Int. Journal of Management and Development Studies 6(9): 35-42 (2017)
ISSN (Online): 2320-0685. ISSN (Print): 2321-1423
Impact Factor: 0.715

Impact assessment of information communication technology and agriculture in selected farm households in Coimbatore district

Parvathi. C[1]

Abstract: *This paper analyses the impact of ICTs in agriculture sector. India is one of the leading contributors to the global food basket. The country's food grain production stood at 252.23 million tonnes in 2015-16, and has a record production of 271.98 million tonnes in 2016-17. India consists of more than 500 villages. It is known as a rural economy as 60 per cent of its population resides in the villages. Information technology means the way we use information, the way we compute information and the way we communicate information. Information technology holds the potential to offer a new approach to rural based development process and the role of rural economy in India. The study is based on primary data with multistage random sampling technique was used in Coimbatore district. Agriculture is one of the most important sectors of nation, and could benefit tremendously with the applications of ICTs especially in bringing changes to socio economic conditions of poor in backward areas. The conclusion of the paper was the government should take more initiative to increase the use of technology in its development programmes and educate rural people in order to application of ICTs in their farm field effectively.*

Keywords: Information Communication Technology, Impacts and Rural Development.

Introduction

India is one of the leading contributors to the global food basket. The country's food grain production stood at 252.23 million tonnes in 2015-16, and has a record production of 271.98 million tonnes in 2016-17 (Government of India, 2017). India's population has nearly doubled since the 1970s; it is currently estimated at over 1.2 billion and is growing at 1.4 percent annually, putting pressure on natural resources such as land and water to produce enough food. The growing food demand both domestically and globally, India will have to produce more. Yields of major crops are low in India compared with those in other countries. For instance, the rice yield in India is 2.6 tonnes per hectare far lower than the 4.7 in China, 3.7 in Brazil, 5.9 in the United States of America (USA), or 9.5 in Australia; that of wheat is 3.0 tonnes per hectare in India, 5.3 in China and 3.1 in the USA and the maize and soybean yields are 2.5 and 0.75 tonnes per hectare in India compared with 5.9 and 1.8 tonnes, respectively, in China (OECD, 2017). In the wake of concerns that intensive farming adversely impacts environmental balance, India will need to adopt sustainable farming practices that include employing efficient irrigation methods with a simultaneous focus on groundwater regeneration, monitoring soil degradation, and adopting energy efficient production methods (Seth and Ganguly, 2017).

[1] Associate Professor, Department of Economics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore.
Corresponding author: Parvathi. C can be contacted at: economic.parvathi@gmail.com.
Any remaining errors or omissions rest solely with the author(s) of this paper.

Information Technology and Rural Connectivity

Information technology means the way we use information, the way we compute information and the way we communicate information. It is vital to a nation, to connect the rural areas in this world of digitization in table 1. Government of India has allocated in 2014 Rs.500 crore for digital India program campaign that aims to set up broadband services in rural India.

Table 1: Internet Access in Rural

Internet Access	Micro level (main points in percent)	Macro level (all points in percent)
Cyber Café	26	49
Mobile Phone	38	48
Home	27	36
Friends House	2	19
Other Public Installed Computer	2	7
Post Office	3	3

Source: Estimates based on Secondary Data

As per the report of Boston Counseling Group (2014) nearly 50 percent of the active Internet Users (AIU) in rural areas, access internet, using mobile phones, community service centre (CSE) and cyber café. 38 percent of the AIU use mobile as the main access point. The report pointed out that total number of user in rural areas who used mobile devices as internet, increased from 0.4 percent in the year 2012-2014.

Review of Literature

The provision of citizen-centered services and development were critical indices in the measurement of performance of every government. In the era of Information Communication Technology (ICTs), government businesses can be conducted through the electronic governance (EGOV) platform Motilewa & Deborah, (2016). Information and communication technologies (ICTs) were increasingly used for knowledge management (KM) currently. The study explored the challenges in using ICTs for KM using the case of Agropedia, an ICT mediated knowledge management platform for Indian agriculture Yadav et.al., (2016). E-velanmai was the enhanced version in satisfying the farmer agro technological information needs. The innovated technological boons like Computer, Internet and Mobile will be helpful for the farmers to get consultancy for their farming issues from various eminent scientists Anbarasan, (2016). Introduce a new concept useful for farmers who were adopting latest technologies and having basic knowledge about technology. The study aimed to provide easy and efficient platform for agriculture market transactions and to bring accuracy and transparency in agricultural marketing system through e-agriculture Mayur (2017). The incredible growth had been occurred in the use of electronic infrastructure for agricultural processes and development in India. In the recent time, an impressive development in information technology and electronic infrastructure had brought its usage well in the capacity of common people. The affordability of electronic equipments and IT based applications resulted to a tremendous development in agriculture sector Kaur and Goraya (2017).

Research Gap

Improved agricultural production is the major weapon in the fight against world hunger, improving rural livelihood and increasing economic growth. Agriculture is one of the most

important sectors of nation, and could benefit tremendously with the applications of ICTs especially in bringing changes to socio economic conditions of poor in backward areas. Agriculture constitutes a major livelihoods sector and most of the rural poor depend on rain-fed agriculture and fragile forests for their livelihoods. Farmers in rural areas have to deal with failed crops and animal illness frequently and due to limited communication facilities, solutions to their problems remain out of reach (World Bank, 2009). However, connectivity technologies have been the greatest achievement in ICT and have unleashed new functionalities for the business community (Patel, 2014). Many studies are focused about the role of ICTs in the agricultural business but this study tries to cover the research gap and to concentration on ICTs use in selected farm households.

Matters and Materials

India consists of more than 500 villages. It is known as a rural economy as 60 per cent of its population resides in the villages. For the development of the country, rural reconstruction and development has been a major thrust of economic planning. The government of India has been giving high priority to rural development with the objective to achieve rural and urban integration in growth processes. The focus of development is to include disadvantaged sections of society that it includes 'equality in growth' and ‘equality of opportunity' to all. The present strategy of rural development is to provide better infrastructure, for agriculture development, public health services, business and financial services in rural areas. In this context, information technology holds the potential to offer a new approach to rural based development process in Coimbatore district. Coimbatore District lies on north of Tamil Nadu. Coimbatore District situated at between $11^{o}00'58"$ and $11^{o}01'61"$North latitude and $76^{o}58'16"$ and $76^{o}09'71"$East longitude. There are12 Community Blocks in the District. The soils of the district are mostly red soil and black soil with moderate amount of sandy coastal alluvium. The total geographical area of the district is 3,97,883 hectares. Of these gross cropped area was 1,91,147 hectares. Pulses and cereals are much in cultivation in the selected district. Coimbatore district receives an average rainfall of 61.22 cms annually, spreading over an average of 44.5 days in a year (CDP, 2016). Coimbatore district is facing acute water and food scarcity following failure of the monsoon due to climate change and the situation in three blocks out of twelve blocks are said to be grim. Coimbatore district is now facing serious water scarcity because of inadequate rainfall and high temperature. Climate change and agriculture are interrelated processes, both of which take place on a global scale. Climate change affects agriculture in a number of ways, including through changes in average temperatures, rainfall, and climate extremes (e.g., heat waves); changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone concentrations; changes in the nutritional quality of some foods; and changes in sea level.

Methodology

Coimbatore district of Tamil Nadu was randomly selected for the present study. Multistage random sampling technique was used to select the herds. The selected district comprised 12 blocks of which Sulur is randomly selected. In the next stage based on the data provided by Tamil Nadu Agriculture University in Coimbatore we have selected Sulur block as Sulur block has better ICT facilities that supports agriculture and majority of the farmers in Sulur block have adopted ICTs with the recommendation of Agro Climatic Research Center, TNAU. We have selected 135 farmers of which 65 farmers belong to ICTs adopters and 65 belong to Non ICTs. Primary data were collected through personal interview method from the sample farm

households. Cross checks were made to minimize the errors due to biasness and also to ensure reliability of the information provided by the respondents. The study was taken up during the months of January to February 2016. The appropriate tools were used in the study for evaluation of the results. The specific objectives of the study are to study the socio economic background of the selected farm households, to analyze the Information and Communication Technology (ICTs) and impacts of the selected sample farm households.

Hypotheses

The following null hypotheses were tested in the course of the study.

Usage of Information and Communication Technology had led to.

1. Economic well being of the farmers is depended on agricultural production.
2. There is ICTs adopted in the selected study block during the period of study.
3. The socio economic status of the farmers was affected due to climate change.
4. ICTs is independent on the socio economic variables of the farmers.
5. The impact ICTs caused in agricultural production of the selected study block.

Major Findings of the Study

General Characteristics of the Farm Households

An important factor influencing the adoption of any new technology is an individual's perception about that technology. Community wise analysis reveals that both in the ICTs and Non ICTs, BC constitutes a major proportion with 44.62 percent and 41.54 percent respectively. MBC constitute 36.92 percent ICTs and 46.15 percent Non ICTs. The selected farm households are mostly headed by males. The data on the age of the head of the selected farm households in both ICTs and Non ICTs reveal that majority of the farm households are in the age group of 30-40 years.

Land Use Pattern

The percentage of farmers have their own farm land are 49.23 percent in ICTs and 63.08 percent in Non ICTs. The percentage of farmers cultivating for 5-10 years is 16.92 percent in ICTs and 7.69 percent in Non ICTs. 47.69 percent farmers in ICTs and 23.08 percent farmers in Non ICTs are cultivating for about 10-15 years respectively.

Information and Communication Technology

The role of ICTs to enhance food security and support rural livelihoods ICTs tools provided and apt ICTs tools for farmers. Majority of the farmers under ICTs are provided with SMS with 44.61 percent followed by video conferencing at 26.15 percent.

ICTs AND Output

Majority 93.85 percent of farmers who use ICTs have had increased yield and 3.08 percent had yield decrease and 3.08 percent farmers had same level of yield. Majority 32.31 percent of farmers have stated that fertilizers and pesticides provided by village knowledge centers is the reason for increase in their yield followed by farming techniques at 30.77 percent.

Information Technology and Rural Development

ICTs promote more holistic development of rural economy which is marketed by plethora of language, customs, beliefs and culture. Information technology now a day has emerged as a key driver that accelerates economic growth and development. Policy makers believed that digitization can help in the sustained development of rural economy as it impact on production, operation and expansion of market and thus reshape the rural economy. As per digital report of Government of India, 2014, the share of internet economy is approximately 5 per cent of the GDP.

Table 2: Sectorial Contribution to Economic Growth

Sector	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
GDP	6.69	4.47	4.86	4.6	7.5
Agriculture and allied activities growth rate	5.02	1.42	4.64	4.8	3.8
Industry growth rate	7.81	0.96	0.65	1.5	3.5
Services growth rate	6.57	6.96	6.86	6.3	8.1
ICTs share in GDP(In per cent)	6.4	7.5	8	5.2	4
Internet user in rural areas(in per cent)	0.12	4	25	32	109
Tele density in rural areas	26.43	33.79	39.22	9.07	41.02

Source: Estimates based on Economic Survey, (2017).

It is evident from the table 2 that the growth is not uniform across the sectors. India's growth is primarily driven by the service sector and its growth rate has been increasing while the growth rate of agriculture and industry shows a declining trend between the years 2011-2015. This evinces that ICTs sector has contributed less to agriculture and industry as compared to service sector in terms of its uses and impact. Secondly, Internet and mobile users in India have increased two fold due to its development of its extensive network in rural areas. The number of internet users has increased from 0.12 million to 109 million during the period of 2011 to 2016. The tale density in rural areas has also increased has also increased from 26.43 to 41.02 million during the same period. Despite this growth of agriculture decline in the respective period. Thirdly, the table also evinced that the share of information technology in GDP has decreased from 6.4 per cent to 4 per cent in the period of 2011-2016. It was 5 per cent of GDP in 2015. It can be concluded that ICTs sectoral dominance within the economy in general and service sector in particular is diminishing in a period 2011-2016. This is a sign of concern for policy makers as many researchers believed that there is positive correlation between GDP growth rates of ICTs industry (Agarwal, 2016).

Factor Analysis

Factor analysis is a generic name given to a class of multivariate technique whose primary purpose is to define the underlying structure in a data matrix. Broadly speaking, it addresses the problem of analyzing the structure of the interrelationships (correlations) among a large number of variables by defining a set of common underlying dimensions, known as factors. With factor analysis, the researcher can first identify the separate dimensions of the structure and then determine the extent to which each variable is explained by each dimension. Once these dimensions and the explanation of each variable are determined, the two primary uses for factor

analysis, namely summarization and data reduction can be achieved. In summarizing the data, factor analysis derives underlying dimensions that, when interpreted and understood, describe the data in a much smaller number of concepts than the original individual variables. Factor analysis was used in the present study to identify the role of ICTs in Providing timely information, Farming technologies, best agricultural practices, Weather update, market information, Relevant to all land type, Pre and post harvest information, Training on usage, Regional language, Cost effectiveness, Easy access, User friendly, and Adoption is easier.

Factor Analysis

Assess the role of ICTs among users

Factor analysis was used to examine the structure of the relationship among the variables assessing the role of ICTs in agriculture production of the user. To determine the appropriateness of applying factor analysis, the KMO and Bartlett's test measure were computed and the results are presented in table. KMO statistics is 0.719 which is signifying higher than acceptable adequacy of sampling. The Bartlett's test of Sphericity was also found to be significant at one percent level providing evidence of the presence of relationship between variables to apply factor analysis in table 3.

Table 3: KMO and Bartlett's Test Measures

KMO and Bartlett's Test	
Kaiser-Mayer -Olkin measures of sampling adequacy	.719
Bartlett's test of Sphericity Approx. Chi-square	394.703
Degrees of freedom	78
Significance level	.000

Source: Estimation based on field survey, (2016).

The communalities for each variable were assessed to determine the amount of variance accounted by the variable to be included in the factor rotations. All the variables had value greater than 0.50 signifying substantial portions of the variance accounted by the factors. Table 4 enlists the Eigen values, their relative explanatory powers and factor loadings for 13 linear components identified within the data set.

Factor 1 has significant loadings for three dimensions namely easy access, user friendly and adoption is easier. These dimensions explained nearly 28 percent of the variance. Factor 2 has significant loadings for three dimensions namely relevant to all land, training on usage and regional language which explain nearly 19 percent of the variance. Factor 3 has significant loadings on three dimensions namely best agricultural practices, Weather update and market information which explains 13 percent of the variance. Factor 4 has significant loading on two dimensions namely providing timely information and farming technologies explains nearly 11 percent of the variance. Hence these are the various factors assessing the role of ICTs among the users.

Table 4: Rotated Component Matrix

Factors	Components			
	1	2	3	4
Providing timely information				.888
Farming technologies				.823
Best agricultural practices			.714	
Weather update			.832	
market information			.760	
Relevant to all land type		.726		
Pre and post harvest information				
Training on usage		.826		
Regional language		.749		
Cost effectiveness				
Easy access	.880			
User friendly	.948			
Adoption is easier	.894			
Eigen value	3.635	2.513	1.735	1.397
Percentage of variance	27.958	19.328	13.349	10.744
Cumulative percentage	27.958	47.285	60.634	71.378

Source: Estimation based on Field Survey, (2016).
Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization, rotation converged in 6 iterations

Conclusion

Adopting advanced technology has helped small countries, including the Netherlands and Israel. Notably, these countries, have augmented the production of high-value crops through enormous productivity breakthroughs and even more importantly, by ensuring the optimal utilization of resources and maintaining the environmental balance. Currently technologies that cater to the optimal utilization of resources (particularly those that are linked to natural resource availability and environmental impact), effective market linkages for improved service delivery and the discovery of the highest price possible as observed in the case of India through the country's electronic National Agricultural Market (e-NAM) a technology driven unified market platform have a brighter future in India. The success of technology adoption lies in customizing to address particular challenges at the local level, supporting institutions and policies to create an enabling ecosystem and harnessing the potential of these technologies to scale and commercialize within a defined time period (Seth and Ganguly, 2017). Information technology has impacted the rural economy indirectly. Analyses have showed the ICT adopters are performance of agriculture production have been used to benefit the economy. However, it is essential that the government should take more initiative to increase the use of this technology in its development programmes and educate rural people in order to use of ICT effectively.

References

Anbarasan P. (2016), "A Case study analysis on e-agriculture (e-velanmai): An ICT based technology transfer model in Agriculture in Tamil Nadu state", *India, African Journal of Agricultural Science and Technology*, Vol: 4, No: 1, PP (563-568).

Ankur and Kavery Ganguly (2017), "Digital Technologies Transforming Indian Agriculture", *The Global Innovation Index*, PP (105-111).

Deshpande Mayur, Dhakne Aniket, Patharkar Mayur, Rathod Aakash (2017), "E-Agriculture Information Monitoring System Using Data Mining", *International Journal of Innovative Research in Computer and Communication Engineering*, Vol: 5, No: 2, PP (1962-1702).

Deven J. Patel and Kapil K. (2014), "Challenges and Opportunities for ICT Initiatives in Agricultural Marketing in India", *Oriental Journal of Computer Science and Technology*, Vol: 7, No: 3, PP (377-381).

Harjinder Kaur and Major Singh Goraya (2017), "A Scenario of IT based Agriculture Projects in India", *International Journal of Advanced Research in Computer Science*, Vol: 8, No: 1, PP (78-82).

India digital Bharat (2014), "The Boston Consulting Group Reports", Internet and Mobile Association of India.

Kiran Yadav, Rasheed Sulaiman V, Yaduraju N.T., Venkatraman Balaji and Prabhakar T.V. (2016), "ICTs in knowledge management: the case of the Agropedia platform for India", *Knowledge Management for Development Journal*, Vol: 11, No: 2, PP (5-22).

Motilewa, Deborah B. and Worlu, Rowland E.K. and Adepoju, Oluwayemisi A. and Fayomi, Oluyemi Oyenike (2016), "Interrogating the Citizen-Centered Services and Development in Nigeria's Agricultural Sector Through E-Governance", Covenant University Conference on E- governance in Nigeria.

Sangita Agrawal (2017), "Role of ICT in Rural Development of India", *International Journal of Economic and Business*, Vol: 4, No: 5, PP (48-53).

Yaduraju.V, Venkatraman Balaji N.T., and Prabhakar T.V. (2016), "ICTs in knowledge management: the case of the Agropedia platform for India", *Knowledge Management for Development Journal* , Vol: 11, No: 2, PP (5-22).

World Bank Report (2003), " E-Banking: Status, Trends, Challenges and Policy Issues", The World Bank, National Informatics Centre, www.nic.in/.

Annual Reports of Ministry of Rural Development, Government of India, New Delhi.

Coimbatore District Profile, 2016.

Government of India Report, 2016 & 2017.

Economic Survey 2017, Economic Division, Department of Economic Affairs, Ministry of Finance, New Delhi: Government of India.

http://indiabudget.nic.in

http://www.ibef.org/industry/information-technology-india.

https://data.oecd.org/agriculture.

https://www.fas.usda.gov.