

# Comparative Analysis of Use and Perceived Attributes of ICTs in Public and Private Extension Systems in India

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## Abstract

*ICT enabled extension offers new opportunities for bridging the knowledge and extension service gap in Indian agriculture. However, several critical challenges still remain. One of the most critical issues related to use of ICTs in the extension system is perceived use of ICTs within these systems. A study was conducted to know about sources of information, use of ICTs, and the perceived attributes of ICTs in private, public and other agricultural extension organizations. While planning to integrate ICTs into the extension system, it is important to consider perceived attributes of ICTs rather than the actual attributes. The results and discussions pertain to the perceived attributes of ICTs as technology per se. On the basis of these attributes, extension organizations may consider evolving ICT enabled extension strategies.*

## Introduction

Agricultural Extension Services do play an important role in delivering information, knowledge and advice to farmers. However in order to remain relevant in these changing times, there is need to specialise in “effectively managing and transferring knowledge” or unformation packages”. Information and Communication Technologies (ICTs) can play an important role in supporting extension in this regard. Over the past two decades, Governments all around the world have invested heavily in strengthening the national ICT infrastructure. ICT applications are supposed to bring new information services to rural areas in which, farmers, as users, will have much greater control than ever over current information channels.

ICT is an umbrella term that includes computer hardware and software; digital broadcast and telecommunications technologies as well as electronic information repositories such as the World Wide Web or those found on CD-ROMs. It represents a broad and continually evolving range of elements that further includes television (TV), radio, mobile phones, and the policies and laws that govern these media and devices.

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ICTs are often used in a plural sense (ICTs) to mean a range of technologies instead of a single technology.

At present, the Information and Communication Technology (ICT) revolution has made the extension function more efficient and effective and provides extension systems with opportunities to deliver new information services to the clients. Now-a-days, it also provides new options for accessing information by providing it directly to farmers and rural households through extension agents, agribusiness, and other intermediaries.

CTA (2003) interpreted ICTs as technologies that facilitate communication and processing and transmission of information by electronic means. However, ICTs in a broader sense, refer to sets of tools, equipment, applications, and services that are utilized to produce, capture, store, disseminate and exchange information (Raji, 2008).

ICT enabled extension offers new opportunities for bridging the knowledge gap in Indian agriculture. However, several critical challenges still remain. Most of the on-going initiatives are work in progress and there is a lot to learn from these. There are 10 critical questions that were critically analysed for evolving extension strategies in promoting ICT enabled extension (Shaik N. Meera, 2013). One of the most critical issues relating to use of ICTs in the extension system is perceived use of ICTs within these systems.

This study was conducted to know about sources of information, use of ICTs, and the perceived attributes of ICTs in private, public and other agricultural extension organizations.

## **Methodology**

To gain a deep insight into the topic a descriptive research design and exploratory study were adopted for the present investigation. The present study was conducted in Ranga Reddy district in the state of Andhra Pradesh purposively as it is the one of the major states where a number of ICT projects are being implemented.

## **Selection of Respondents**

The analysis of ICT projects in the state shows that both the public and private sector are involved in delivering their services in agricultural extension. So, in the present study, a proportionate number of respondents were selected both from the public and private sector extension organizations.

The State Department of Agriculture, the National Institute of Agricultural Extension Management (MANAGE) under the Ministry of Agriculture GOI, the State Agricultural University viz., Acharya N G Ranga Agricultural University (ANGRAU), ICAR institutes and Nagarjuna Fertilizers, ETV, TV5, e-choupal (ITC) etc. were selected purposively for the study.

A proportionate sample of 60 respondents was selected randomly from State Department of Agriculture (SDA), Research and Development (R&D) sector and Private Organizations respectively, for the study. Thus a total of 180 respondents were selected for the study.

## **Data Collection**

A detailed questionnaire was prepared in accordance with the methodological procedures described and objectives of the study. The schedule was pre-tested and suitably modified in the light of the experience obtained during pre-testing.

## **Results and Discussions**

### **Personal Profile of the Respondents**

Personal profile of the respondents has basic information on age, gender, education, nativity, number of years of service and major job responsibility area. The same is presented in Table 1.

It is clear from the table that slightly more than half (51.67%) the respondents were young followed by middle (28.33%) and old age (20.00%). Although the percentage of males is more in comparison to the females, still the percentage of women who had experience in using ICTs, is encouraging. The percentage of graduate respondents in the present study was high in the State Department of Agriculture. Not a single respondent from Research and Development (R&D) and private sector belonged to the graduate category as either post-graduation or doctorate is the minimum educational criteria for R&D, with post graduation for private sector. In the area of nativity, majority (36.11%) of the respondents belonged to urban area followed by rural (32.78%) and semi-urban (31.11%). The number of years of service was categorized as low, medium and high. Majority of the respondents fell into low category of years of service (59.44%) followed by medium (22.22%) and high (18.33%). This might be due to the reason that majority of them belonged to the young age category. The major job responsibility area was the area where the respondents were giving their services to a major extent. It was categorized as extension, research, training and administration. From the table, it is clear that majority (70 %) of respondents belonged to the area of extension as the major job

responsibility followed by research (13.33%), training (11.11%) and administration (05.56%).

Thus it could be concluded from the table that majority of the respondents were young, male, post graduate, belonged to urban area, fell into low category of years of service, with extension as the major area of job responsibility.

Table 1 gives detailed in-depth information on the personal profile of the respondents belonging to R&D sector, State Department of Agriculture and Private sector.

**Table 1. Personal profile of the Respondents working in R&D, SDA and Private sector**

S.No.	Characteristics	Category	R&D Sector (n=60)	SDA (n=60)	Private Sector (n=60)	Total (N=180)
1.	Age	Young	18 (30.00)	36 (60.00)	39 (65.00)	93 (51.67)
		Middle	20 (33.33)	13 (21.67)	18 (30.00)	51 (28.33)
		Old	22 (36.67)	11 (18.33)	03 (05.00)	36 (20.00)
2.	Gender	Male	39 (65.00)	36 (60.00)	41 (68.33)	116 (64.44)
		Female	21 (35.00)	24 (40.00)	19 (31.67)	64 (35.56)
3.	Education	Graduate	00 (00.00)	33 (55.00)	00 (00.00)	33 (18.33)
		Post graduate	25 (41.67)	27 (45.00)	57 (95.00)	109 (60.56)
		Doctorate	35 (58.33)	00 (00.00)	03 (05.00)	38 (21.11)
4.	Nativity	Rural	22 (36.67)	25 (41.67)	12 (20.00)	59 (32.78)
		Semi-urban	16 (26.67)	17 (28.33)	23 (38.33)	56 (31.11)
		Urban	22 (36.67)	18 (30.00)	25 (41.67)	65 (36.11)
5.	No. of years of Service	Low (less than 5 years)	31 (51.67)	40 (66.67)	36 (60.00)	107 (59.44)
		Middle (5 to 10 years)	14 (23.33)	13 (21.67)	13 (21.67)	40 (22.22)
		High (more than 10 years)	15 (25.00)	07 (11.67)	11 (18.33)	33 (18.33)
6.	Major job responsibility area	Extension	32 (53.33)	53 (88.33)	41 (68.33)	126 (70.00)
		Research	14 (23.33)	00 (00.00)	10 (16.67)	24 (13.33)
		Training	11 (18.33)	00 (00.00)	09 (15.00)	20 (11.11)
		Administration	03 (05.00)	07 (11.67)	00 (00.00)	10 (05.56)

*Figures in parentheses indicate percentage*

In R & D sector, majority (53.33%) of the respondents were involved in extension followed by research (23.33%), training (18.33%) and administration (5%). About 88.33 per cent of the respondents from SDA sector were involved in extension followed by 12 per cent respondents from administration. Not a single respondent from SDA was involved in either research or training as a major job responsibility.

About 68.33 per cent of the respondents from the private sector were involved in extension followed by research (16.67%) and training (15%). Not a single respondent was on the administration side.

So, it could be summarized from the table that in the R&D sector, majority of the respondents were old, male, doctorate, hailing from both rural and urban areas, have less experience in the job and extension was the major job responsibility. In SDA, majority of the respondents were young, male, graduate, hailing from rural areas, fell into the low category of number of years of service and extension was the major job responsibility. From private sector also, majority of the respondents were young, male, post graduate, hailing from urban areas, have less years of service and extension was the major job responsibility.

### **Possession of Smart Gadgets (ICTs) by the Respondents**

Even though there is a range of ICT tools that could be applied in extension, what is important is to find out the most critical ICT tools with the respondents. Table 2 gives a picture of smart gadgets (ICTs) possessed by the respondents. It is also interesting to note that possession of a smart phone is not a sufficient condition, but the use of internet on mobile phone/smart phone (46.67%) is. That is the reason why most of those who have smart phones use internet for accessing the information for extension delivery. It shows that regardless of the type of mobile like smart phone/mobile phone, the internet use percentage is good among the respondents.

So, it can be concluded from the above table that the respondents have smart gadgets (ICTs) at their personal level with internet facility. This trend can be better utilized in future to train the extension personnel on use of ICTs in transfer of technology, especially through mobiles, which they have at their own level.

In-depth analysis of the table shows that about 93 per cent of R&D sector respondents and 90 per cent of private sector respondents have personal computers/laptop while only 63 per cent of the SDA respondents have personal computers/laptops. About 84 per cent of R&D sector respondents and about 79 per cent of the private sector respondents have personal computer/laptop with internet connection whereas much less than half (43.33%) of the SDA respondents have personal computer/laptop with internet connection. Cent per cent of the respondents from all the three sectors have mobile phones. With respect to smart phone, 65 per cent of private sector respondents have smart phones, followed by 45 per cent of SDA respondents and about 27 per cent of R&D sector respondents. With the use of internet on mobile phone/smart phone, it is an encouraging finding that about 47 per cent of R&D sector respondents, 37 per cent of SDA respondents and about 57 per

cent of private sector respondents have internet connection on their mobile phones. This can be better utilized to train extension personnel at their time and pace. It is also evident from the table that although SDA sector employees do not possess a computer/laptop they are using mobile/smart phone with internet facility. This trend indicates the possibility of training and updating SDA sector extension personnel through mobiles/smart phones at their ease, time and pace to speed up technology transfer skills and knowledge. Thus it can be observed that respondents have access to ICT tools at their personal levels.

The efforts of the policy makers or the administrators could be on utilization of these ICT tools by the extension personnel working at the field level.

**Table 2. Distribution of Respondents according to Possession of Smart Gadgets (ICTs)**

S.No.	Smart Gadgets (ICTs)	R&D Sector (n=60)	SDA (n=60)	Private Sector (n=60)	Total (N=180)
1.	Personal computer / Laptop	56 (93.33)	38 (63.33)	54 (90.00)	148 (82.22)
2.	Personal computer/ Laptop with internet connection	50 (83.33)	26 (43.33)	47 (78.33)	123 (68.33)
3.	Mobile phone	60 (100.00)	60 (100.00)	60 (100.00)	180 (100.00)
4.	Smart phone	16 (26.67)	27 (45.00)	39 (65.00)	82 (45.56)
5.	Mobile phone/Smart phone with internet facility	28 (46.67)	22 (36.67)	34 (56.67)	84 (46.67)

*Figures in parentheses indicate percentage*

## Sources of Awareness about ICTs

Table 3 highlights the sources of awareness about ICTs by the respondents. It is clear from the table that about 94 per cent of the respondents have awareness about ICTs through interpersonal communication channels like family members, friends and colleagues followed by mass media channels (84.44%) like newspaper/ magazines/ books etc., training (81.67%) and internet (57.78%). It could be seen from the table that slightly more than half of the respondents (57.78%) had undergone training on ICTs. There is also an interesting finding that internet itself is a good source of awareness about ICTs which can further be utilized for the above said purpose. The important point which needs attention while delivering awareness or information on ICTs through internet, is to provide the right information from authentic sources. It is also important to note that interpersonal sources are still a good source of information on ICTs besides mass media sources whereas training as a source of information about ICTs is far behind (Table 3). So, it should be a priority of the respective departments or the policy makers to update and improve awareness of the respondents about ICTs through training also so that they can obtain practical

knowledge on ICTs. However it is very difficult to delineate the contribution of each of the sources of information about ICTs.

Table 3 shows sector wise sources of awareness about ICTs. It is also evident from the table that with respect to training on ICTs (sources of awareness on ICTs), SDA is far behind (33.33%) in comparison to R&D sector (63.33%). The private sector is far better in the areas of training (76.67%) on ICTs in comparison to R&D sector and SDA. The reason might be, in the private sector, respondents are getting specific training immediately after starting their job and also getting trained from time to time to perform better in the respective job. Hence there is a need to train the extension personnel especially from the SDA sector and R&D Sector, on ICTs from time to time.

It could be implied from Table 3 that R&D sector respondents are utilizing interpersonal sources, mass media, internet and training as effective sources of awareness on ICTs. The same trend was also found with private sector respondents i.e., interpersonal channels ranked first as sources of awareness on ICTs followed by mass media channels, internet and training. To sum up, it can be concluded that interpersonal channel of communication along with mass media is still a good source of awareness about the ICTs for respondents. It is suggested to consider interpersonal channel of communication, as an effective and widely accepted channel of information by the respondents and accordingly plan the programmes for capacity building of extension personnel.

**Table 3. Distribution of respondents according to Sources of Awareness about ICTs**

S.No.	Source of Information	R&D Sector (n=60)	SDA (n=60)	Private Sector (n=60)	Total (N=180)
1.	Interpersonal communication (Family members, Friends/Colleagues)	56 (93.33)	58 (96.67)	55 (91.67)	169 (93.89)
2.	Mass media (Newspaper /Magazines/Books, Office/Institution etc.)	48 (80.00)	50 (83.33)	54 (90.00)	152 (84.44)
3.	Training	38 (63.33)	20 (33.33)	46 (76.67)	104 (57.78)
4.	Internet	53 (88.33)	43 (71.67)	51 (85.00)	147 (81.67)

Figures in parentheses indicate percentage

### Perceived Attributes of ICTs

An effort was made to know about the perceived attributes of the ICTs by the respondents. These attributes were as per the attributes of innovation suggested by Rogers. The attributes were categorized into six attributes of innovation i.e., relative

advantage, complexity, compatibility, trialability, observability and predictability and measured with the help of appropriate indicators. Findings are presented in Table 4.

Time saving was seen as the most preferable attribute of ICTs under Relative advantage. All the respondents agreed that saving time was one of the important attributes of the ICTs followed by informative (99.44%), economical (97.78%) as they reach a larger number of beneficiaries simultaneously within a short time, no time limitation (90 %) to utilize it, up to date (96.67%), easy to use (86.11%) and social recognition (83.33%). When a technology is introduced, the cost and time are the two important factors which influence the adoption and performance of the technology/innovation. The data shows that ICTs are time saving and economical as they are capable of reaching a large number of beneficiaries simultaneously, within a short time span.

Complexity is inversely related to adoption of the innovation/technology. If the innovation/technology is complex, the adoption rate will be slow. In the present study, complexity of ICTs was measured with the help of four indicators. More than three fourth (96.11%) of the respondents opined that to handle the ICTs, skills are needed and lack of skills would affect its usage and adoption by the respondents. Majority of the respondents perceived that ICTs are difficult to maintain (61.11%), learn and handle (47.78%) and understand (40.56%). Difficult to understand is related to lack of skills and expertise, hence training on skills, can improve use of ICTs.

An innovation/technology can be adopted only when it is compatible with the social system. Compatibility was studied on the parameters like applicability, social, cultural and language barriers. Table 4 shows that ICT adoption has no applicability barriers, irrespective of social discrimination (91.11%) followed by no social barriers (91.11%), no cultural barriers (88.89%) and no language barriers (76.67%). One of the most critical aspects with respect to use of ICTs is that the content developed should be in local language and be available in a customized, localized and personalized manner.

Adoption of a technology in any social system is affected, until and unless an innovation/technology can be tried on a limited basis. There were two parameters in trialability attribute of the innovation. Near about the same percentage of the respondents agreed that ICTs can be tried without purchasing (90.56%) and ease in trying (91.11%). This feature is a really good indicator in adoption and use of ICTs.

The positive results/effects of an innovation/technology boost up technology adoption. The same is true with ICTs also. Immediate feedback (95.56%) in the use of ICTs is a major parameter under observability attribute followed by providing accurate information (96.11%).

Table 4. Perceived Attributes of ICTs (N=180)

S.No.	Perceived Attributes	Components	Respondents			
			Total (N=180)	R & D (n=60)	SDA (n=60)	Private (n=60)
1.	Relative advantage	Time saving	180 (100.00)	60 (100.00)	60 (100.00)	60 (100.00)
		Economical to reach many people at a time	176 (97.78)	59 (98.33)	57 (95.00)	60 (100.00)
		Informative	179 (99.44)	59 (98.33)	60 (100.00)	60 (100.00)
		No Time limitation (24x7 service)	162 (90.00)	57 (95.00)	45 (75.00)	60 (100.00)
		Low investment	29 (16.11)	16 (08.89)	13 (07.22)	00 (00.00)
		Upto date	174 (96.67)	57 (95.00)	57 (95.00)	60 (100.00)
		Easy to use	155 (86.11)	47 (78.33)	48 (80.00)	60 (100.00)
		Social recognition	150 (83.33)	48 (80.00)	42 (70.00)	60 (100.00)
2.	Complexity	Needs skills and expertise	173 (96.11)	55 (91.67)	58 (96.67)	60 (100.00)
		Difficult to learn and handle	86 (47.78)	25 (41.67)	38 (63.33)	23 (38.33)
		Difficult to maintain	110 (61.11)	35 (58.33)	45 (75.00)	30 (50.00)
		Difficult to understand	73 (40.56)	22 (36.67)	35 (58.33)	16 (26.67)
3.	Compatibility	Applicable to all beneficiaries without any social discrimination	164 (91.11)	54 (90.00)	50 (83.33)	60 (100.00)
		No Language barriers	138 (76.67)	29 (48.33)	49 (81.67)	60 (100.00)
		No cultural barriers	160 (88.89)	56 (93.33)	44 (73.33)	60 (100.00)
		No social barriers	164 (91.11)	54 (90.00)	50 (83.33)	60 (100.00)
4.	Trialability	Try even without purchasing	163 (90.56)	45 (75.00)	58 (96.67)	60 (100.00)
		Ease in trying majority of features	164 (91.11)	47 (78.33)	57 (95.00)	60 (100.00)
5.	Observability	Immediate feedback	172 (95.56)	55 (91.67)	57 (95.00)	60 (100.00)
		Gives accurate information most of the time	173 (96.11)	54 (90.00)	59 (98.33)	60 (100.00)
6.	Predictability	Impacts (both positive and negative) are predictable easily	173 (96.11)	56 (93.33)	57 (95.00)	60 (100.00)

Figures in parentheses indicate percentage

The last attribute of ICTs was measured on Predictability. It is good to see from the Table 4 that near about the same percentage of respondents agreed with the predictable quality of ICTs in terms of impacts (96.11%), results (96.67%) and future needs (97.22%).

## **Conclusion**

This study focused on the use and attributes of the ICTs as perceived by the respondents. The data shows that ICTs are time saving and economical as they are capable of reaching a large number of beneficiaries simultaneously within a short time span. One of the critical aspects with respect to use of ICTs is that the content developed should be in local language and be available in a customized, localized and personalized manner. Attributes such as immediate feedback in the use of ICTs and observability, providing accurate information may be considered while planning ICT extension activities. Respondents agreed with the predictable quality of ICTs in terms of impact (96.11%), results (96.67%) and future needs (97.22%). The efforts of the policy makers or administrators should be on how to utilize these ICT tools for the betterment of the extension personnel working at the field level. On the basis of these attributes, extension organizations may also consider evolving ICT enabled extension strategies.

The results and discussions pertain to the perceived attributes of ICTs as a technology per se. When we take into consideration different applications, services and other utilities of ICTs, the perception of the respondents would be much more favourable compared to the results obtained in the study.

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