ICT based market information services in Kerala – determinants and barriers of adoption

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ABSTRACT

ICT based market information services are getting wide importance as a means of empowering farmers by enabling them to take informed decisions, and in removing information asymmetry. This study analyses determinants of adoption as well as barriers to adoption of ICT based market information services (MIS) in Kerala. Logistic regression model revealed that factors like education, family size, and contact with extension agent positively influenced adoption of ICT based market information services by the farmers whereas income from other sources negatively influenced the adoption. Technical barriers and language were found to be the most important barriers for adoption of MIS followed by irrelevancy of contents, lack of reliability, lack of awareness and cost involved. The study suggested that further efforts to create awareness about such interventions among farmers, providing content in local languages in user friendly manner will increase the adoption of MIS and would remove information asymmetry in agricultural marketing.

Keywords: ICT based Market Information Services, Asymmetric Information, Logistic Regression, Kerala

Getting right information at right time is crucial for efficient functioning of markets, especially in the case of agricultural commodities; owing to it's perishability, seasonality and bulkiness. Starting from the planning phase till marketing the produce, the farmer is in need of information regarding various aspects of the crop production. But in most developing countries, the situation prevailing is that of asymmetric information (Svensson and Yanagizawa 2009) with farmers knowing little about market conditions. This puts them in a disadvantageous position, especially when they don't have a considerable volume for sales. Access to market information has been a major factor influencing smallholder agriculture globally (Barrett, 2008). Hence it is important to know the reach and influence of market information services among the farmers.

In this era of Information and Communication Technology, there are a lot of avenues that can be utilized to make farmers keep in touch with accurate and reliable market information. Whereas markets that are often accessed by smallholder farmers who form majority of the poor in developing countries are characterized by poor infrastructure and limited investment capital (Barrett and Swallow,2006). Hence there is an immediate call to equip our markets with adequate infrastructural facilities so as to make sure efficient dissemination of up-to-date price information to the needy farmers. Market access helps alleviate poverty through commercializing agriculture and result in uniform distribution of incomes in developing countries (Sakabira et al., 2012). Information asymmetry is an important contributor to overall transaction cost. Earlier studies reveals asymmetric information between buyers and

sellers will lead to inefficient pricing of the produce, market distortion, and even destruction of the entire market itself (Varian,1992).

In India, farmers are considered to be the least organized, and hence faces exploitation from middlemen and traders due to their less bargaining power. ICT based Market Information Services has the potential to change the picture, if farmers better utilize the possibilities contained within that. With the advent of ICT based market information services, market prices for various commodities in various markets are available in fingertips. This helps farmers to plan the sale so as to get better price for his/her produce and this also helps to avoid exploitations from the middlemen, who makes use of the information-gap prevailing.

The advent of ICT in agriculture made information easily accessible, and drastically reduced the information cost. ICT is any device, tool, or application that permits the exchange or collection of data through interaction or transmission. Through the use of ICT in agricultural marketing, profitability would improve through a reduction in transaction cost, information search cost, travel cost, and a reduction in wastage or spoilage. It helps the farmers to make informed decisions, to negotiate with the traders, to determine in which market to sell, to store, and to plan for future crops (Mwakaje, 2010, Jairath, 2012). The increases in their affordability, accessibility, and adaptability have resulted in their use even within rural homesteads relying on agriculture. Now information can be shared even with the illiterate poor farmers, using measures such as voice messages. When there occurs an ICT revolution globally in all spheres of life, ignoring it will only lead to further excluding our poor farmers from the mainstream. ICT sector in India have witnessed major changes and emerged as a powerful tool in agriculture. There is a rapid growth in the ICT sector since late 1980s and it's use rose dramatically since the 1990s (Jain et al, 2012).

India has 55.48 crore mobile users (India Mobile Landscape(IML) 2013 study by Juxt). Within this, 29.8 crore(54%) is in rural areas, compared to 25.6 crore in cities and towns. If we consider the internet use pattern, there are 110 million mobile internet users in India, and within that, 25 million are in rural India. Growth of internet penetration in rural India is driven largely by the mobile phone. All these points to increasing access and adoption of ICT devices; and hence providing ICT based information can make great impact owing to its wider penetration, easy access and cheap cost.

Analysis of prices of various commodities in different market reveals that prices vary drastically over time and over place. Farmers can make a better profit only if they get instant and accurate information of price movements in various markets for each commodity.

For instance, price movement of Black Pepper over period in Cochin market is shown in Figure 1. Price moved from ₹ 396/kg to ₹ 510/kg during January 2013 to December 2013. Being a storable commodity, farmers could have avoid losses and make profit by selling at proper time if they were being informed about the price movements.
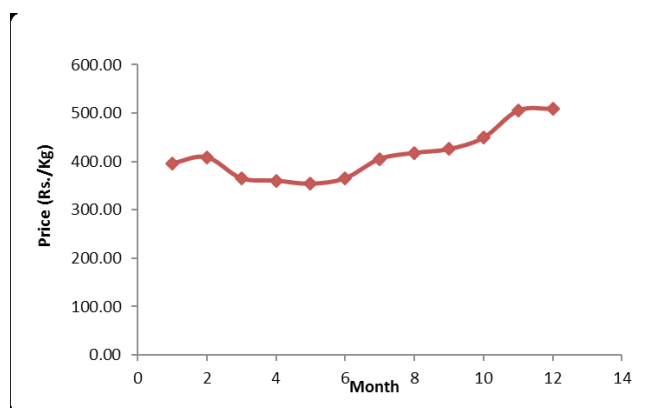
Figure 1. Black Pepper monthly price in Cochin from January 2013 to December 2013

Prices differ at various markets at the same point of time also. This is depicted in Figure 2 & 3. Market price of Banana on 9th Dec 2013 of 10 main markets in Kerala and 3 markets in a single district in Kerala is plotted. Even within district, there is wide price variation. This points to prevalence of asymmetric information.
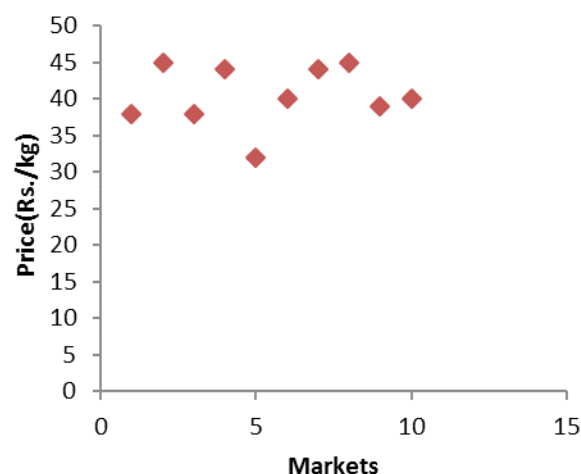
Data source: VFPCK website

Figure 2. Price of Banana (Rs/Kg) in various markets in Kerala on 09/12/13

Throughout India, there are a number of public and private sector initiatives that provide ICT based market information services to farmers. Market Intelligence Centres under NAIP lead by TNAU, Iffco Kisan Sanchar Ltd., Reuters Market Light, E-Choupal by ITC, Agropedia, aAqua etc., are a few among them. Even though many opportunities are there to serve farmers, their utilization behavior of these devices are not clear. If we could provide these services in such a way so as to reach each and every farmer with efficiency, farmers can be rescued from the clutches of middlemen who take advantages of the information gap. It is important to study the various factors that influence farmers decision to adopt the ICT based Market Information Services. At the same time, we should be able to find out what are the barriers of adoption with respect to the non-adopters. In this context, a study on prevailing ICT based market information services will be of paramount importance. The present study was undertaken specifically (i) to examine the various factors influencing adoption of ICT based market information services by the farmers, and (ii) to identify the barriers of adoption of ICT based market information services by the farmers.
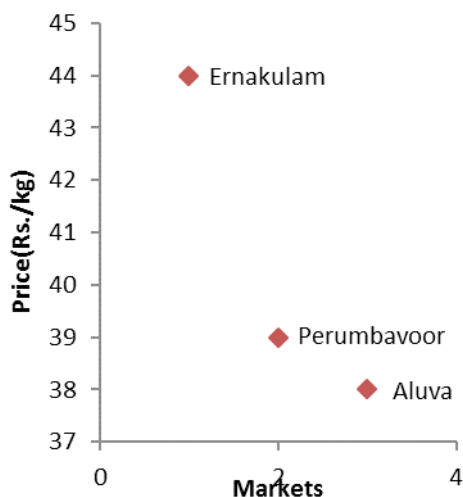
Data source: VFPCK website

Figure 3. Price of Banana (Rs/Kg) in various markets in Ernakulam District of Kerala on 09/12/13

Materials and Methods

The study was conducted in Malappuram and Idukki districts of Kerala, where Iffco Kisan Sanchar Ltd. and Vegetable and Fruit Promotion Council-Kerala are the main agencies that provide market information service to farmers. Vandoor block of Malappuram district and Nedungandam block of Idukki district were selected owing to the availability of adopter and non-adopter farmers. Data pertaining to agro-socio-economic variables of farmers were collected through a structured interview schedule during the year 2013. The secondary data were collected from websites of Rubber board and VFPCK. Total sample size was 80, comprising of 40 adopter and 40 non-adopter farmers.

Simple average and percentage analysis was used for easy representation and comparison of general characteristics of the sample farmers. Logistic regression was used to study the determinants of adoption of ICT based Market Information Services. Logit is a binary response model. It takes the value one for adopters and zero for non-adopters. In this study logistic regression model is used to identify the probability of various factors influencing adoption decision of the farmers. The model is given as follows:

$$L_i = \ln[\hat{P_i} / (1 - \hat{P_i})] = \hat{Z_i} = \hat{\beta_1} + \hat{\beta_2} X_i \quad ..(1)$$

The probability of adoption of ICT based MIS is a function of various individual factors. The model is represented as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + U_i \ldots\ldots..(2)$$

Where, Y is dummy variable for adoption status; X1, X2, X3, X4, X5, X6, X7, and X8 denote age of the farmer in years, education in years, family size, size of land holding, dummy variable for land ownership status, last year income from agriculture (₹), contact with extension agent (number/month), and income from other sources (₹) respectively.

To understand and rank the barriers faced by non-adopters for adopting the service, Garret ranking technique was used. Ranks given by each farmer were converted into per cent position using the formula (3).

$$\text{Per cent Position} = \frac{100 \times (R_{ij} - 0.5)}{N_i} \quad \ldots\ldots.(3)$$

Where,

Rij = Rank given for ith factor by jth individual

Nj = Number of factors ranked by jth individual

By referring to the Garrett's table, the per cent positions estimated were converted into scores. Thus, for each factor, scores of various respondents were added and mean values were estimated. Once they were arranged in descending order, the attribute with the highest mean value was considered as most important constraint and others were followed in that order.

Results and Discussion

Among the total 80 farmers surveyed, adopters were having more years of education, and most of them were young. 10% of adopters were graduates, whereas only 3% of non-adopters were having graduation. 35% among adopters were having higher secondary education compared to 5% among the non-adopters. 32.5% of non-adopters were having middle school education only, compared to 7.5% in adopters. Majority (58.75%) of the respondents fall in the age group of 45-55 years, comprising 65% of adopters and 52.5% of non-adopters. Among the adopters 12.5% fall under the age group of less than 45 years compared to a meagre 5% among the non-adopters. Considering the land ownership pattern, 67.50% adopters uses rental land, compared to 40% non-adopters. 60% non-adopters cultivates only in own land. Among the respondents 48.33% were having income from other sources. Within the adopters, 40% were having other income sources compared to a higher 57.50% in the non-adopter category. More non-adopters were having income from other sources compared to adopters.

Table 1. Distribution of farmers based on land ownership

| Sl.No.	Adopters Number (%)		Non adopters Number (%)	
1	Own land	13(32.50)	Own land	24(60.00)
2	Rental	27(67.50)	Rental	16(40.00)
3	Total	40(100.00)	Total	40(100.00)

Determinants of adoption

Logistic regression analysis was employed to assess the various factors influencing the adoption of ICT based market information services (MIS). Various

socio-economic characteristics of the farmers were expected to have influence on adoption decision. The variables used were age, education, family size, land ownership, contact with extension agents and income from other sources. Results of analysis are presented in Table 3.

Table 2. Distribution of farmers based on income from other sources

Sl.No	Number (%)	
1	Adopters	16(40.00)
2	Non adopters	23(57.50)
3	Total	39(48.75)

Source: Survey data
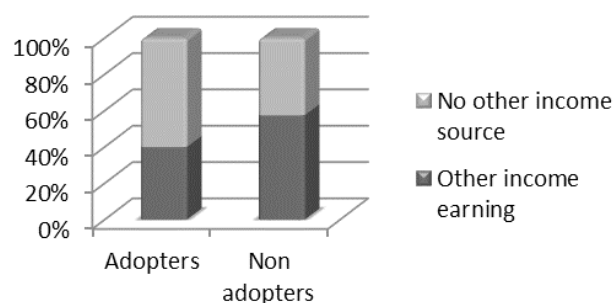
Source: Survey data

Table 3. Determinants of adoption-logistic regression

Factors	Co-efficient	Odds ratio	Probability
Age in years	0.59	1.06	0.51
Education in years	0.62***	1.87	0.65
Family size(No.)	0.63*	1.88	0.65
Land ownership (Dummy)	-0.93	0.39	0.28
Contact with extension agents	0.46***	1.58	0.61
Income from other sources	-0.00001*	1.00	0.50

***,**,* Significant at 1%, 5%, & 10% respectively.

LR chi^2(8) : 49.75
Prob>chi^2 : 0.0000
Pseudo R^2 : 0.4486
Log Likelihood = -30.57

From Table 3, it could be observed that the model fit well to the data as indicated by the observed significance of log likelihood ratio test. Education, Family size, Contact with extension agent and

Income from other sources were found to be the significant factors influencing the decision to adopt or not to adopt ICT based Market Information Services. Education, Family size and Contact with extension agent were the significant positive factors. Whereas, income from other sources shows significant negative influence. For instance one unit increase in level of education would result in probability of increasing the adoption of ICT based MIS by 0.65 units. Similarly, one unit each increase in family size and contact with extension agent would result in probability of increasing adoption by 0.65 units and 0.61 units respectively. Whereas, one unit increase in income from other source would decrease the probability of adoption of ICT based MIS by 0.50 units.

Barriers of Adoption

The barriers of adoption of ICT based MIS were analyzed using Garret's ranking technique and the results are given in Table 4.

Table 4. Barriers of adoption- Garret ranking technique

Barriers	Garrett mean score	Rank
Technical barriers	65.93	1
Language	56.88	2
Irrelevant/Inferior content	54.15	3
Lack of reliability	53.58	4
Lack of awareness	46.88	5
Huge cost	24.05	6

From the study, it is revealed that technical barriers were the most important barrier preventing adoption of ICT based MIS. Farmers feel it is not easy for them to follow the instructions through phone or internet, as they are not able to use these devices properly. They want it to be in a much simpler manner, so that anyone can utilize these services without much hurdles. Language came as another most important barrier, as the internet based services are in English. Lack of relevant contents of the message and lack of reliability were other two constraints. Many farmers strongly believe this will not bring them any profit even though they didn't try it so far. Lack of awareness and cost involved came in the last as most of the farmers had heard something about this. They were aware, but were not having a full understanding on what it is and how it works.

Conclusions

The study has revealed that education, family size, contact with extension agent and income from other sources are the significant factors influencing adoption of ICT based market information services. Education, family size, and contact with extension agent showed positive influence whereas income from other source was found to be having negative influence on adoption decision. Technical barriers and language was found to be the most important barriers followed by irrelevancy of contents, lack of reliability, lack of awareness and cost involved. Farmers were found to be partially aware of the intervention, and hence extension strategies should be strengthened to give wide publicity and to create awareness and proper understanding among the farmers about the usage and advantages of such interventions. Providing content in local language and in user friendly manner may take adoption rate to further heights.

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