

AN EMPIRICAL INVESTIGATION OF ICTS IN THE AGRICULTURAL DEVELOPMENT OF THE UNION TERRITORY OF PUDUCHERRY, INDIA

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ABSTRACT

It is globally accepted that the agricultural sector is the backbone of every economy. This sector plays a significant role over the course of economic development by contributing a considerable share in the gross domestic product and employment generation. Further, this sector is considered as a herculean weapon to eradicate extreme poverty, food insecurity and poor standard of living particularly in the underdeveloped and developing nations. There are some internal and external forces which have both positive and negative effects on this sector, which includes government policies, environmental condition, population pressure on land, cropping pattern, globalization, international trade and information, communication and technology. Against the above theoretical background, the present study tries to assess the role of ICTs in the development of agriculture in the Union territory of Puducherry, India. In order to execute this study, both primary and secondary data have been used. Secondary data have been collected from the published reports and materials while primary data have been collected from 90 sample respondents from three villages using simple random sampling method. The dataset include socio-economic profiles of the sample respondents and role of television, radio, cell phone, news papers and internet in offering information for the development of agriculture. The study uses simple percentage and Garrett Ranking method to analyze the data. The result of this study shows that television is in the towering position, followed by radio, news papers, cell phone, and internet in generating awareness on suitable input applications like pesticide and fertilizer use, soil quality test, credit opportunities, agricultural prices and cultivation methods. Hence, the study suggests that agro-based programmes should be more effectively relayed through local and national level channels in vernacular language to enhance the agricultural production and productivity.

Keywords: *Agricultural development, ICTs in agriculture, Indian agriculture, primary sector and impact of ICTs.*

INTRODUCTION

In any economy, agriculture is the mainstay over the course of economic development at least at the first phase. The Nobel laureate *Theodore Schultz* in his acceptance speech of 1979 Nobel Prize insisted to focus on poor for having a better understanding on economics because, the world's majority is poor. And also emphasized to focus on agriculture to understand the poor since, agriculture is the main source of income for most of the poor (Shultz, 1979). Agricultural sector has the caliber to play a catalytic role for socio-economic development in general and low income countries in particular. In a classic work published in the world famous journal- *American economic review*, Johnston and Mellor (1961) portrayed the significant role played of agricultural sector in the economic development of a nation. According to their view, "in underdeveloped countries, agriculture is an existing industry of major proportions, frequently only existing industry of any consequence". Further, they highlighted that the role of agricultural sector for economic growth in five propositions- Economic development is characterized by a substantial increase in the demand for agricultural products, and failure to expand food supplies. This food subsistence aspect was accepted by Schultz (1964) in pace with the growth of demand can seriously impede economic growth, earns foreign exchange by export, supply labor force to other sectors, contribute a sizable dose of capital required for secondary sector and increased demand for industrial output.

The development experience of the developed nations such as England, France, Belgium, Germany and Sweden attained spectacular growth within a short span; they attained a substantial industrial development only with the support of agricultural development (Nicholls, 1970). Further, Kuznets (1966) presented his empirical findings that the agriculture sector supplies low cost food and labor and growth of productivity in agricultural sector offers capital to other modern sector, which are essential for economic growth. The importance of such linkages was further stressed by Singer (1979) articulated that as a result of “agricultural demand-led industrialization” overall economic development is taking place. In fact due to production and consumption linkages a nation’s development approach should be agriculture-driven rather than export-driven. Matsuyama (1992) opined the connection between the overall economic and agricultural growth was determined by the level of openness to international trade. Further, he suggests that because of its linkage effect, in small and closed nations agricultural growth goes hand in hand with economic growth. In the recent assessment World Bank (2008), stressed that the agricultural sector is extending its support with other sectors to attain faster economic growth, reduce considerable level of poverty, and sustain the existing environment.

The available empirical literatures have been describing the significant role played by the agricultural sector in poverty alleviation. Among the available studies from the last decade, Mellor (2001) mentioned that the direct and indirect contribution of agricultural growth significantly reduced the poverty level in developing countries; this is not because of overall economic growth. According to Irz *et al.* (2001) agricultural growth is one of the effective instruments to reduce poverty. The direct effect of growth of agricultural sector for poverty reduction through farm employment and profitability, and indirectly from employment generation in upstream and downstream of non-farm sectors. In a research work pursued by DFID (2004) emphasized that over the past four decades, there was a close correlation between the growth of agricultural productivity and the reduction of poverty, in the sense that productivity growth in the agricultural sector downsized the poverty level. Christiaensen and Demery (2007) highlighted that the growth of agricultural sector had significantly affect the poverty level than that of other sectors. Further, from their statistical evidence they expressed that there was 1.6 times reduction in poverty from 1 per cent per capita growth in agricultural sector. Bresciani and Valdes (2007) from their six country case study found that there are three channels to reduce poverty from agricultural sector they includes (a) labour market, (b) farm income, and (c) food prices. Their intensive analysis concluded that the development of agricultural sector was consistently reduced the poverty level than that of other leading sectors.

In a World Bank’s study conducted by Ligon and Sadoulet (2008) used regression co-efficient on time series and cross-section data to find out the connection between agricultural sector and poor household income. They concluded that the growth of agricultural sector was pro-poor, which substantially more important for poor households. In a recent appraisal on agriculture for development, World Bank (2008) concluded that the agricultural development not only enhances the economic growth, but also reduces poverty, and protect the existing environment. Likewise, Montalvo and Ravallion (2009) in their comprehensive research work found that in China the spectacular success against poverty was achieved by the driving force of agriculture, not because of other sectors. Further, because of the trade-off situation existing between manufacturing and service sector their impact of poverty alleviation is limited. The attempt of Loayza and Raddatz (2010) was differing from other studies that they tried to assess the impact of agricultural sector on poverty, based on the amount of labor used. From their cross- section data of developing countries reached a conclusion that the growth of agriculture as labor intensive sector has greater impact on poverty level than that of capital intensive sectors. In another study pursued in the same year by Christiaensen *et al.* (2010) found from their cross-country regression model that the effect of agricultural growth in poverty reduction was superior than that of other sectors over the study period. Pack (2009), in his comprehensive research conducted in East Asian countries concludes that the increase in rural employment and income due to expansion of agricultural productivity reduced the level of poverty in these nations. This result was also corroborated by Thirtle *et al.* (2001) and Ravallion and Chen (2007). Among the available Indian studies, Ahluwalia (1978) found that there is a significant adverse relationship between agricultural growth and poverty resulting that the incidence of poverty reduced in India. Datt and Ravallion (1996, 1998) concluded that both absolute and relative poverty had been reduced as a result of higher level of farm productivity during different study periods. Roy and Pal (2002) concluded that thanks to the enhancement of agricultural productivity, there was a significant reduction in the poverty level in India. Virmani (2007) uttered that in

addition to the nominal contribution to the overall growth of GDP, agricultural sector contributed considerably for the reduction of poverty in India.

A miracle in the recent achievement of this world is the development of information and communication technology. The term ICT is rightly defined by UNDP as “a varied set of goods, applications and services used to produce, store, process, distribute and exchange information. They include the most familiar technologies of television, radio and telephone (now called older or traditional ICTs) and the relatively newer ones—personal computers, mobile phones, satellite and wireless technologies and the internet”. Undoubtedly, the information and communication technology is ruling the entire world and one of the significant driving forces to attain the socio-economic development in the 21st century. The importance of ICTs in the development was exposed by the United Nations Secretary General, *Kofi Annan*, in his address in the United Nations Commission on Science and Technology for Development (UNCSTD) in 1997. Certainly, revolutionary changes occurred in information and communication technology field. The quantum and access with regard to information and knowledge are mounting. The developing countries, for advancement in sustainable development particularly, in the fields like agriculture, economics, health, human resource and environmental management, should make use of the information and technology (Annan, 1997).

Information and communication technology provides agricultural information, which is a vehicle for the growth of this sector. Government agencies, scientists, researchers, teachers, practitioners, area specialists in agriculture, planners and policy makers, are producing a sizable amount of knowledge about agriculture information. These information are widely distributed through means of radio, television, newspapers, magazines and reports, very recently through internet and cell phone (Batte *et al.*, 1990; Nazari and Hasbullah, 2008; Emmanuel, 2010, Olaniyi, 2013; Chhachar *et al.*, 2014). The diffusion of knowledge in agricultural sector is a vital important, because through which cultivator get acquainted with modern and superior farming, enhanced seedlings fertilizers, modern pest control techniques, pesticides, fungicides and herbicides. In the present decade, many researchers are investigating the impact of ICTs in the field of agriculture. The quintessence of few international level studies conducted by Streeter *et al.* (1991), Sarahelen and Sonka (1997), Palaskas *et al.* (1997), Poole and Kenny (2003), Bertolini (2004), Kalusopa (2005), Kizilaslan, (2006) and Lio and Liu, (2006) exposed that the information and knowledge are important instruments to hasten agricultural development by means of apt production planning, cultivation practices, and appropriate management after post-harvesting. In India, Nataraju and Perumal (1996), Bhaskar and Rao (2001), Veeranjanyulu (2004), Gupta (2005), Sharma *et al.* (2012) Adhiguru and Devi (2012) and Ansari and Pandey (2013) studied the effect of different types of ICTs in agriculture. But, there is no scientific research pursued in Pondicherry region at ground level. Hence, the present study attempts to fill the gap in the literature.

RESEARCH METHOD

The agricultural sector has been experiencing a number of changes and challenges over the course of development. The prime among the changes undergone by the agricultural sector is that the paradigm shift from the use of human and animal power to machine and information force. In fact, in the 21st century, the information and communication technology (ICT) became one of the chief driving forces. Its penetration can be seen almost in all corners of the sectors. It changed the way we think, live, buy, earn, learn, work, play, and relay. This trend attracts researchers all over the world to focus their attention on the impact of ICTs in the human life. Against the above theoretical background, the present study attempted to appraise the impact of ICTs in the agricultural development of Pondicherry union territory, India. Pondicherry region is a unique place on the planet, the core urban area has encompassed by the cosmopolitan and modern culture and out pocket of this region is emblematic rural. Under this circumstance, the present study assessed the role of ICTs in the agricultural development of rural Puducherry in 2016. In order to accomplish this study, both primary and secondary data have been used. Secondary data have been collected from the published reports and materials. Primary data have been collected from the sample respondents selected from the fields. As the eastern part of this region is covered by the *Bay of Bengal*, sample villages from rest of the three directions have been selected based on the place where intensive cultivation is taking place. For collection of primary data 90 respondents were selected from three selected villages such as Sanjeevi nagar from north, Baagur from south and Suthukeni from west using simple random sampling technique. The dataset

includes socio-economic profiles of the sample respondents and role of television, radio, cell phone, and news papers, in offering information for the development of agriculture. The study uses simple percentage and Garrett Ranking (GR) method using the following formula

$$GR = \frac{100(R_{ij} - 0.5)}{N_j}$$

Where R_{ij} is rank given for i^{th} item by j^{th} individual N_j is number of items ranked by j^{th} individual. The result of this technique identifies that, which one of the existing instruments is in the towering place in offering the information for agricultural development.

RESULTS AND DISCUSSION

India, the second fast growing nation, has its distinguishing characteristics with three sides of water and one side land. The existing, vast and diverse geographical conditions, races and religions, different climates, time-zones and culture, make it subcontinent in true sense of the term (Gupta and Gupta, 2008). Because of its inimitable locational characteristics, India has been in a fascinating place in the world map. At the time of independence, Indian economy was overwhelmingly agriculture and rural based in nature with around 85 per cent of the population lived in village areas and attained their livelihood from agricultural and its related activities using conventional low-productivity techniques. This nature of economic backwardness in Indian economy was reflected in its uneven occupational distribution with nearly 70 per cent of population engaged in agro-based activities (Kapila, 2009). Still agriculture is in the prominent place in offering employment and food for subsistence in India (Economic Survey, 2015). In the present study an attempt is made to find out the role of ICTs in the development of agriculture in rural Puducherry. The analysis part has been classified into two parts. The first part focuses on the socio-economic traits of sample respondents and the rest deals with the role of ICTs in agriculture.

The socio-economic status of a particular society is an important indicator to understand the present position and predict the future trend (Agarwal *et al.*, 2005). Further, West *et al.* (2010) in their research highlighted that in a society, a family's or an individual's position in the existing environment can naturally be represented by socio-economic conditions, which is backed by various factors. The socio-economic status of the sample respondents presented in Table 1 reveals that male, middle and old age people are in majority. An overwhelming percentage (79) of Hindus respondents in the study area may be attributed to the concentration of this religion. Even though 21 per cent of the sample respondents are illiterate, they can able to receive agriculture related information in their vernacular language. Since, cultivation is the major economic activity in these villages, majority (47 per cent) gained more than 30 years of experience in this field, which implies that people have been involving in this activity right from their young age. Income is playing a substantial role in all walks of human life, in rural areas, land holding is one of the chief determinants of income, as major part of the village mass depending upon agriculture. Among the total 90 sample respondents, majority holding one to five acres of land, at the same time most of the sample respondents fall in the income category of up to 25,000 annual income per annum. This trend implies that the return from the agricultural activity is not as profitable as early. Further, it is worth noting that even though, 10 per cent of the respondents holding 6-10 acres land they don't have the conducive milieu to cultivate all the existing land.

In order to find the major role played by the existing instruments in the development of agriculture, the opinions of the sample respondents have been collected and the Garrett Ranking technique has been applied. Scholars in social science (Ramanigopal *et al.*, 2011; Myilswamy and Kumar, 2013; Chhachhar *et al.*, 2014; Syiem and Raj, 2015; and Mahendran and Sumathi, 2015) widely used this technique in ranking the observation of sample respondents in different areas. After crossing different stages such as the rank wise estimation, percent position, garret value, and multiplication of respective ranks, obtained the final Garrett Ranking result, as presented in Table 2 and Figure 1..

It is evident from the table that television is in the towering position with 71.4 per cent of the average scoring in disseminating information for agricultural development. Since, rural people are attracted by TV programs, which is functioning as a main vehicle in diffusing information related to cultivation. This result is coinciding with the research findings of Olaniyi (2013) and Chhachhar *et al.*, (2014) in different nations. In the study area, radio is in the second place in providing the agriculture related information. Since, radio

Table: 1 Socio-economic profile of the sample respondents

Variables	Classification	Frequency	Percentage
Gender	Male	71	78.9
	Female	19	21.1
	Total	90	100
Age	Young	14	15.5
	Middle	32	36.5
	Old	44	48.0
Religion	Hindu	71	78.9
	Muslim	16	17.8
	Christian	3	3.3
Education	Illiterate	19	21.1
	Primary	43	47.8
	Secondary	28	31.1
Experience	Upto 15 years	13	14.4
	16-30	35	38.9
	31 and above	42	46.7
Land holding	Less than 1 acre	27	30.0
	1-5	54	60.0
	6-10	9	10.0
Income	Upto 25,000	34	37.8
	20006-50,000	21	23.3
	51,001-1,00,000	29	32.2
	1,00001-1,50,000	6	6.5

Table: 2 Final results of Garret ranking (GR)

Factor	Sum	Sample	Average	GR
F1- Radio	5110	90	56.8	II
F2- Television	6430	90	71.4	I
F3- Cell phone	4020	90	44.7	IV
F4-News paper	4545	90	50.5	III
F5- Internet	2380	90	26.4	V

Source: Computed from primary data

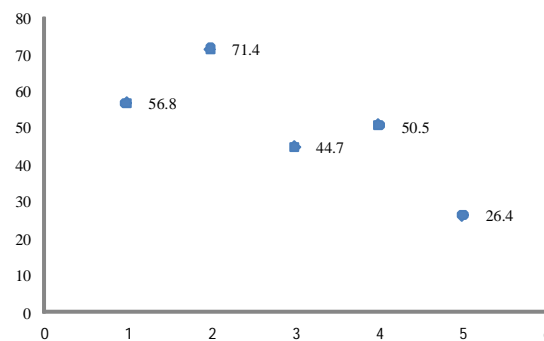


Figure 1. Final results of Garret Ranking

is very cheaper in cost to purchase and maintenance, most of the village people using this instrument for different purpose in general and agricultural purpose in particular. Moreover, rural cultivators are habituated to hear the programs in radio right from their childhood. News paper with 51 per cent score is in the third place, as the access to news paper is very high particularly in tea shops, government buildings and other public places of villages, people receive agro-based information through news papers. Even though, cell phones are widely used in rural areas, this finds place next to newspaper with regard to access of agriculture related information. Still people are using the cell phones to get information from the people such as distribution of seeds in the union office; availability of fertilizer in the nearby town, etc. As the level of technical knowhow is very low in rural areas, they are not in that position to get information for agricultural development from internet. Hence, accessing internet is in the rock bottom in the Garrett ranking.

CONCLUSION

The study administered the simple percentage and Garrett Ranking technique to analyze the data. The result of this study revealed that television is in the soaring position, followed by radio and newspapers in disseminating knowledge on suitable input applications like soil quality test, high quality seeds, pesticide and fertilizer use, credit opportunities, agricultural prices and cultivation methods. Hence, the study suggests that broadcasting agro-based programs should be more effectively relayed through local and national level channels in vernacular language to enhance the agricultural production, as this is a herculean weapon to reduce poverty not only in India but also all other underdeveloped and developing nations.

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