aiyelaagbe., S.O. Akinbode and T.A. Adedokun. 2009. Consumer Awareness and Willingness to Pay for Organic Vegetables in South West Nigeria. *Asian J. of Food and Agro-industry*: 57-65.
5. Karthikeyan, C. 2011a. e-Velanmai: An Information and Communication Technology (ICT) Enabled agrotechnology transfer model. *Paper presented in the international conference on 'innovative approaches for agricultural knowledge management – global extension experiences'* held during 9-12, November 2011 at NASC Complex, New Delhi.
6. Karthikeyan, C. 2011b. e-Velanmai: Pilot Testing And Upscaling of ICT Enabled Agricultural Extension model. Lead paper published in the compendium of the *national seminar on "Innovations in farming systems research and extension for inclusive development"*, (Edited by Sudeepkumar,N.K., P.Thilakar, N.V.Rajkumar, T.Senthilkumar, P.Thirunavukarasu) held during 24-25, November 2011 at Tamil Nadu Veterinary and Animal Sciences University, Chennai.
7. Mcnamara, K., Belden, C., Kelly, T., Pehu, E., Donovan, K. 2011. Introduction: ICT in Agricultural Development. In *ICT in Agriculture: Connecting Smallholders to Knowledge, Networks, and Institutions. Report Number 64605: World Bank*; Washington DC; 3-14.
8. Mwaura, F., Muwanika Fred Roland and Okoboi Geoffrey. 2010. Willingness to Pay for Extension Services in Uganda among Farmers Involved in Crop and Animal Husbandry. Contributed Paper presented at the *Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) conference*, Cape Town, South Africa.
9. Ozor, N., Garforth, J.C and Madukwe, C.M. 2011. Farmers' Willingness to Pay for Agricultural Extension Service: Evidence from Nigeria. *J. of International Development*: 1-11.
10. Saravanan, R. 2010. India. In *ICTs for Agricultural Extension: Global Experiments, Innovations and Experiences*. Saravanan, R. (Ed.). New Delhi: *New India Publishing Agency*: 115-168.
11. Saravanan, R.2012. e-Agriculture Prototype for Knowledge Facilitation among Tribal Farmers of North-East India: Innovations, Impact and Lessons. *The J. of Agric. Educ. and Exten*: 1-19.
12. Stienen, J., Bruinsma, W and Neuman, F. 2007. How ICT can make a Difference in Agricultural Livelihoods. International Institute for Communication and Development (IICD). Available online at: URL: www.iicd.org/files/ICT%20and%20agricultural%20livelihoods.pdf and retrieved on 03 January 2013.