FACTORS IMPACTING THE ICT ADOPTION OR REJECTION DECISION BY THE FARMERS OF PUNJAB

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***Abstract*:** ICT has gained immense popularity and is being used by people of all age groups. It is catering to different types of needs of individuals. The emergence of older mediums like Radio, T.V., Newspapers too had impacted the society greatly in the past, particularly their contribution towards the 'change' is vital. Likewise, due to the popularity of ICTs, the idea of using ICT for development too gained popularity. Knowledge is Power' is the notion behind using ICT for development. However, in order to achieve development using ICT, it's important that the ICT has penetration and adoption at the grassroots. So what can be the factors which can influence the decision of an individual regarding adoption or rejection of using ICT for development? Hence, this paper attempts to study the factors which can impact the adoption decision. A survey was conducted with a sample size of 360 farmers chosen randomly from nine districts of Punjab. It was found that 'No interest' or lack of interest was the main reason given by the farmers for rejection of the idea. Similarly, the adopters of ICT revealed that 'Simple & understandable language' was the main reason for adoption of ICT for development.

Key Words: ICT, ICT for development, Factors impacting ICT adoption decision

I. INTRODUCTION

Mass communication mediums have undergone major changes over the years. Print is the oldest medium of mass communication which has gained loyal readers over many years. However, the print medium has undergone major changes, transitioning into digital platforms. For instance, the traditional newspapers, books, magazines etc. are being published on digital platforms. Similarly, radio gained immense popularity in the beginning, but has been merged in the mobile handsets now. Likewise, the idiot box or T.V. took the society by a storm at the time of its emergence, but the same has transformed into flat screen digital T.Vs. – or smart T.V.s as we know them – which can be connected to the internet and mobile handsets. But the evolution of telephones i.e. from landlines to wireless handsets was the most effective one. In today's world, mobile phones have succeeded in tapping majority of the population. It still remains irreplaceable.

Likewise, New media tools have emerged and are popularly being used by majority. Such tools are now collectively called ICTs i.e. Information and communication technologies. ICTs can be defined as technologies which perform mainly four major functions i.e. capturing, storage, processing and manipulation, transmit and display. It is an umbrella term which covers any communication device or application encompassing; radio, T.V., cellular phones, computer & network hardwares and softwares, satellite systems, etc, as well as various services and applications. These ICTs today can be used for various activities. It has made communication a lot faster, given access to abundance of information to all, provided options for entertainment such as watching videos online including T.V. content, listening to music like radios, reading books, articles, etc. like newspapers and magazines, online gaming, online shopping etc.

PENETRATION OF ICT IN INDIA

An article published in the Hindu, dated 1Dec, 2015, India is ranked at 131 out of 167positions on the ICTs Global index (IDI) in the year 2015. South Korea is on top of this list. The article also highlighted that the position is low despite the fact that the number of households with internet and computers have increased. Does that mean that the ICT usage in India is low?

The reforms in the telecommunication sector since 1990s have facilitated ICT infrastructure in India. Wireless telephones have grown over landlines. The numbers of wireless telephones have increased from 867.81 million to 904.52 million in 2013-2014. Private operators too are increasing. Tele density has also increased to 75.23%. Government owned BSNL is also focusing on rural regions, North eastern and tribal regions. The Year India book, 2018, also revealed that the tele-density (telephone per 100 persons) was 83.40 in April, 2016, which rose to 93.01 in March, 2017. The rural tele-density increased from 51.26 per cent to 56.98 per cent in March, 2017. In the year 2016, the total internet connections were 342.66 million which increased to 422.19 million in March 2017.

ICT AND DEVELOPMENT

"Development is neither a simple, nor straightforward linear process. It is a multi-dimensional exercise that seeks to transform society by addressing the entire complex of interwoven strands, living impulses, which are part of an organic whole". (Haqqani 2003:xi)

There are number of approaches to achieve development. ICT4D is a new approach the world as well as India has started using keeping in mind the penetration of ICT tools at the ground level. ICT has opened new possibilities for sustainable development. Knowledge is power is the notion behind this concept. The idea is to deliver the right kind of information to the right individual at the right time so that the individual can use such information for the upliftment, growth and development of himself. Due to the depth of penetration of ICT in the 21st century humans are exposed to not just one but multiple ICT tools. Hence, ICT is now being used to convey development messages. ICT for development is a new approached being used in India.

ICT BASED INITIATIVES IN INDIA

Bhoomi project was started by the Karnataka Government in Feb, 2001 with the aim to computerize data related to land and maintain land records. The aim was to bring in transparency, security and reliability. This project covered 6.7 million landowners and 176 taluks. The records could be easily accessed by users through a network of rural kiosks. E-sampark is another programme based on ICT to provide all kind of services from a single window. It aims at connecting all the departments and delivering services to the people transparently.

The Digital India Programme launched 1st of July in 2015, by the Government of India was based on the same ICT4D concept. The aim of the programme was to provide digital infrastructure, literacy and deliver services digitally to the end beneficiaries to bring in transparency in the system. In order to bridge the gap between the Government and the public, all the government ministries, departments and offices were digitized so that the public can connect directly.

Similarly many ICT based initiatives have been undertook in the agriculture sector like Warana wired village project in Maharashtra, Gyandoot in Madhya Pradesh, Information village project by MSSRF in Pondicherry, iKisan in Andhra Pradesh, Automated Milk collection Centre in Gujarat by Amul, Bhoomi Project in Karnataka, Computer aided online registration department in Andhra Pradesh, Online marketing in Karnataka, Knowledge Network for Grass Root Innovations in Gujarat etc.

However, despite several efforts and support by the government, ICT based initiatives did not have 100% penetration and reach. So what can be the barriers and facilitators for influencing the decision of an individual for adoption or rejection of ICT based development.

II. REVIEW OF LITERATURE

Multiple studies have been done on this context and each study happens to suggest new factors influencing the adoption or rejection decision of individuals. Dr. Harekrishna Misra, IRMA, Gujrat (2009), carried out a study and found poor and low technology, poor management, high purchase cost and maintenance of hardware, Access and affordability have been highlighted in a researched conducted by A.K. Wafula-Kwake and Dennis N. Ocholla (2007). Karwal, A., Singh, S. J., & Shah, N. (2005) revealed that the adoption and success of an ICT based initiative depends on 3Ps i.e. People/Employees, Physical workplace and Processes. S. Sivakumar (2004) emphasized upon the content. Rao, V. M. (2004) carried out a study in Pondicherry and suggested that good connectivity, good power supply i.e. electricity and alternate energy such as solar and wind, demand driven content, accessibility by all without discrimination, people's participation, prior training to the operators of kiosks and rural people and timey feedbacks as few factors influencing the adoption decision and hence success of a ICT based initiative. Another research conducted by Sundén, S., & Wicander, G. (2007) studied and aspects like Self esteem, social power, basic education, ICT education, Skills, Needs, ownership, participation, leadership, financial support, Electricity, software, hardware, content etc. as factors influencing adoption decision.

RATIONALE

Agriculture is the backbone of the Indian Economy. When we discuss the development of India, the rural population cannot be ignored. It is the principle source for more than 55% of the population to sustain their livelihood and hence become an important group to focus upon.

WHY PUNJAB?

Punjab is the "Granary of India" with a large share in the agriculture sector in the nation's economy. Approximately 82 per cent of the state's land is under cultivation compared with the national average of 40 per cent. Hence it was selected as the research area and farmers of Punjab were focused upon.

OBJECTIVE

- This research paper is written with an attempt to find out the awareness level among the farmers of Punjab about ICT based agriculture
- It further tries on finding out the dominant source of awareness for ICT based agriculture
- This paper also attempts to find out the factors responsible for adoption or rejection of ICT for agriculture by the farmers.

METHODOLOGY

A survey was conducted to collect the data. A sample size of 360 farmers was taken from nine districts of Punjab, chosen randomly. Forty farmers from each district were selected to record data.

III. RESULT AND DISCUSSION

3.1: Awareness level among the farmers of Punjab about ICT based agriculture

It was important to study the awareness of the farmers at the grassroots regarding such ICT based agriculture. Two aspects of awareness were studies i.e. the awareness level and the source of awareness. The first hypothesis was that Majority are aware about ICT based agriculture system. The second hypothesis was that the respondents became aware about ICT based agriculture systems because of the T.V.

H_1: *Majority are aware of ICT based agriculture system.*

A Likert scale was used to record the awareness levels of the farmers about the ICT based agriculture systems. In order to analyze the awareness levels frequency table were used. The representation of the results is shown in the graph below-

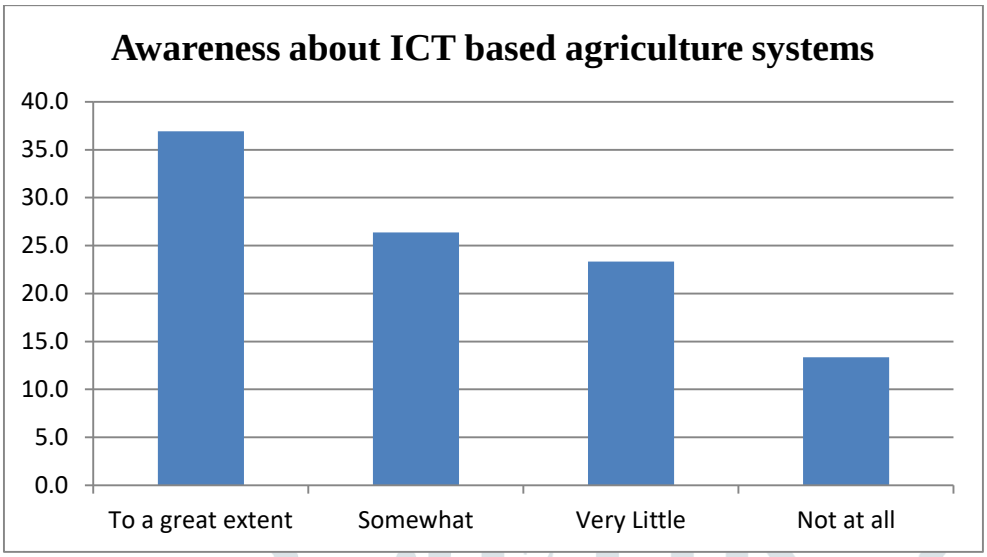

Fig 1: Awareness levels of ICT based agriculture systems

It was found that **majority i.e. 36.9%** i.e. 133 of the respondents out of 360 knew '**To a great extent', 26.4 %** i.e. 95 respondents knew '**somewhat**' and **23.3%** i.e. 84 respondents knew '**very little'** about it. Merely **13.3% i.e.** 48 out of the total 360 respondents were '**not at all'** aware about the ICT based agriculture systems. Hence, the data supports and proves the hypothesis. Majority of the farmers were aware about such ICT based systems if not in details then atleast to some extent.

3.2: SOURCE OF AWARENESS ABOUT ICT BASED AGRICULTURE

After studying the awareness levels, it became necessary to understand the source of awareness. The same sources can be further utilized to spread awareness and to reach out to the untapped population. In order to understand the sources of awareness six categories were made such as Print, T.V., Radio, Mobile, Word of mouth and New media. It was hypothesized that-

H_2: *Majority became aware of ICT based agriculture system because of T.V.*

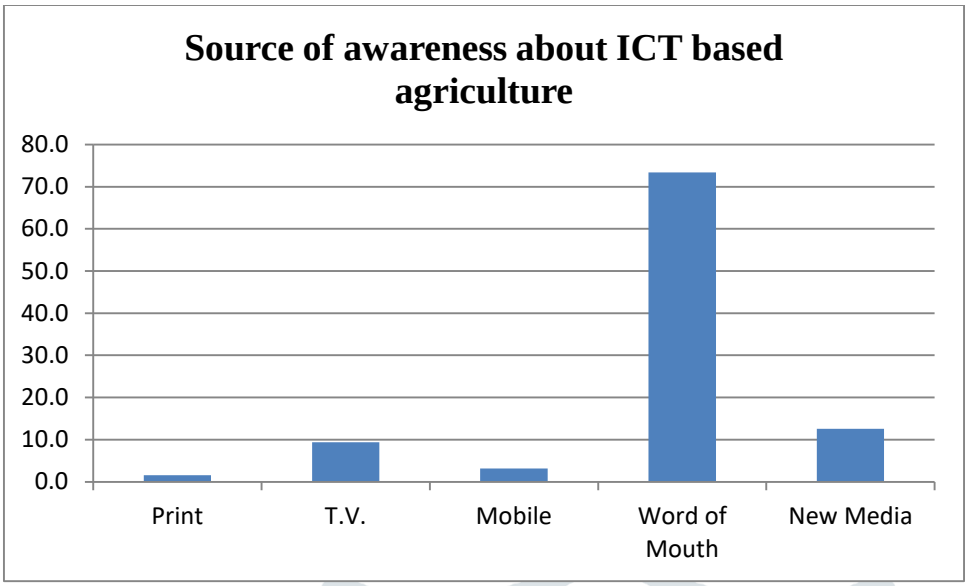

Fig 2: Sources of awareness about ICT based agriculture

Majority **73%** i.e. 234 of the respondents out of the total respondents who were aware of ICT based systems **became aware through** '**word of mouth'**, followed by New media i.e. 13%, T.V. i.e. 9% and mobile i.e. 3%. Whereas, **merely 2%** i.e. 5 respondents **became aware through** '**Print**' medium. Hence, the data doesn't support the hypothesis. 'Word of mouth' was the source of awareness for majority of the farmers.

Similar findings were revealed by previously conducted researches. For example, a research was conducted by S. Lwasa, N. Asingwire, J.J. Okello and J. Kiwanuka (2011) on one ICT i.e. mobile and it was found that people had high levels of awareness about it. The current study too found high levels of awareness about ICTs and is in consonance with the previously mentioned study. However, a contradiction was found upon comparing the findings of the current study with a research conducted by L.A. Akinbile and O. E. Alabi (2010). Akinbile and O. E. (2010) Alabi's research found that majority of the farmers had poor knowledge about ICTs. They also found that experts, mass media, extension agents and friends were approached for source of information. The current research too found that the source of awareness about ICTs was through word of mouth however, the farmers in the current research were well aware of ICTs.

3.3: THE FACTORS IMPACTING DECISION OF ADOPTION OR NON-ADOPTION OF ICT IN AGRICULTURE

The main aim was to find out the factors impacting the decision of adoption of ICT for the purpose of accessing information related to agriculture. Now it became necessary to understand the reasons and factors that affect individuals in the adoption process. The factors related to four broad categories i.e. Human factors, Social factors, Infrastructural factors and Content factors were studied.

FACTORS FOR REJECTION OF ICT FOR AGRICULTURE

The following hypothesis was formed to find out the factors influencing rejection decision of non-adopters:

H_1: *'Don't know how to operate' or difficulty in operating is the dominant reason for rejection*.

In order to find out the reasons for rejection, a non-parametric chi square test was used. Please refer table no.1 for results.

Table no. 1

Factors for rejection	Frequencies	Chi-Square	p-value
i. No computer/device	12	449.513	**.0001**
ii. Too expensive	21		
iii. Not useful	88		
iv. Time consuming	32		
v. **No interest**	**107**		
vi. Don't know how to operate	62		
vii. Fear of technology	27		
viii. Don't think its credible	21		
ix. Difficulty in connection	3		
x. No internet connection	6		
xi. Government officials	6		
xii. Availability of alternative media	19		
xiii. Peer advice	75		
xiv. No access	6		
xv. No personal effort	78		

The hypothesis was that 'Don't know how to operate' was the dominant reason for rejection. However the above table shows otherwise. Hence the hypothesis is disproved. As evident from the above table, 'No interest' was the dominant reason for rejection of ICT for agriculture by majority i.e. 60% of the respondents.

Similarly, the next popular reasons for rejections were 'Not useful' with 49% responses, Peer advice with 42% and 'Don't know how to operate' with 35% responses. This indicates that despite awareness, 49% of non- adopters perceive that ICT based agriculture system is 'Not useful' to them and prefer to follow the traditional ways of farming and seek Peer advice (42%) in case of any problem. 35% of the respondents 'don't know how to operate' ICTs to access information related to agriculture. Minimum responses i.e. 2% respondents suggested 'Difficulty in connection' as a reason for rejection.

FACTORS IMPACTING ADOPTION OF ICT FOR AGRICULTURE

After understanding the reasons and the experience or perception of non-adopters about the idea of ICT based agricultural development, the focus shifted on adopters. List of factors were made to find out the dominant reasons for adoption.

The following hypothesis was formed to study the factors influencing acceptance/adoption decision by adopters:

H_2: *'New and interesting' is the dominant reason for rejection*

In order to find out the reasons for adoption, a non-parametric chi square test was used. Please refer table no. 2 for results.

Table no. 2: Reasons for adoption

Reasons	Frequencies	Chi-Square	p-value
i. New and interesting	149	373.184	**.0001**
ii. Free access	38		
iii. Useful in getting info	157		
iv Comfort level	162		
v. Tool efficacy	151		
vi. Sarpanch support and encourages usage	20		

vii. Friends & acquaintances are using	79		
viii. Government promotes its usage	35		
ix. Regular supply of electricity	56		
x. Good internet connection	104		
xi. Easy & simple Softwares	46		
xii. Simple & understandable language	**167**		
xiii. Filtered information	107		
xiv. Correct/authentic info	131		

The hypothesis suggested that 'New and interesting' was the dominant reason for adoption. However the above table indicates that majority i.e. 92% of the respondents chose 'Simple and understanding content' as the reason for adoption of ICT for agriculture. Hence the hypothesis is disproved. Other popular reasons for adoption were Comfort level (89%), Useful in getting information (86%) and Tool efficacy (83%). Minimum i.e. 11% of the respondents chose 'Sarpanch support and encourages usage' as the reason for adoption.

A study by Mukesh Ranga and Priyanka Pradhan (2014), suggested infrastructure, connectivity and affordability, equitable access, e-literacy, strengthening rural and public libraries, community ownership of ICT, local language content, affordable cost were some factors suggested for success. Similarly, S. Sivakumar (2004) in a research emphasized upon the content as a major influencing factor in the adoption process. Rao, V. M. (2004) carried out a study in Pondicherry and suggested that good connectivity, good power supply i.e. electricity and alternate energy such as solar and wind, demand driven content, accessibility by all without discrimination, people's participation, prior training to the operators of kiosks and rural people and timey feedbacks as few factors influencing the adoption decision. The current study too is in consonance to these studies and found that 'No interest' i.e. lack of people's participation was the dominant reason for rejection whereas Simple understandable Content was the dominant reason for adoption as emphasized by S. Sivakumar (2004).

CONCLUSION

The dominant reason for rejection was found to be a Human factor i.e. 'No interest,' however once that human barrier is removed and people adopt ICT, 'Content factor' becomes the dominant reason for adoption. Here, it was found that there is a gap between awareness and adoption. The results indicated that majority had awareness about ICT based agriculture systems but the awareness levels varied. Infact it was found that compared to the number of farmers that were aware, the adoption was lesser. It clearly means that mere adoption does not result in adoption and hence in order to convert the awareness into adoption more efforts and steps need to be put in.

Based on the findings it can be recommended that the main reasons given by the non adopters such as 'no interest', 'Not useful,' 'Don't know how to operate,' 'No personal effort,' and 'Peer advice' suggest lack of trust in the ICT based system and hence resistance to the idea by individuals. Hence, the gap must be filled by focusing on and removing the 'Human barriers' for atleast ensuring trial. This can be only done after spreading 100% awareness, followed by more persuasion and then the decision of trial becomes possible which may result into adoption. Efforts should be put in to ensure that the farmers atleast generate interest in trying to understand the concept, understand the usefulness, become more efficient in operating ICT tools hence workshops can be conducted to impart knowledge about the usage i.e. both in terms of usage of tools as well as the exact sources and platforms to be accessed to gather solutions to their problems instead of approaching 'Peers' for advice. ICT has the potential of bringing overall development, provided its implemented properly at the ground levels.

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