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Constraints Faced by the Coffee Planters in Using ICT Technologies in Dindigul District of Tamil Nadu

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2022/v40i1031130

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/90685>

Original Research Article

Received 02 August 2022
Accepted 07 August 2022
Published 10 August 2022

ABSTRACT

Aims: ICT is crucial in bringing cutting-edge technologies to farmers and increasing farm income. However, this is not the case in practice, as farmers confront a number of obstacles when it comes to ICT adoption. Recognizing this issue, a study was conducted to learn about the constraints farmers' confront when utilising ICT.

Study Design: A descriptive research design was employed to identify particular constraints faced by coffee growers while employing ICT tools and the data was analysed using specific statistical tools.

Place and Duration of Study: This study was undertaken on purpose in four coffee board liaison zones of Dindigul district in Tamil Nadu between May 2022 and July 2022.

Methodology: In each zone, a sample of 40 farmers was chosen at random, for a total of 160 sample farmers for the study. To examine the objectives, a well-structured and pre-tested interview schedule was employed, and data were obtained through survey in the study region. The data obtained through survey was analysed using garrett's ranking technique.

Results: The study discovered that Lack of faith in using ICTs, lack of knowledge about ICTs' advantages, inconsistent power source, inadequate network connections, low proficiency with ICT, inadequate ICT handling abilities, negative perception of ICTs, lack of experience with ICTs in the real world and training, non-availability of multilingual ICT services, not affordable to implement ICT,

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non-availability of ICT service centres, and High cost of servicing ICTs were the major constraints faced by farmers in the effective use of ICTs.

Conclusion: Farmers in the study area now have greater access to and availability of ICTs, but in order for the farming community to benefit the most from better access to information services through the use of ICTs for agriculture and other developmental purposes, it is important to make sure that the problems of the farmers are addressed.

Keywords: ICT; constraints of farmers; ICT utilization; ICT in agriculture.

1. INTRODUCTION

Coffee is one the most important plantation crop in India. Indian coffee is a remarkable beverage, with interesting complexity and thrilling strength. India is the only country where 100% of its coffee is grown in the shade. In India, we have around 375000 coffee growers, most of them are in the hilly areas of Karnataka (54 per cent), followed by Kerala and Tamil Nadu. Coffee cultivation is also fast spreading in unconventional areas of Andhra Pradesh, Odisha, and the North Eastern states. Of these, around 98% are small-time farmers who work in silos. Coffee is primarily an export crop, with 65 percent to 70 percent of coffee produced in the country exported and the remainder eaten domestically. India has three distinct coffee-growing regions: the traditional region, which includes Karnataka, Kerala, and Tamil Nadu; the new areas developed in the non-traditional areas of Andhra Pradesh and Odisha on the country's eastern coast; and the third region, which includes the north-eastern Indian states of Assam, Manipur, Meghalaya, Mizoram, Tripura, Nagaland, and Arunachal Pradesh, collectively known as the "Seven Sister States of India." Tamil Nadu is a traditional coffee growing area in India, producing 17,970 Metric Tonnes of coffee in the year 2021-22. Tamil Nadu is a major coffee producing state, accounting for more than 5% of total coffee production in India [1]. There is an urgent need for a vibrant, dynamic, and innovative approach to agricultural extension in order to attain the desired growth rate and better serve farmers. Furthermore, land and water resources are nearly depleted; hence, ensuring food security is significantly dependent on "Knowledge Resource." [2]. Information and communication technology (ICT) is a major driving force in modern civilization, providing new techniques and methods of sharing, transmitting, and upgrading knowledge and information across various societies. ICT might be used to improve, supplement, or replace current information systems and networks. In India, there is a severe shortage of extension officers at all levels; just 91,288 of the 143,863 positions in the

Department of Agriculture are filled. Furthermore, one extension officer served 1162 operational holdings, indicating that the national ratio of extension workers to operational holdings is low at 1:1162 as opposed to the suggested 1:750 [3]. Because of the large number of empty positions or gaps in extension employees, extension services only reach 6.8 percent of farmers on average [4].

ICT, such as radio and television, is used by numerous extension agencies around the world to quickly spread information to a large audience. It may be beneficial in some circumstances to disseminate agricultural knowledge widely with minimal regard for the context, as with seasonal climate predictions. Higher numbers of farmers can be reached by an information intervention with the available resources because giving this type of information via ICT is less expensive than through visits by extension people [5]. Additionally, using digital communication can reduce the geographic bias frequently seen with traditional face-to-face dissemination methods, which tend to focus on farmers who live close to densely populated areas or good transportation. Self-selection of consumers through subscription to particular message kinds enables personalised matching of information supply and demand [6]. For instance, farmers in Ghana can join up for the "Esoko" programme, which provides SMS market price notifications every two weeks. These announcements gave farmers more negotiating power, enabling them to agree to higher product prices for groundnuts and maize [7].

Strong variation in biophysical circumstances, input use, aspirations, and other aspects characterises smallholder farming. This diversity must be addressed by extension services, which can be done by sending various advice messages to various farms. This is difficult with traditional extension formats since they frequently seek to promote widespread adoption of standardised technology. The collecting of information about people's homes, farms, or

even plots is made possible by digital two-way communication via farmers' mobile phones. This information may then be used to pick and send individually designed advice items [8].

India have more potential to export coffee but are not able to meet the quality and fetch high price in foreign market. Production and marketing of these valuable products using ICT tools will improve quality of the produce through timely operations and access to market through accurate market information. ICT can play a significant role in agricultural information and knowledge transmission. E-agriculture aids in the dissemination of obtained information to farmers, who are usually located in rural regions, for use in their daily activities [9]. The use of ICTs is expanding in developing nations, and its importance is being examined by numerous scholars. For example, Based on plot-level responses to 10 questions about agricultural practices, rainfall, the intended use of the produce, and other factors, Carmona et al. (2015) created a straightforward grading system that makes recommendations on pesticide application (apply/don't apply). The method, which is aimed at Argentina commercial soybean growers, has been implemented as a smartphone app called "AgroDecisor," where producers enter data and get immediate feedback. However, as the spread develops, farmers will confront a number of problems that may impede their use of ICTs. In order to better serve the community, authorities and service providers must overcome these limits. Several studies have been undertaken to determine the constraints that farmers confront.

According to Rebekka Syiem et al. [10], the state of Meghalaya had the highest availability and accessibility levels for mobile phones, followed by television and radio. According to the report, farmers' biggest obstacle is a lack of trust in using ICTs, which is followed by unstable power supplies, poor network access, a lack of knowledge about the advantages of ICTs, etc. According to Farooq et al. [11] the major constraints faced by ICT users were poor internet connectivity (76.67 percent) and a lack of network coverage in rural areas (62.50 percent) among physical, economic, and infrastructural problems, and a lack of region-specific information (94.17 percent) and trustworthy information (35.83 percent) among operational problems. ICT is critical in providing farmers with cutting-edge technologies and increasing farm income. However, this is not the reality on the ground, as farmers face a number of challenges

when it comes to ICT adoption. Recognizing this issue, a study was conducted with an objective to learn about the constraints farmers' face when utilising ICT. This study gives a holistic view about the problems faced by the farmers to the policy makers and authorities who can bring necessary changes to increase the ICT penetration in the study area. The main barriers to ICT use, according to Kale, R.B. et al [12], study of 87 respondents from the scientific staff of KVKs in Rajasthan and Gujarat, were a lack of ICT expertise, sluggish internet performance, a lack of ICT use trainings, and farmers' ignorance of ICT use for agriculture and education. Mishra A. et al. [13] examined the difficulties farmers encounter and made recommendations for how to use ICT services for agricultural information effectively. Responses from the 120 farmers were gathered, and it was discovered that the main barriers to ICT use among farmers were a lack of knowledge of ICT tools, equipment that was in bad shape, a delay in receiving pertinent information, and awareness of new ICT services. All of these obstacles can be removed by putting into practise the recommendations made by farmers, such as providing adequate and improved infrastructure at the village level, timely delivery of pertinent information, skill development, training, and raising awareness of the use of ICTs for agricultural and educational purposes.

2. METHODOLOGY

The current study was undertaken on purpose in four coffee board liaison zones of Dindigul district in Tamilnadu, namely Perumalmalai, Adalur, Pannaikadu, and Manalur zones, to assess the constraints encountered by farmers in using ICT tools such as Mobile phones, Television, Radio, Internet, Computers and Newspapers. In each zone, a sample of 40 farmers was chosen using convenient sampling method, for a total of 160 sample farmers for the study. To examine the objectives, a well-structured and pre-tested interview schedule was employed, and data were obtained through surveys. To analyse the collected data, conventional analysis was used to present the demographic details of the respondents which gives an idea about the socioeconomic level in the study area and garrett's ranking technique was employed. The sample coffee farmers were asked to rank the constraints towards utilising ICT tools on the plantation, and these rankings were then transformed into percent positions using the formula.

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

Where,

R_{ij} = Ranking given to the i^{th} attribute by the j^{th} individual

N_j = Number of attributes ranked by the j^{th} individual

Using Garrett's presented table (1969), the percent position of each element was transformed into scores. For each factor, the mean score was estimated. The factors' mean scores were organised in descending order, starting with the factor having the highest mean score. Consequently, the primary constraint was found.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Variables of the Respondents

Demographic characteristics such as age, education qualification, experience in coffee cultivation, farm size and farm income, participation in training programmes of farmers were examined which are the most influencing factors on farm decisions and presented in the Table 1.

Table 1 displays data on respondents' age, education, land holding size, years of farming experience of the household head, and total household income. Farmers had an average age of 50 years, and the majority of respondents (49.3 percent) were middle-aged, followed by the elderly (47.5 percent). This demonstrates that there are more elderly persons involved in coffee cultivation than young people. If a community's younger population is too small, it is always a threat. In terms of respondents' educational status, the majority (40.6 percent) had secondary education, followed by graduation and above (35.6 percent), and primary education (17.5 percent). The study findings led to the conclusion that future ICT development programmes will be beneficial in the current study areas due to the respondents' higher educational qualifications. With a mean score of 23 years, the respondents also had extensive farming experience. 54.3 percent of the 160 respondents were marginal farmers, followed by 28.7 percent of respondents were small farmers. It was also discovered that 60% of respondents had a low income, 28% had a medium income, and 11.2 percent had a high

income. The data also found that just 40 percent of farmers participated in training programmes, with the bulk of farmers (60 percent) not participating in any training programmes.

3.2 Constraints Faced by the Farmers in Using ICTs

Even with high-quality coffee beans, Dindigul area coffee growers struggle with increased market volatility, climatic change, pest and disease outbreaks, and an ineffective supply system. One of the main causes of decreased production and lower earnings is a lack of information and communication about current agricultural practices, pest and disease detection, schemes, coffee marketing, etc. Therefore, it is crucial to research the obstacles that prevent farmers in the coffee industry from using ICT tools like mobile phones, TV, radio, computers, and newspapers to access information. This provides a comprehensive viewpoint and solutions to the issues in the research area. Major constraints coffee farmers facing in Dindigul district are presented in Table 2.

Table 2 shows the findings of the constraint analysis, which are explored further below. Farmers' main barrier was an absence of confidence in using ICTs (72.53), particularly mobile phone applications and other computer-based technologies, due to a lack of knowledge about how to utilise those ICTs (69.10) appropriately to gain benefits. Farmers also encountered intermittent power fluctuations (63.51), which prevented them from using ICTs such as mobile phones, computers, TVs, and so on. This slowed the study area's rapid ICT development. Inadequate network connections (61.91) was ranked fourth as one of main restriction encountered by farmers. Farmers said that connectivity is extremely restricted and limited to only a few networks. As a result, farmers do not regard mobile phone use as reliable and reputable when inadequate network access is a barrier to their use. Farmers also reported having trouble using mobile applications and the internet owing to a lack of experience. This, however, is tied to a Low proficiency with ICT (51.93). Some respondents stated that they are unable to use most of the basic capabilities of mobile phones, such as SMS, due to illiteracy and a lack of expertise in utilising those ICTs (50.50). The usage of ICTs was further hampered by the attitudes of some of the elderly farmers (49.38). Some of the farmers expressed

concern about a Lack of experience with ICTs in the real world and training (39.50) with mobile phone applications and the internet, and they believed that they required some training to educate and teach them how to use ICTs that could aid them in coffee growing and marketing. Some of the farmers struggled to understand the English language. This is because most mobile phones and PCs have English language menus (38.82). Farmers also claimed that a lack of financial support (33.77) made it difficult for them to use advanced ICTs and other applications. Farmers also cited a dearth of mending centres

and ICT repair facilities (33.27) in the communities for mobile phones and televisions. As a result, farmers were forced to fix their things and transport them to town at a considerable cost, incurring additional fees and loss for the farmer. Farmers also complained about the high expense of fixing ICTs (30.74) such as mobile phones and television sets. This, however, prevented them from using ICTs on occasion because electronic items were frequently broken. The findings are consistent with Agwu et al. [14], Shankariah and Swamy [15], and Rebekka syiem et al. [10].

Table 1. Demographic characteristics of respondents (N=160)*

Socio-economic factors	Mean	Standard Deviation	Number (Percentage)
Age (years)	50.28	11.59	-
Young (up to 30)	-	-	5 (3.1)
Middle aged (31-50)	-	-	79 (49.3)
Old aged (above 50)	-	-	76 (47.5)
Education level	-	-	-
Illiterate (1)	-	-	10 (6.2)
Primary education (2)	-	-	28 (17.5)
Secondary education	-	-	65 (40.6)
Graduation and above	-	-	57 (35.6)
Farming experience (years)	23.77	10.31	-
Low (up to 13)	-	-	23 (14.3)
Medium (13 – 34)	-	-	111 (69.3)
High (above 34)	-	-	26 (16.2)
Farm size	3.37	4.53	-
Marginal	-	-	87 (54.3)
Small	-	-	46 (28.7)
Semi-Medium	-	-	21 (3.1)
Medium	-	-	5 (3.1)
Large	-	-	1 (0.6)
Annual income (Thousand Rs.)	359.6	311.3	-
Low income (up to 3 lakh)	-	-	97 (60.6)
Medium income (3 to 7 lakh)	-	-	45 (28)
High income (above 7 lakh)	-	-	18 (11.2)
Training participation	-	-	-
0 – no participation	-	-	95 (59.3)
1 - participation	-	-	65 (40.6)

(Figures in parenthesis indicates percent to the total)

* Multiple responses

Table 2. Constraints faced by the farmers while using ICTs

Sl. No	Constraints	Mean Score	Rank
1	Lack of faith in using ICTs	72.53	I
2	Lack of knowledge about ICTs' advantages	69.10	II
3	Inconsistent power source	63.51	III
4	Inadequate network connections	61.91	IV
5	Low proficiency with ICT	51.93	V
6	Inadequate ICT handling abilities	50.50	VI
7	Negative perception of ICTs	49.38	VII
8	Lack of experience with ICTs in the real world and training	39.50	VIII

Sl. No	Constraints	Mean Score	Rank
9	Non availability of multilingual ICT services	38.82	IX
10	Not affordable to implement ICT	33.77	X
11	Non availability of ICT service centres	33.27	XI
12	High cost of servicing ICTs	30.74	XII

4. CONCLUSION

The study discovered that Lack of faith in using ICTs, lack of knowledge about ICTs' advantages, inconsistent power source, inadequate network connections, low proficiency with ICT, inadequate ICT handling abilities, negative perception of ICTs, lack of experience with ICTs in the real world and training, non-availability of multilingual ICT services, not affordable to implement ICT, non-availability of ICT service centres, and High cost of servicing ICTs were the major constraints faced by farmers in the effective use of ICTs. However, constraint analysis is crucial in order to reach out to farmers' voices and issues in order for planners, administrators, development workers, and policymakers to build developmental programmes and interventions that can cater to farmers' requirements and benefit them more effectively. Farmers in the study area now have greater access to and availability of ICTs, but in order for the farming community to benefit the most from better access to information services through the use of ICTs for agriculture and other developmental purposes, it is important to make sure that the problems of the farmers are addressed.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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