

## **Original Research Article**

# **Availability of Information and Communication Technology among the agricultural line department officials of Odisha**

The agriculture department professionals in Odisha having access to information and communication technology (ICT): a study

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### **ABSTRACT**

The study to determine the availability of Information and Communication Technology among the agricultural line department officials of Odisha was undertaken in Khordha district of Odisha state in the year 2021. For the present study, 105 respondents (22 district level agricultural officials, 59 block level agricultural officials and 24 village level agricultural officials) were selected by following stratified random sampling method. Keeping in view the sampling area, sampling size and the method of data collection ex-post facto research design was used for the study. The data collected was statistically analyzed using frequency, percentage, mean score and mean percentage score. The study revealed that majority of the district level agricultural officials (100%) had the availability of Microsoft package, laptop, internet services, social media, e-mail, web based search engines, modem, mobile phone, headphone, television and video conferencing and the block level agricultural officials (100%) had the availability of Microsoft package, laptop, internet services, social media, e-mail, web based search engines, modem, mobile phone, television and video conferencing whereas the village level agricultural officials (100%) had the availability of only mobile phone and television. Proper awareness, provision of training and knowledge of ICT tools, uninterrupted power supply in the offices and the proper maintenance of ICT tools can rectify the constraints persisting in ICT tools handling.

### **Abstract**

To evaluate the availability of information and communication technology among the agricultural department staff in the year 2021, a study was carried out in the Khordha district of the state of Odisha. The stratified random sample approach was used to choose 105 respondents for the current study, comprising 22 district level, 59 block level and 24 village level agricultural officers. Ex-post facto research design was employed for the study while taking into consideration the sampling method. Using frequency, percentage and mean score. The study found that the majority of the district level officers (100%) had access to a Microsoft package, a laptop, internet services, social media, e-mail, web-based search engines, a modem, a mobile phone, headphones, a television and video conferencing and block level officers (100%) had access to a Microsoft package, a laptop, internet services, social media, e-mail, web-based search engines, a modem, a functioning in the ICT tools can be handled with good awareness and training dependable electricity in the workplaces.

*Keywords: Information and Communication Technology, Availability, Agricultural line department officials, Odisha.*

## **1. INTRODUCTION**

The major objective of the study was to determine the availability of Information and Communication Technologies among the agriculture line department officials of Odisha. Information and communication technology (ICT) can be regarded as a pool of technology comprising of many tools which assist in storage, dealing out of information, or in broadcasting information, or both. The inclusion tools in ICT are technologies such as desktop and laptop computers, software, peripherals and which help in communication of data and dissipating information to a wider audience. The application-level usage of ICT is rapidly enlarging and diversifying. Most recent and emerging technological improvements such as e-agriculture focus on the augmentation of agricultural and rural development through upgraded information and communication processes. To be specific, e-agriculture encompasses a cascade of input process such as conceptualization, design, development, evaluation and application of innovative ways to use ICT in the rural realm, with key attention on agriculture. This new technological revolution resolves and responds to farmers' needs accurately and swiftly when compared to the technology prevailing a decade earlier. Extension workers are mandated to deliver agricultural information to farmers. Extension workers have the skills and the ability, but require a better path to acquire and propagate information. It is believed that ICTs can enhance the effectiveness and efficiency of extension services if the extension workers would accept and use ICTs to improve themselves and farmers.

The study's primary goal was to determine whether the staff of Odisha's agriculture department got access to information and communication technologies. Information and communication technology (ICT) is a vast field of technology that includes a variety of tools for storing, exchanging, transmitting, or both types of information. Technologies including desktop and laptop computers, software, peripherals, and other ICT inclusion tools aid in data exchange and information dissemination to a wider audience. ICT usage at the application level is expanding and diversifying quickly. Most recently developed and emerging technologies, including e-agriculture, are geared toward accelerating agricultural and rural development through improved information and communication systems. To be more precise, e-agricultural includes a range of new ways to employ ICT in rural areas, with a focus on agriculture, including conceptualization, design, development, evaluation, and application. When compared to the technologies in use a decade before, this new technological revolution precisely and quickly resolves and addresses the needs of farmers. Farmers must receive agricultural knowledge from extension personnel. Although extension workers have the aptitude, they still need a more effective way to gather and disseminate knowledge. If extension agents adopt and use ICTs to better themselves and farmers, it is thought that ICTs can increase the effectiveness and efficiency of extension services.

## **2. METHODS**

The study included all the agricultural line department officials like District Agriculture Officer (DAO), Assistant Agricultural Officer (AAO), Assistant Horticulture officer (AHO), Village Agricultural Worker (VAW), Women Village Agricultural Worker (WVAW) and Subject Matter Specialists (SMS) from Khordha district of Odisha State. Keeping in view the objectives of the study, sampling area, sampling size and the method of data collection ex-post facto research design was used for the study.

A total of 105 respondents (22 district level agricultural officials, 59 block level agricultural officials and 24 village level agricultural officials) were selected by following stratified random sampling method. An interview schedule was constructed for assembling data from the agricultural line department officials. The secondary source of data was combined from thesis, journals, internet and official records of agriculture department.

The data collected from the sample respondents were coded, analysed and tabulated for comparative study. The statistical tools used for the study includes the various descriptive statistics and ranking. On the basis of average mean scores and mean scores, rank order was considered. The item securing highest average means scores/mean scores was assumed as first rank and then next highest was given second rank and so on.

Mean Score (MS) = Total score assigned by all the respondents to a practice ÷ Total number of respondents

Mean Percentage Score (MPS) = (Total score obtained by the respondents ÷ Maximum obtainable score) x 100

### 3. RESULTS

The data presented in Table 1 depicted that in case of district level agricultural officials Microsoft package, laptop, internet services, social media, e-mail, web-based search engines, modem, mobile phone, head phone, television and video conferencing (MS=3 and MPS=100) were most available among different ICT tools and ranked first and Radio (MS=1.64 and MPS=54.55) was the least available ICT tool and ranked twelfth.

**Table 1. Availability wise distribution of district level agricultural officials**

| SL. NO                    | CATEGORY                 | DISTRICT LEVEL OFFICIALS (n=22) |       |              |       |               |       |      |       |      |
|---------------------------|--------------------------|---------------------------------|-------|--------------|-------|---------------|-------|------|-------|------|
|                           |                          | Regularly                       |       | Occasionally |       | Not available |       | MS   | MPS   | Rank |
|                           |                          | F                               | %     | F            | %     | F             | %     |      |       |      |
| <b>A Computer related</b> |                          |                                 |       |              |       |               |       |      |       |      |
| 1                         | Microsoft package        | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 2                         | Laptop                   | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 3                         | USB                      | 18                              | 81.82 | 4            | 18.18 | 0             | 0     | 2.82 | 93.94 | II   |
| 4                         | Memory card              | 12                              | 54.55 | 8            | 36.36 | 2             | 9.09  | 2.45 | 81.82 | IV   |
| 5                         | Fax                      | 11                              | 50    | 11           | 50    | 0             | 0     | 2.5  | 83.33 | III  |
| 6                         | Digital camera           | 6                               | 27.27 | 8            | 36.36 | 8             | 36.36 | 1.91 | 63.64 | XI   |
| <b>B Internet related</b> |                          |                                 |       |              |       |               |       |      |       |      |
| 1                         | Internet services        | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 2                         | Social media             | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 3                         | E-mail                   | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 4                         | Web based search engines | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 5                         | Modem                    | 22                              | 100   | 0            | 0     | 0             | 0     | 3    | 100   | I    |
| 6                         | e-journals               | 8                               | 36.36 | 10           | 45.45 | 4             | 18.18 | 2.18 | 72.73 | VII  |

**C Audio related**

|   |                |    |       |    |       |    |       |      |       |     |
|---|----------------|----|-------|----|-------|----|-------|------|-------|-----|
| 1 | Mobile phone   | 22 | 100   | 0  | 0     | 0  | 0     | 3    | 100   | I   |
| 2 | Microphone     | 6  | 27.27 | 10 | 45.45 | 6  | 27.27 | 2    | 66.67 | X   |
| 3 | Landline phone | 10 | 45.45 | 8  | 36.36 | 4  | 18.18 | 2.27 | 75.76 | VI  |
| 4 | Bluetooth      | 12 | 54.55 | 6  | 27.27 | 4  | 18.18 | 2.36 | 78.79 | V   |
| 5 | Headphone      | 22 | 100   | 0  | 0     | 0  | 0     | 3    | 100   | I   |
| 6 | Radio          | 4  | 18.18 | 6  | 27.27 | 12 | 54.55 | 1.64 | 54.55 | XII |

**D Audio-visual related**

|   |                    |    |       |   |       |    |       |      |       |      |
|---|--------------------|----|-------|---|-------|----|-------|------|-------|------|
| 1 | Television         | 22 | 100   | 0 | 0     | 0  | 0     | 3    | 100   | I    |
| 2 | Video conferencing | 22 | 100   | 0 | 0     | 0  | 0     | 3    | 100   | I    |
| 3 | Tablet device      | 8  | 36.36 | 9 | 40.91 | 5  | 22.73 | 2.14 | 71.21 | VIII |
| 4 | Smart TV           | 20 | 90.91 | 0 | 0     | 2  | 9.09  | 2.82 | 93.94 | II   |
| 5 | DVD player         | 12 | 54.55 | 0 | 0     | 10 | 45.45 | 2.09 | 69.7  | IX   |

\*n=number of respondents

From Table 2, in case of block level agricultural officials Microsoft package, laptop, internet services, social media, e-mail, web-based search engines, modem, mobile phone, television and video conferencing (MS=3 and MPS=100) were most available among different ICT tools and ranked first and Fax (MS=1.15 and MPS=38.42) was the least available ICT tool and ranked fourteenth.

Table 3 indicated the availability of ICT tools by the village level agricultural officials. Mobile phone and television (MS=3 and MPS=100) were most available and Fax (MS=1 and MPS=33.33) was the least available among different ICT tools and ranked first and seventeenth respectively.

**Table 2. Availability wise distribution of block level agricultural officials**

| SL. NO                    | CATEGORY          | BLOCK LEVEL OFFICIALS (n=59) |       |                  |       |                  |       |      |       | Rank |
|---------------------------|-------------------|------------------------------|-------|------------------|-------|------------------|-------|------|-------|------|
|                           |                   | Regularly                    |       | Occasionall<br>y |       | Not<br>available |       | MS   | MPS   |      |
|                           |                   | F                            | %     | F                | %     | F                | %     |      |       |      |
| <b>A Computer related</b> |                   |                              |       |                  |       |                  |       |      |       |      |
| 1                         | Microsoft package | 59                           | 100   | 0                | 0     | 0                | 0     | 3    | 100   | I    |
| 2                         | Laptop            | 59                           | 100   | 0                | 0     | 0                | 0     | 3    | 100   | I    |
| 3                         | USB               | 31                           | 52.54 | 28               | 47.46 | 0                | 0     | 2.53 | 84.18 | III  |
| 4                         | Memory card       | 25                           | 42.37 | 23               | 38.98 | 11               | 18.64 | 2.24 | 74.58 | V    |
| 5                         | Fax               | 0                            | 0     | 9                | 15.25 | 50               | 84.75 | 1.15 | 38.42 | XIV  |
| 6                         | Digital camera    | 5                            | 8.47  | 20               | 33.9  | 34               | 57.63 | 1.51 | 50.28 | XII  |
| <b>B Internet related</b> |                   |                              |       |                  |       |                  |       |      |       |      |
| 1                         | Internet services | 59                           | 100   | 0                | 0     | 0                | 0     | 3    | 100   | I    |
| 2                         | Social media      | 59                           | 100   | 0                | 0     | 0                | 0     | 3    | 100   | I    |
| 3                         | E-mail            | 59                           | 100   | 0                | 0     | 0                | 0     | 3    | 100   | I    |
| 4                         | Web based         | 59                           | 100   | 0                | 0     | 0                | 0     | 3    | 100   | I    |



|                               |                          |    |       |   |       |    |       |      |       |      |
|-------------------------------|--------------------------|----|-------|---|-------|----|-------|------|-------|------|
| 1                             | Internet services        | 6  | 25    | 9 | 37.5  | 9  | 37.5  | 1.88 | 62.5  | VIII |
| 2                             | Social media             | 18 | 75    | 0 | 0     | 6  | 25    | 2.5  | 83.33 | III  |
| 3                             | E-mail                   | 6  | 25    | 0 | 0     | 18 | 75    | 1.5  | 50    | XI   |
| 4                             | Web based search engines | 18 | 75    | 0 | 0     | 6  | 25    | 2.5  | 83.33 | III  |
| 5                             | Modem                    | 2  | 8.33  | 4 | 16.67 | 18 | 75    | 1.33 | 44.44 | XII  |
| 6                             | e-journals               | 0  | 0     | 2 | 8.33  | 22 | 91.67 | 1.08 | 36.11 | XVI  |
| <b>C Audio related</b>        |                          |    |       |   |       |    |       |      |       |      |
| 1                             | Mobile phone             | 24 | 100   | 0 | 0     | 0  | 0     | 3    | 100   | I    |
| 2                             | Microphone               | 0  | 0     | 4 | 16.67 | 20 | 83.33 | 1.17 | 38.89 | XV   |
| 3                             | Landline phone           | 14 | 58.33 | 4 | 16.67 | 6  | 25    | 2.33 | 77.78 | IV   |
| 4                             | Bluetooth                | 4  | 16.67 | 0 | 0     | 20 | 83.33 | 1.33 | 44.44 | XII  |
| 5                             | Headphone                | 20 | 83.33 | 0 | 0     | 4  | 16.67 | 2.67 | 88.89 | II   |
| 6                             | Radio                    | 12 | 50    | 4 | 16.67 | 8  | 33.33 | 2.17 | 72.22 | VI   |
| <b>D Audio-visual related</b> |                          |    |       |   |       |    |       |      |       |      |
| 1                             | Television               | 24 | 100   | 0 | 0     | 0  | 0     | 3    | 100   | I    |
| 2                             | Video conferencing       | 13 | 54.17 | 5 | 20.83 | 6  | 25    | 2.29 | 76.39 | V    |
| 3                             | Tablet device            | 3  | 12.5  | 0 | 0     | 21 | 87.5  | 1.25 | 41.67 | XIV  |
| 4                             | Smart TV                 | 9  | 37.5  | 0 | 0     | 15 | 62.5  | 1.75 | 58.33 | X    |
| 5                             | DVD player               | 6  | 25    | 7 | 29.17 | 11 | 45.83 | 1.79 | 59.72 | IX   |

\*n=number of respondents

## Discussion

The current study was revealed that Wolfert *et al.*, (2017) [1] noticed the advancement of technology *via* digital platforms such as e-commerce, computational power, agro-advisory apps, big data and satellite systems like remote sensing, quicken the information sharing and communication among farmers.

According to the review of the current study by Wolfert *et al.* (2017) [1], the development of technology through digital platforms like e-commerce, computing power, agro-advisory applications, big data, and satellite systems like remote sensing has sped up farmer communication and information sharing. According to an observation made by O'Dea (2020) [2], smartphones are the ICT that are most commonly utilised worldwide. The study also implied that developing nations had the highest proportion of smartphone users globally (O'Dea, 2020) [2]. According to Statista's research from 2020 [3], there are currently over 3.2 billion smartphone users worldwide, and by 2021, that number is expected to grow to about 3.8 billion. Different ICT applications have been developed in the agriculture sector as a result of the rapid growth of ICT applications in many areas of society.

Smartphones are the most widely used ICT across the globe as per the observation recorded by O'Dea (2020) [2]. The research further conveyed that the highest share of smartphone users worldwide was supposedly noticed in developing countries (O'Dea, 2020) [2]. Research conducted by Statista (2020) [3] acclaimed that around 3.2 billion people in the world had the applicability of using smartphones and forecasted that this figure could proliferate to a number of 3.8 billion by 2021. The pace at which ICT applications are growing in every sector of the world has triggered the development of different ICT applications in the agriculture sector.

Globally, extension services revolve around dissemination of agricultural information, knowledge and new technologies to farmers and people exercising rural livelihood. According to the International Food Policy Research Institute (IFPRI), agricultural advisory services (in short, agricultural extension) enact a crucial role in promoting productivity, enhancing food security, improving and improvising rural livelihoods, and uplifting agriculture as a pro-poor economic growth engine (IFPRI, 2020) [4]. The extension services articulate new ideas and technologies to rural inhabitants with the help of different methods and approaches. The main reason for introducing these different approaches is to help farmers understand the information and method demonstrated to them by the agricultural extension officers. In doing so, they espouse new technologies to improve their livelihoods and become resilient to challenges arising in their farming activities. Agricultural extension services can be a powerful tool in helping smallholders breach the chain of low productivity, vulnerability, and poverty as emphasized by Davis and Franzel (2018) [5]. The extension services uphold a better position for providing farmers with knowledge and tools about modern agricultural practices, greater access to finance, and market solutions. Extension and advisory services are vital to enhancement of rural and subsistence farmers which are regarded as the central pillar of agriculture and food supply chains in low-income countries (Francis, 2014) [6]. Usage of multidisciplinary tool such as educational methodologies, communication and group techniques by the extension services play a crucial role in promoting new technologies, communicating information and sharing knowledge among rural dwellers and farmers (Sousa *et al.*, 2016) [7]. ICTs have the potential to minimise the gap between extension and research to farmers. Globally, there are numerous ICT applications and programmes that are active and have been devised to improve communication among extension workers and other parties within the agriculture value chain. In Afghanistan, an ICT application platform called 'e-Afghan' (Bell, 2013) [8] has been formulated to connect farmers to extension workers, research institutions and other parties that avail and help farmers in Afghanistan to share credible information. In the same way, Digital Green in Ethiopia has forged an ICT agricultural advisory services platform known as

FarmStack that blend farm-level data, input availability, local weather market information as well as linking extension system actors and information (Digital Green, 2019) [9]. Similarly, in Jamaica, the Lifelong Learning for Farmers program have developed an SMS interactive service to proffer rural farmers with information and knowledge on good agricultural practices (K'adamawe, 2012) [10]. Lastly, i-Shamba (a phone-based farmer club) has been set in motion in Kenya. The new technology has backed up a call centre, where agricultural extension experts and researchers extend technical assistance to subscribers through voice call or SMS on issues related to weather, inputs, good agricultural practices and market information (Tsan *et al.*, 2019) [11].

#### 4. CONCLUSION

The study has revealed the fact that district level and block level agricultural officials had much more accessibility and availability to almost all the ICT tools, whereas the village level agricultural officials had comparatively limited accessibility and availability of most of the ICT tools. ICT tools are concurrently changing the overall outlook in enhancement of the agricultural and allied sector. But some constraints lie within the ICT tools usage which can be rectified and further move ahead. The following are the recommendations for rectifying the constraints persisting in ICT tools handling:

According to the study, agricultural authorities at the district and block levels had substantially greater access to and availability of practically all ICT tools, but agricultural officials at the village level had relatively restricted access to and availability of most ICT resources. ICT tools are simultaneously altering the general perspective for improving the agricultural and related sector. However, there are some limitations in the use of ICT technologies that can be fixed to advance further. The following suggestions are made to address the limitations that still affect how ICT tools are handled:

- Proper knowledge and awareness must be disseminated to all the levels of agricultural officials for the effective utilization of ICT tools.

To effectively use ICT tools, agricultural officials at all levels must receive the proper training and education.

- Proper ICT infrastructure should be there for the effective utilization of ICT tools in Government offices especially at block and village level.

For the successful use of ICT tools in government offices, particularly at the block and village level, there should be a proper ICT infrastructure.

- There should be a regular monetary provision at the Government offices for the maintenance of ICT tools.

At government offices, a consistent financial budget should be set aside for the upkeep of ICT equipment.

- Staffs working at the village level need to be made more skilled for use of ICT tools through frequent trainings.

Through regular trainings, it is necessary to increase the ICT tool use proficiency of staff members working at the village level.

- Village level staffs should be provided with smart phones to work smoothly and more efficiently.

To facilitate smoother and more effective operations, smart phones should be made available to village level workers.

- The Government should ensure to suffice the availability of ICT tools to all levels of agricultural officials at affordable prices.

The government should make sure that there are enough inexpensive ICT tools available to agricultural officials at all levels.

- Allocate sufficient funds and financial support for the procurement and installation of the ICT tools.

Allocate sufficient money and financial support for the ICT instruments' purchase and implementation.

## REFERENCES

1. Wolfert, Sjaak, Ge, Lan, Verdouw, Cor, Bogaardt, MJ. Big Data in Smart Farming – A review. *Agricultural Systems*. 2017;153: 69-80.
2. O'Dea, S. Smartphone users worldwide 2016-2021, Statista online publication;2020.
3. Statista, 2020. Statista Inc. The Statistics Portal;2020.
4. IFPRI. Agricultural extension. Available at: <https://www.ifpri.org/topic/agricultureextension> ;2020. (accessed 07 March 2021).
5. Davis, K., Franzel, S. Extension and Advisory Services in 10 Developing Countries: A Cross-country Analysis. Developing Local Extension Capacity (DLEC) Project. The US government's global hunger and food security initiatives; 2018.
6. Francis, J. Modern ICTs and rural extension: Have we reached the tipping point? Rural21 publication. Frankfurt, Germany; 2014.
7. Sousa, F., Nicolay, G., Home, R. Information technologies as a tool for agricultural extension and farmer-to-farmer exchange: Mobile-phone video use in Mali and Burkina Faso, *IJEDICT*. 2016; 12 (3): 19–36.
8. Bell, M. e-Afghan Ag. Content is just part of the story. Presentation at CTA's ICT4Ag International Conference, Kigali, Rwanda, November 2013.
9. Digital Green. Farm stack. A digital green web publication. Available at: <https://www.digitalgreen.org/farmstack/> ; 2019. (accessed March 2021).
10. K'adamawe, K. Evaluation of RADA Text Messages on Agricultural Disaster Risk Management (ADRM). Report. Youth Crime Watch/Office of Social Entrepreneurship, University of the West Indies, Jamaica. 2012.

11. Tsan, M., Totapally, S., Hailu, M., Addom. B. The Digitalisation of African Agriculture Report, Technical Centre for Agricultural and Rural Cooperation (CTA) publication. Wageningen, Netherlands; 2019.

12. Agwu, EA. and Elizabeth, EO. Access and Use of Information Communication Technologies by Women Staff of Public Extension Service in the North Central Zone of Nigeria, Agricultural Information Worldwide. 2013; 6 (1): 18-24.

### **ABBREVIATIONS**

ICT- Information and Communication Technology

DAO-District Agriculture Officer

AAO-Assistant Agricultural Officer

AHO-Assistant Horticulture officer

VAW-Village Agricultural Worker

WVAW-Women Village Agricultural Worker

SMS-Subject Matter Specialists

UNDER PEER REVIEW