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# Role of Information and Communication Technologies in Knowledge Management

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**ABSTRACT:** The integration of Information and Communication Technologies (ICTs) in Knowledge Management (KM) has transformed agricultural practices and rural livelihoods, particularly in developing countries like India. The many ways that ICTs can improve knowledge creation, storage, distribution, and use throughout the agricultural value chain are examined in this paper. By giving farmers rapid access to information on crop practices, weather forecasts, market prices, and pest control, ICT tools including mobile phones, the internet, radio, and digital platforms empower farmers. In order to close knowledge gaps and promote participatory development, the article outlines government and non-government efforts such as e-Choupal, Kisan Call Centers, and Digital Green. This essay focuses on students' knowledge of the value of ICT resources in the classroom, including YouTube, WhatsApp, Research Scholar, and others. Despite its potential, the report also discusses current issues such low digital literacy, poor rural connectivity, and a dearth of regionally relevant material. In order to create a more resilient and information-driven agricultural industry, the assessment ends with strategic recommendations for enhancing ICT infrastructure, encouraging public-private partnerships, and incorporating indigenous knowledge systems.

**Key words:** Knowledge Management (KM), Information and Communication Technologies (ICTs)

## I. INTRODUCTION

**Need of knowledge management**

The set of techniques for producing, disseminating, utilizing, and maintaining an organization's knowledge and information is known as knowledge management, or KM. It describes a multidisciplinary strategy to maximize knowledge utilization in order to accomplish organizational goals (Anonymous). The notion that knowledge is a useful resource that can be used to the advantage of communities and organizations is the foundation of the knowledge management (KM) concept. In order to promote learning, creativity, and teamwork, KM entails the methodical and deliberate management of knowledge resources (Gonzalez 2017).

- ✓ Speed up access to information and knowledge
- ✓ Improve decision-making processes
- ✓ Promote innovation and cultural change
- ✓ Improve the efficiency of an organization's operating units

**Process of knowledge management**

The knowledge management process involves following stages:

- Knowledge Generation/ creation
- Knowledge Storage
- Knowledge Dissemination
- Knowledge utilization

**1. Knowledge management in agriculture**

Knowledge management in agriculture (KMA) is the methodical creation, preservation, sharing, and application of knowledge to deal with current and new agricultural issues. Knowledge, which is acknowledged as the fourth factor of production after land, labor, and capital, is essential to increasing farmers' income and productivity (AFAAS 2011; Das 2022). KM presents particular difficulties in India because of the country's sizable population of small and marginal farmers, the majority of whom lack access to contemporary technology (Yadav 2015).

**1.1 Knowledge Generation in agriculture**: Scientific research from institutions (SAUs, ICAR, etc.) and traditional farmer knowledge are key

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sources. This diverse information needs integration for specific agricultural domains.

**1.2 Knowledge Storage in agriculture**: Agricultural data is preserved in repositories like *Agropedia*, *Eprints@IARI*, and *ERepository@IIHR*. These platforms store content in various formats (digital, multimedia) and languages for easy access (Das 2022).

**1.3 Knowledge Dissemination in agriculture**: Information is spread through mass media (TV, radio), internet platforms, field demonstrations, and expert systems like *EXOWHEM* and *RiceCrop Doctor*, which support extension workers and farmers in decision-making (Kukreja 2013).

**1.4 Utilization of knowledge in agriculture:** The most farmers applied the knowledge which was obtained from various applications, farm communities and other organizations, in their farming systems. Crop production and productivity may be increased by using the knowledge (Vangala 2015).

## II. Review

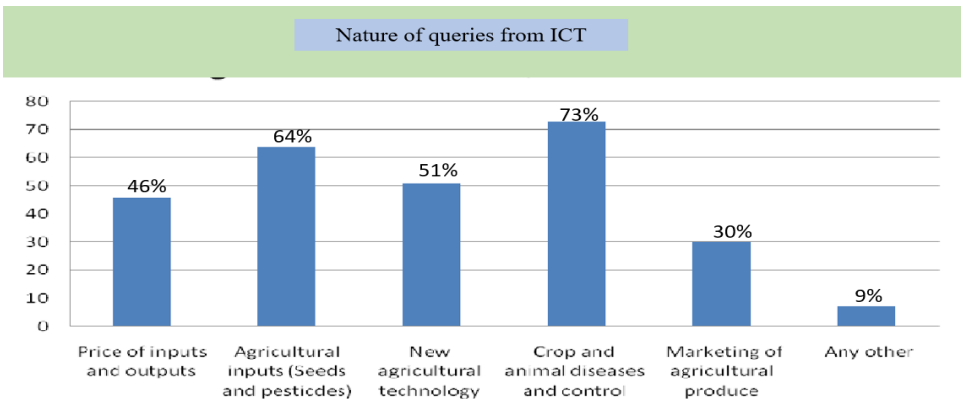
**Singh S, 2021** According to Singh S the videos can be used as an effective medium of transferring agricultural information and encouraging knowledge of recommended technologies among the farming communities.

**Schar M F, 2019** According to Schar the 87.50 percent of the farmers were satisfied in assessing information from whatsapp, PAU farmer portal, Facebook, YouTube.

**Singh G, 2017** According to Singh G the 41.00 per cent of farmers adopted recommended practices of soil testing, 33 per cent of respondents adopt leaf colour chart and about half of the respondents adopt the seed treatment practices after watching the videos.

## III.Role of ICT in livelihood in Haryana

It was discovered that the types of questions being posed via the lifelines technology were highly diverse. The majority of the inquiries (73 farmers) concerned the management of agricultural and animal illnesses. The farmers recommended that the questions on disease control be addressed within four to five hours because they require an urgent remedy. 51 users inquired about the availability of new agricultural technology, while roughly 64 farmers asked questions concerning the use of agricultural inputs like seeds and pesticides. Surprisingly, very few questions concerned the commercialization of the agricultural products. The predominance of subsistence farming in the Mewat region may be the cause of this. Positive outcomes are seen in perceptions of the technology's usefulness and desire to keep using it. While over 50% of users thought the technology was extremely helpful for their line of work, over 93% of respondents said they wanted to keep using it. The respondents who did not think the technology was helpful said that they would be encouraged to use it more frequently if the time it took to respond to the questions decreased. Mehta, Pradeep K. (2010)




### 3.1 Distribution of respondents according to their purpose for using ICT

The table illustrates how respondents use different ICT tools for diverse objectives. Mobile phones are the most popular tool, particularly for business (34%), education (22%), entertainment (96%), and agriculture (30%). In addition to helping education (22%), television is mostly used for amusement (100%) and agriculture (30%). Agriculture, health, and social welfare do not use the internet; instead, it is mostly used for education (34%), business (26%), and entertainment (62%). Radio is solely used for pleasure (40%) and agriculture (12%), whereas computers and kiosks are utilized sparingly, mostly for business and

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education. Just 12% of people use email for educational purposes.

Overall, the data indicates that entertainment is the most common purpose for ICT use, with mobile phones and television being the dominant tools. However, there is low ICT usage for health and social welfare, highlighting areas for development and outreach. (Bansal, V., *et al*. 2022)

**Distribution of respondents according to their purpose for using ICT**

| ICT tools | Education (%) | Health (%) | Business (%) | Agriculture (%) | Social welfare (%) | Entertainment (%) |
|---|---|---|---|---|---|---|
| Television | 22 | 4 | 0 | 30 | 0 | 100 |
| Radio | 0 | 0 | 0 | 12 | 0 | 40 |
| Mobile | 22 | 0 | 34 | 30 | 0 | 96 |
| Kiosk/ service centres | 12 | 0 | 4 | 0 | 0 | 0 |
| Computer | 18 | 0 | 20 | 0 | 0 | 14 |
| Internet | 34 | 0 | 26 | 0 | 0 | 62 |
| E-mail | 12 | 0 | 0 | 0 | 0 | 0 |

### 3.2 Types of Channel used by the Farmers for Accessing Agriculture Information

According to the report, 80% of farmers use Short Message Service (SMS) and Multimedia Messaging Service (MMS) services to obtain agricultural information, while 79% use phone calls and 68% use community radios. This is due to the fact that a large number of farmers own mobile phones, making it simple for extension agents and agriculture researchers to contact with farmers via this channel. Due to the existence of community radio in the study's studied area, the study also shows that agricultural information is mostly accessed through community radios (Sanga et al., 2013).

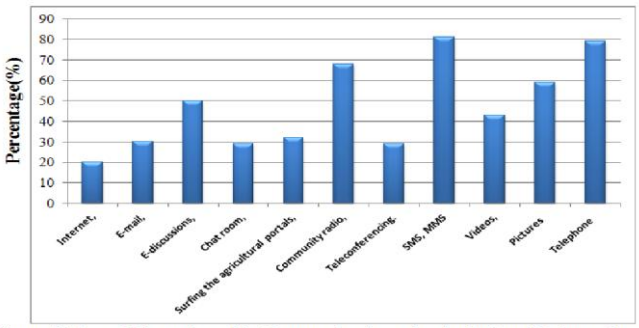


**Figure 5: Type of Channel used by Farmers for Accessing Agricultural Information**

**Case study of FFMA user**

The Fisheries Forecasting and Management App (FFMA) is helping fishermen in Nagapattinam, Tamil Nadu, according to a case study of Mr. Murugan, a fisherman from Nagore Pattinacherry. It describes how the FFMA's GPS capability was effectively used to discover rich fishing zones and to contact for assistance when stranded at sea. He made Rs. 59,000 (€770) in a week thanks to this. (S. Velvizhi et al., 2018)

• More than 8,223 fishermen have received FFMA training.

• The app is frequently used by 3,593 fishermen in Nagapattinam for fishing information and early alerts.

**. 60%** of users rely on the app for real-time fishing and weather alerts.

**64%** of respondents say FFMA reduces risks to their lives and livelihood assets.

**Case Study**

In order to provide IT-based solutions that could boost the production and efficiency of the Indian dairy industry at the local level, Shree Kamdhenu Electronics Private Ltd. (SKEPL) was established in 1996. Under the brand name AKASHGANGA,

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SKEPL offers integrated systems that automate local dairy cooperatives' milk collection procedures. In addition to reducing handling and boosting productivity, the AKASHGANGA system also improves transparency and establishes a foundation for raising the caliber of milk produced.

## IV.ICT in Agricultural Research and Extension:

ICT has a huge impact on agricultural research. Communication and dissemination of research findings are being significantly impacted by the evolving nature of agricultural information systems. The growth of web-based information systems has made it more easier to access databases and information online, which is driving the creation of meta databases. Nnadi (2012).

In this regard, ICAR has established the Directorate of Knowledge Management in Agriculture (DKMA) at its headquarters. Agropedia, the Consortium for eResources in Agriculture (CeRA), E-Granth, and the National Information Systems on Animal Experiments (NISAE) are some of the other initiatives of the Indian National Agricultural Research System (NARS) that make research projects and findings easily accessible, thereby limiting research duplication. ICT makes it possible for the extension worker to get knowledge produced by the researcher more quickly, communicate it to the farmer, and apply it more successfully (Flor, 2002).

Virtual KVK (vKVK) and KVK-Net initiated by ICAR are a means to connect extension scientists and farmers, based on its web platform which hosts information on agriculture and rural livelihood. vKVK makes use of existing vast extension network of Krishi Vigyan Kendras (KVKs) or Farm Science Centres (FSCs) in the country and allows the extension officers to send SMSs and voice-based agro-advisories in local dialect to the farmers‘ mobile phone.

## V.Awareness of Students on the Usefulness of ICT Tools in Education

A questionnaire with 54 ICT-related questions and five open-ended interview questions was used to collect data from 120 participants. According to the analysis, male and female respondents differed significantly in their awareness of the usage of ICT tools; female students were more active in adopting these tools. Additionally, there was a noticeable age difference amongst the pupils, with the younger students using these ICT tools more frequently. (Fatma Tansu and Tochukwu, I.U. 2017)

| Purpose level of using ICT tools in education | For learning | Other purpose |
|---|---|---|
| Use a computer to create or edit audio and video | 46.7% | 53.3% |
| Use a computer to play games | 46.7% | 53.3% |
| Use the web to share photographs or other digital material | 39.2% | 60.8% |
| Use the web/internet to send or receive email | 48.3% | 51.7% |
| Use the web/internet for instant messaging/chat | 44.2% | 55.8% |
| Use social networking software on the web | 44.2% | 55.8% |
| Use the web to download podcasts | 41.7% | 58.3% |
| Use the web to make phone calls | 40.0% | 60.0% |
| Use the web for web conferencing | 46.7% | 53.3% |
| Use the web to contribute to the development of a wiki | 46.7% | 53.3% |
| Use a mobile phone to send or receive email | 48.3% | 51.7% |

## VI.Challenges related to ICT in agricultural knowledge management

ICT initiatives in the public and commercial sectors can spread information for rural development and agriculture, but they are still in their infancy in India and are developing into a new trend. Not every type of farmer is benefiting equally from these initiatives (Barau 2017). Thus, there are still numerous obstacles to overcome in order to capture this knowledge and fully exploit ICT, as will be covered below:

**Urban-Rural Digital Divide:** Rural areas are underserved by internet and telecom access, which is mostly concentrated in urban areas.
**Infrastructure Problems:** The expensive cost of digital equipment and power outages restrict use in remote areas.
**Poor Knowledge Sharing Mechanisms**: Agricultural research is duplicated as a result of inadequate national and regional mechanisms (Rafea 2009).
Language Barriers: Since most research is written in English, local farmers cannot access it without translation.

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**Scientific Validation Problems:** Because of their lack of business opportunities and legitimacy, ICT technologies are frequently left out of mainstream science.

**Uncoordinated ICT Models:** There is no single national integration strategy, and many ICT projects are dispersed, leaving out isolated and impoverished farmers.

**Low Digital Literacy:** Extension agents at the grassroots level frequently lack the ICT expertise required to properly assist farmers.

## VII. Strategies for promoting ICT in agriculture by extension agents

**Government Facilitation:** State and federal governments should spearhead integrated national programs that connect ICT initiatives with all agricultural stakeholders (Mahdi 2016).

**Village-Level ICT Access:** To deliver timely, localized agriculture information, public-private partnerships could support information kiosks (Saroj 2019).

**Consortium Networking:** Establish networks to facilitate the smooth exchange of information between government agencies and agricultural databases.

**Sustainable ICT Governance:** To guarantee long-term continuity even in the face of administrative transfers, institutionalize e-governance approaches.

**Curriculum Upgrade:** Adapt agricultural university curricula to the changing demands of education and ICT.

**Preserve Indigenous Knowledge:** Use digital tools to record and disseminate Indigenous Technical Knowledge (ITKs) in regional languages.

**Building Capacity:** Educate scientists, farmers, and extension agents to promote technology use and enhance digital literacy.

**Use of Edutainment:** Use entertaining content, music, and videos to creatively convey agricultural messages.

## VIII.CONCLUSION

By improving knowledge production, storage, sharing, and usage, ICTs revolutionize agriculture by providing farmers with timely and pertinent information. Mobile phones, radio, and digital platforms (e.g., FFMA, e-Choupal) are examples of tools that help close knowledge gaps and increase productivity. However, obstacles including insufficient digital literacy, inadequate infrastructure, and the digital divide prevent them from reaching their full potential. Stronger ICT infrastructure, inclusive collaborations, digital education, and the preservation of indigenous knowledge are all necessary to address these problems. ICTs ultimately act as accelerators for rural development and sustainable agriculture.

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