

RESEARCH ARTICLE

Extent of Utilization of ICT Tools Among the Agricultural Line Department Officials of Odisha

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ABSTRACT

Information and communication technology (ICT) can be thought of as a collection of technologies that include a variety of tools for storing, disseminating, or both. Since technology is currently undergoing its full transformation, ICT tools will be crucial in agriculture and related sectors. The goal of this study was to determine how extensively Odisha's agriculture line department employees used ICT technologies in 2021. Khordha District in Odisha State was selected for the study on purpose. Following a simple random sampling method, 105 agricultural authorities were chosen as respondents for the current study. Descriptive statistics, mean, standard deviation, weighted mean scores, and Pearson's coefficient of correlation were used for analysing the collected data. The findings showed that the dependent variable extent of utilization of ICT tools was negatively correlated with the independent variables age, service experience, and cadre. In contrast, the dependent variable extent of utilization of ICT tools was positively correlated with the independent variables' availability, accessibility, control over and skill in using the tools. To rank the barriers to using ICT tools, the Garrett ranking approach was utilized. The findings showed that among agricultural authorities, poor training on ICT tools (74.9%) was the primary obstacle to their use, followed by a lack of handling skills for ICT equipment (73.0%) and a lack of awareness (70.8%). Constraints in the handling of ICT tools can be alleviated by guaranteeing uninterrupted electricity in the workplaces, maintaining ICT equipment properly, and offering training and information on ICT tools. **Key words :** Information and Communication Technology; ICT tools; Extent of utilization; Agricultural line department officials.

Sustainable agri-food system is a knowledge-intensive system require a new kind of knowledge. It is well understood that moving towards sustainability in agriculture call for innovative solutions and appropriate technology such as ICT (Bello and Aderbigbe, 2014). It hold the potential to contribute to sustainability transitions in agriculture due to their disruptive potential and have well established history of being utilized to enhance resource efficiency and productivity within food system. The food system can be enhanced either through farm typology designing (Kaur et al., 2021), for bigger or small farm as well as growing of food crop or vegetables in round year concept (Noopur et al., 2021a) despite constraints being faced by the growers or farmers and extension officers (Sharma et al., 2007a). Hence opinion of the farmers and officers is a must (Sharma et al., 2007b)

for sustainable agri-food system and bringing change in cropping system for food system productivity (Chauhan et al., 2009) and farmers preference to select the available technology (Noopur et al., 2021b). The technologies included in ICTs, such as the internet connections, desktop and laptop computers, software, and peripherals, are designed to be successful in the information processing and communication functions. Additionally, it includes a wide range of applied and improved Internet-era technologies as well as other pre-existing traditional aids including radios, landline telephones, televisions, and satellites. The distribution of standards, norms, procedures, and tools, as well as the growth of institutional and human capacities, as well as governmental assistance, are the essential elements of e-agriculture.

The issues in the agriculture sector, such as pest and

disease outbreaks, protracted droughts, seasonality and spatial dispersion of farming, information asymmetry, and high transaction costs, may be identified and addressed through the practical application of ICTs (Anh *et al.*, 2019). According to Purnomo and Lee (2010), the use of ICT along the agricultural value chain (from farm to fork) may open up a number of opportunities for chain participants to obtain timely, accurate, and relevant information. This will not only increase profitability but also improve food security, remunerative agriculture, sustainable agriculture and farming systems (Panwar *et al.*, 2019). Additionally, there is a chance that ICT will amplify issues with land registration, value, and taxation that are faced by farmers, governments, and other land users.

Worldwide, a number of ICT tools and programs are in use to improve communication between extension personnel and other players in the agriculture value chain as well as growers. Workers in extension are required to provide farmers with agricultural information on pests, diseases, weather, marketing, product availability etc. The communication gap between extension, research, and farmers can be filled through ICTs. Although extension workers possess the necessary abilities and capabilities, they nevertheless need a more effective method of obtaining and disseminating information to related fields. In order to effectively disseminate and transmit innovations and technology for agricultural growth, it is crucial in the current situation to investigate the degree of ICT tool usage among agricultural line department employees.

METHODOLOGY

All officials from the agricultural line department were included in the study from Khordha district of Odisha State (India). The study employed an ex-post facto research design. Khordha district in Odisha State was chosen in particular for the study because it has the highest percentage of agriculture line department officials in the entire state. A total of 105 respondents were selected using a simple random sampling method. With the aid of Google forms and followed by in-person meetings, a pretested structured interview schedule was created for gathering the data from the agricultural line department personnel. Journals, theses, the internet, and official records collected from the agricultural department were merged to create a secondary source of data. Age, gender, education, service duration, cadre, tool availability, tool accessibility, tool control, and

tool use skills were chosen as independent variables, and the extent of utilization of ICT tools was chosen as the dependent variable. Using grapesAgri1 (Gopinath *et al.*, 2021) in R Studio 4.3.1 software, the data were analysed using statistical methods like frequency, percentage, mean, standard deviation, weighted mean scores, and Pearson's coefficient of correlation.

Extent of utilization of the ICT tools by the respondents was measured on the basis of frequency of use and it was recorded and measured on a five-point scale continuum as Daily, Weekly, Monthly, Occasionally and Never with scores of 5, 4, 3, 2 and 1 respectively. The agricultural line department officials were ranked on the basis of extent of utilization of ICT tools by calculating Weighted Mean Scores (WMS) using the formula:

$$x = \frac{\sum_{i=1}^n (x_i * w_i)}{\sum_{i=1}^n w_i}$$

Where,

x_i = Observed values

w_i = Allocated weighted value

The data were statistically analysed, and the Garrett ranking approach (Garrett and Woodworth, 1969) was used to determine the restrictions on the use of ICT technologies using the formula:

$$\text{Percentage position} = 100 (R_{ij} - 0.5) / N_j$$

Where,

R_{ij} = The i th variable's rank as determined by the j^{th} responders

N_j = The number of variables that j th respondents ranked

Suggestions by the respondents for the effective utilization of ICT tools was also analysed using descriptive statistics (frequency and percentage) and rank order analysis.

RESULTS AND DISCUSSION

Profile of the respondents: It was revealed in the study that that greater part of the respondents are youth under 18-30 years of age (48.57%) followed by middle aged of 31-50 years of age (46.67%), while above 51 years of age were only 4.76% (Table 1). Among the respondents majority (51.53%) of the respondents were female. It was found that the majority of respondents (56.19%) had 1-10 years of experience in service, followed by those with 11-20 years (38.1%) and 21-35 years (5.71%). Among the agricultural line department officials majority (67.62%) of the respondents had completed graduation followed by post-graduation (16.19%), intermediate (7.62%), and Doctor of philosophy (4.76%) and it is also found that only a few

Table 1. Profile of the agricultural line department officials (N=105)

Category	No.	%	
Age			
			Range=18-60
Youth (18-30)	51	48.57	Mean=33.09
Middle aged (31-50)	49	46.67	SD=9.19
Old/senior (above 50)	5	4.76	CV=27.77%
Gender			
			Range=1-2
Male	51	48.57	Mean=1.51
Female	54	51.53	SD=0.50
			CV=33.11%
Experience in service			
			Range=1-35
1-10 years	59	56.19	Mean=10.05
11-20 years	40	38.1	SD=7.75
21-35 years	6	5.71	CV=77.11%
Education			
			Range=1-5
Matriculate	4	3.81	Mean=3.10
Intermediate	8	7.62	SD=0.76
Graduation	71	67.62	CV=24.51%
Post graduation	17	16.19	
Doctor of philosophy	5	4.76	
Cadre			
			Range=1-3
District level	22	20.95	Mean=1.98
Block level	59	56.19	SD=0.66
Village level	24	22.86	CV=33.33%
Availability of tools			
			Range=31-42
Low (<31.67)	22	20.95	Mean=36.50
Medium (31.67-41.33)	73	69.52	SD=4.83
High (> 41.33)	10	9.52	CV=13.23%
Accessibility of tools			
			Range=31-42
Low (<31.26)	24	22.86	Mean=36.34
Medium (31.26-41.42)	69	65.71	SD=5.08
High (> 41.42)	12	11.43	CV=13.98%
Control over the tools			
			Range=30-42
Low (<30.92)	28	26.67	Mean=36.03
Medium (30.92-41.14)	64	60.95	SD=5.11
High (> 41.14)	13	12.38	CV=14.18%
Skill in using the tools			
			Range=32-43
Low (<32.37)	24	22.86	Mean=37.61
Medium (32.37-42.85)	68	64.76	SD=5.24
High (> 42.85)	13	12.38	CV=13.93%

(3.81%) agricultural officials had only matriculate education. Majority (56.19%) of the officials were coming under block level followed by village level (22.86%) and district level (20.95%). The results indicate that the respondents had a medium availability and accessibility of ICT tools and also found that majority (64.76%) of the officials had a medium skill in using the ICT tools and majority (60.95%) of the officials coming under the medium category of control over the ICT tools.

The correlation coefficient (r) of extent of utilization of ICT tools of agricultural officials with nine

independent variables revealed that the independent variables age (X_1), experience in service (X_4) and cadre (X_5) were negatively and significantly correlated and gender (X_2) and education (X_3) were negatively and non-significantly correlated with the dependent variable extent of utilization of ICT tools (Table 2). The independent variables availability of tools (X_6), accessibility of tools (X_7), control over the tools (X_8) and skill in using the tools (X_9) were positively and significantly correlated with the dependent variable.

The independent variable age (X_1) was negatively and significantly correlated with the dependent variable extent of utilization of ICT tools among the agricultural officials. In the present study 48.57 per cent of officials using the ICT tools are under 18-30 years of age indicated that utilization of ICT tools are high among the young officials compared to old aged officials. The identical findings were obtained in the study by Kafura *et al.* (2016) on the usage of ICT as a tool for extension by the farmers in Bangladesh's Gazipur area. The independent variable gender (X_2) was negatively associated with the extent of utilization of ICT tools of agricultural officials. It is found that gender is not having any role in the utilization of ICT tools. The education (X_3) was positively associated with the dependent variable extent of utilization of ICT tools. It is found that higher the educational level, higher the opportunity and skills of using ICT tools. This might have been the reason for the positive correlation of education with the dependent variable extent of utilization of ICT tools. The study by Prasad and Pradhan (2019), which explored the degree of ICT usage among farmers for agricultural sustainability in the Sub-Himalayan region, reported findings remarkably similar to these.

Table 2. Correlation coefficient of extent of utilization of ICT tools of agricultural officials (N=105)

Variables	(r)
Age (X_1)	-0.2*
Gender (X_2)	-0.003
Education (X_3)	0.12
Service experience (X_4)	-0.305**
Cadre (X_5)	-0.348***
Availability of ICT tools (X_6)	0.879***
Accessibility of ICT tools (X_7)	0.862***
Control over the tools (X_8)	0.849***
Skill in using the tools (X_9)	0.934***

*** Correlation is significant at 0.001 level (two tailed)

** Correlation is significant at 0.01 level (two tailed)

* Correlation is significant at 0.05 level (two tailed)

Table 3. Extent of utilization of ICT tools by the agricultural officials (N=105)

Category	Daily	Weekly	Monthly	Occasionally	Never	Wms	Rank
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)		
<i>Computer related</i>							
Microsoft package	70 (66.67)	11 (10.48)	0 (0.0)	2 (1.90)	22 (20.95)	4.00	VIII
Laptop	81 (77.14)	0 (0.0)	0 (0.0)	6 (5.71)	19 (18.09)	4.13	VI
USB	14 (13.33)	18 (17.14)	13 (12.38)	40 (38.09)	20 (19.05)	2.68	XII
Fax	6 (5.71)	5 (4.76)	9 (8.57)	17 (16.19)	68 (64.76)	1.70	XIII
<i>Internet related</i>							
Internet services	74 (70.48)	16 (15.24)	4 (3.81)	3 (2.86)	8 (7.62)	4.38	IV
Social media	87 (82.86)	8 (7.62)	0 (0.0)	3 (2.86)	7 (6.67)	4.57	III
E-mail	43 (40.96)	38 (36.19)	0 (0.0)	3 (2.86)	21 (20.0)	3.75	IX
Web based search engines	71 (67.62)	21 (20.0)	0 (0.0)	3 (2.86)	10 (9.52)	4.33	V
<i>Audio related</i>							
Mobile phone	105 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5.00	I
Landline phone	21 (20.0)	24 (22.86)	5 (4.76)	29 (27.62)	26 (24.76)	2.86	XI
Headphone	77 (73.33)	2 (1.90)	0 (0.0)	14 (13.33)	12 (11.43)	4.12	VII
Radio	3 (2.86)	5 (4.76)	0 (0.0)	34 (32.38)	63 (60.0)	1.58	XIV
<i>Audio-visual related</i>							
Television	93 (88.57)	9 (8.57)	0 (0.0)	3 (2.86)	0 (0.0)	4.83	II
Video conferencing	12 (11.43)	61 (58.09)	7 (6.67)	20 (19.05)	5 (4.76)	3.52	X

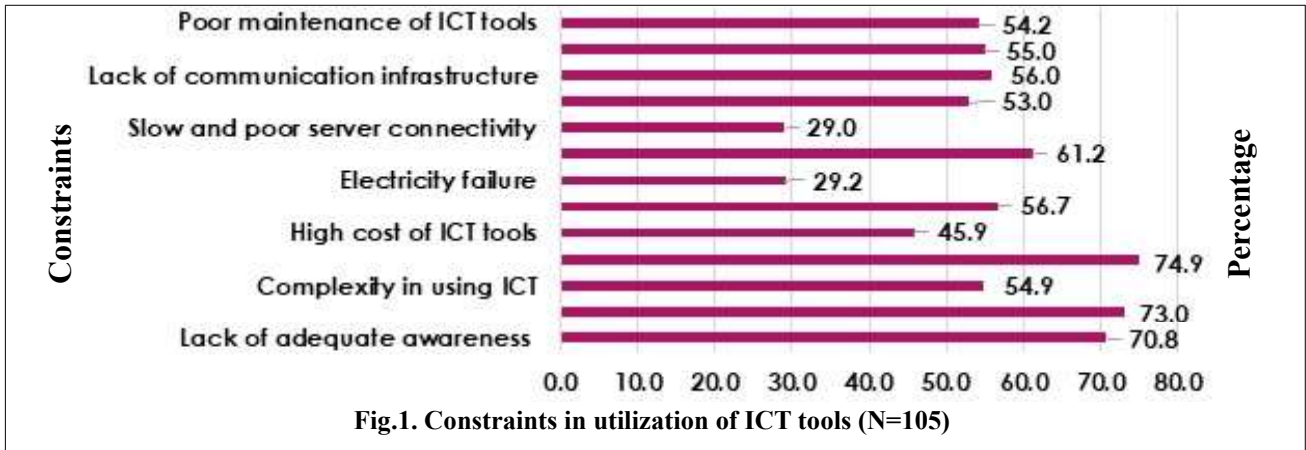
The service experience (X_4) was negatively and significantly correlated with the extent of utilization of ICT tools. It was found that the use of ICT tools was higher in the officials of 1-10 years' experience in service. It was also reported that the officials with more experience were traditional and the extent of use of ICT tools were less. Similar results were reported in the study of *Jha et al. (2021)* for the assessment of utilization pattern of ICT tools among farm women in Uttarakhand. The cadre (X_5) was negatively and significantly related with the utilization of ICT tools. The results showed that the extent of use of ICT tools were higher among the district and block level officials when compared to the village level officials.

The availability of ICT tools (X_6) was positively and significantly correlated with the extent of utilization of ICT tools. The officials with higher availability of ICT tools were found to be having the higher extent of use of ICT tools. The accessibility of ICT tools (X_7) was positively and significantly associated with the extent of utilization of ICT tools. That means the officials with higher accessibility of ICT tools were had higher extent of utilization of ICT tools. And it was also found that mobile phone was the most accessible ICT tool to the agricultural line department officials. Comparable findings were identified by *Malik et al., 2021*. They pictured that all respondents were assumed to have access to a mobile phone, which was ranked first, followed by a mobile camera, a copier, cable or satellite TV, the internet, a computer, e-mail, Wi-Fi,

a printer, a scanner, an LCD projector, broadband, a professional camera, and video software.

The ICT tools (X_8) was positively and significantly allied with the dependent variable extent of utilization of ICT tools indicated that the officials who had the control over the ICT tools were had higher extent of utilization of ICT tools. The skill in using the tools (X_9) was positively and significantly connected with the dependent variable extent of utilization of ICT tools. It can be understood that the officials who had the ability to use one's knowledge about a topic effectively and readily use in execution or performance, that comes from training or practice were having high extent of utilization of ICT tools. Additionally, it may be deduced that officials who attended more trainings used ICT tools to a larger level. Similar findings were reported from the study of *Roy et al. (2018)*.

Extent of utilization of ICT tools: The extent of utilization of ICT tools by the agricultural line department officials. Fourteen ICT tools were categorised into computer related, internet related, audio related and audio-visual related. It can be understood from the Table 3 that, the mobile phone ranked as the ICT tool that agricultural officials utilized the most frequently. The identical outcomes were reported by *Prasad and Pradhan (2019)* and *Kumar et al. (2021)*. The probable reason for the frequent use of mobile phone is the user-friendly nature and the easy availability and accessibility of mobile phone. It can be seen that radio was the least frequently



used ICT tool among the agricultural officials and it ranked fourteenth. All the ICT tools studied are meant for change of perception of mindset of the farmers (Sharma et al., 2014) through extension functionary for sustainable agri-food system.

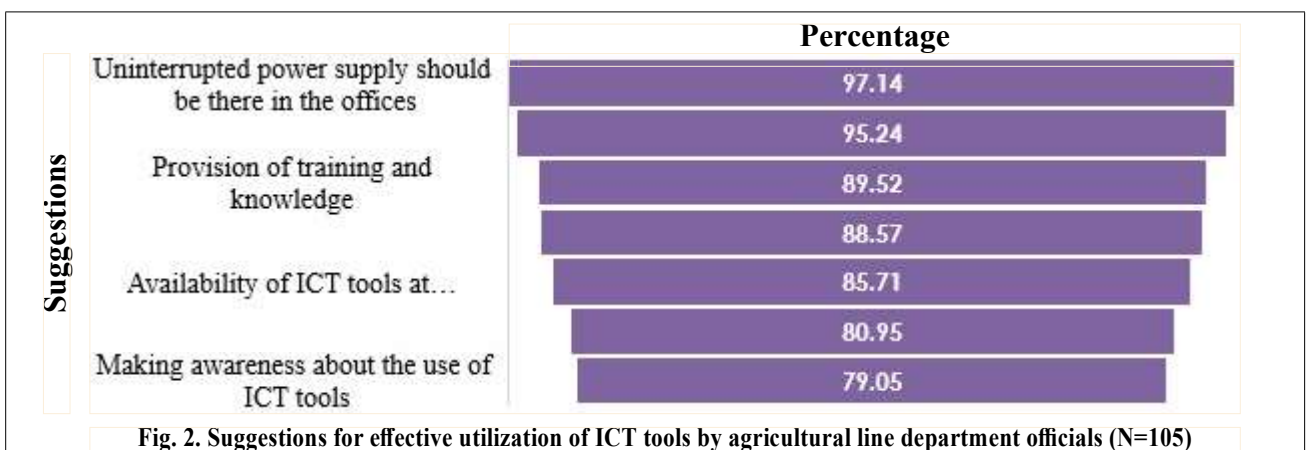
Constraints in utilization of ICT tools: Figure 1 clearly depicted the various restraints faced by the agricultural officials in utilization of ICT tools. Results showed that inadequate training on ICT tools (74.9%) was the top barrier to ICT tool use among agricultural authorities, followed by lack of adequate skills in using ICT facilities (73.0%). Agwu and Ogbonah (2014) reported obtaining comparable results. Similar findings were noted by Dhaka and Chayal (2010). They claimed that inconsistent internet connectivity was one of the main obstacles, followed by the facilitators' lack of subject matter expertise and the insufficient effectiveness of physical facilities like power and internet access in remote areas. These constraints some time are creating hindrance in the food production system necessitating to address the constraints of the farmers (Noopur et al., 2023). Hence addressing the constraints in ICT tools will automatically help in sustainable food production

system through refocusing the concept of knowledge management (Chauhan et al., 2015)

Suggestions for effective utilization of ICT tools: Figure 2 evidently epitomized the various suggestions for the effective utilization of ICT tools opined by the agricultural line department officials. The research results suggested that the limitations on how ICT tools can be used can be overcome by providing training and information about ICT tools, maintaining ICT tools properly, and providing an uninterrupted electrical supply in the offices.

CONCLUSION

ICT tool use is so variegated that it is analogous to a wildfire in its intensity. ICT tools will be crucial to the development of agriculture and related industries because technology is currently undergoing a full transformation. The study found that mobile phones were the ICT tool that agricultural authorities utilized the most since they were so readily available and used by the officials. The survey has also uncovered the barriers to ICT tool usage, The biggest obstacle is a lack of basic expertise in using ICT facilities, which



is followed by poor training on ICT tools. Challenges in the handling of ICT tools can be resolved by ensuring uninterrupted electricity in the workplaces, maintaining ICT equipment properly, and offering training and information on ICT tools.

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