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Impact of Digitalization an Agricultural Productivity -With Special Reference to Telangana State

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Abstract

The Indian government is focusing on making the best use of modern technologies to ensure a steady supply of food and boost the productivity of farmers. This paper looks at how different digital services used by farmers affect agricultural output and explores how digital tools are changing farming in India. It also discusses how these technologies can help increase crop yields and improve decisions made at the farm level. The paper is mainly based on an analysis and exploration of data collected through structured forms and surveys from some areas in Telangana state. The study found that farmers are not using many digital services much in their farming activities, and they also have limited knowledge about available information. The paper recommends that policy makers should promote and support the use of digital tools in agriculture to raise food production and move farming towards a more digital approach.

Key Words: Agriculture, Farmers, Digitalisation, Technologies

1.Introduction

In India, high growth in agriculture is important for the overall growth of the economy and also for providing jobs and ensuring food security for the majority of people. While growth has been higher in the past two decades, there has been a lack of inclusive growth focused on agriculture. For true growth that benefits the poor and leads to real development, high agricultural growth and increased income for farmers are essential. Digitization plays a key role in speeding up growth in this sector. In recent years, the increasing use of modern technologies has had a big impact on all areas, including agriculture and related fields. To reach the highest level of agricultural productivity, it is necessary to speed up the sharing of knowledge and reduce the gap in knowledge among farmers. Using digital technology can completely change the farming sector in India and bring benefits to all farmers, including those with small land holdings, marginalized groups, and the poor.

In recent years, India's agriculture sector has seen major technological improvements, leading to a strong push for digitization. This is because the main aim is to increase productivity and ensure sustainability, especially as new challenges arise. Digitization in agriculture means using digital technologies to change and improve farming practices. These technologies include AI, robots, drones, sensors, communication systems, and smart irrigation tools.

Niti Aayog has predicted that AI in agriculture could reach a value of \$2.6 billion by 2025, growing at a rate of 22.5% each year. Today, technology helps farmers grow more by helping them select the best crops, seeds, and farming techniques. "Digital agriculture is a strong tool that can speed up changes in farming and rural areas. It can change farming methods, improve access to markets, and solve long-standing problems in agriculture. We study and develop the use of new digital technologies for small-scale farmers," says Anil Rai (2023). Agriculture has always been important for the development of rural areas, and it remains a top priority for Indian policymakers. In 2020-21, agriculture contributed 20.2% to the gross value added. Digitalization brings a lot of potential for innovation and transformation in India's agriculture. Using digital technology can help increase productivity, reduce waste, increase exports, improve farmers' incomes, and enhance food and nutrition security. It can also help protect the environment and support sustainable development in agriculture. In addition, the rise in internet and mobile phone use in India has affected many areas, including agriculture, education, healthcare, and e-commerce. Therefore, it's clear that Indian agriculture is now ready to fully embrace digital transformation.

2.Literature Review

Pathak & Arya (2023)¹ A comparative analysis of key aspects of several portals and applications found that very few applications were unique, while most others replicated similar features. With greater affordability of digital technologies, aided by rising rural internet penetration and growing investor interest, India's agricultural landscape could become more resilient to climate change, while boosting food security and economic growth.

Saha (2022)² suggests that on a planet with limited resources and a changing climate, it is imperative to produce more food sustainably. Technological processing power and analytical advances offer this possibility. Digitalization of agriculture will certainly address these difficulties. New technologies, advanced sensor capabilities, increased data connectivity and computer-based artificial or augmented intelligence (AI) decision support and self-learning systems will play a key role in the transformation to digital agriculture.

Katekar (2021)³ This paper explores the digitalization of Indian agriculture to create value for the farming community and enhance opportunities to double farmers' income. It highlights the applications of various digital technologies to increase agricultural yield, improve farm-level decision making, maximize resource use efficiency. It is an analytical paper based on a survey of literature and draws on secondary data. The researchers have adopted qualitative research methodology to conduct the study. The paper analyzes the scope of application of advanced digital technologies in agriculture and suggests principles for integrating digital technology into the agri-food system to maximize the impact of digitalization to increase farmers' income.

Beriya Abhishek (2020)⁴ Analyzed the challenges and possibilities of emerging digital agriculture in India. The main objective of this paper is to study how digital agriculture helps in increasing the income of farmers and to examine the challenges faced in digital agriculture. It mentions many applications and portals of digital agriculture. To understand the challenges associated with digital agriculture in India, comparison has been made with the average farms of America, Australia and Europe. We find that low cost of technology, easy to use portable hardware, per capita production, policy support and harnessing the power of farmer collectives are needed for the success of agriculture in India.

Dr. Zearamane (2018)⁵ The study focuses on explaining the concept of digital technology and the growth of Indian agriculture. The paper also analyses the approach adopted by such companies to check how the supply-chain demand will be met in the future. The research paper is based on secondary data and is descriptive and conceptual in nature. The conclusion is that the technology platform can bring the desired results in agriculture such as reduced costs, improved productivity and quality, better prices, reduced risk and ultimately a sustainable ecosystem.

3.Objective of the study

1. To analyze the impact of digitalization on an agricultural productivity in Telangana.

4.Methodology of the study

This study is an exploratory survey that follows a systematic and organized approach to achieve its goals. Both primary and secondary data have been used, but the focus is mainly on primary data. Data was collected through a structured questionnaire in December, 2025. A purposive random sampling method was used to select participants. The total number of farmer respondents is 150, i.e., each district 50 farmers were select, such as Karimnagar 50, Warangal 50 and Nalgonda 50 in three districts in Telangana State.

5.Data analysis and interpretation

Government Initiatives for Digitization of Agricultural Sector:

- **Virtual Agricultural Market:** The Government wants to make a common electronic platform which will allow farmers to sell their produce to buyers, anywhere in the country. The Centre has set aside Rs. 200 crores for the creation of this National Agriculture Market online trading portal. The platform will be launched on April 14 and will tackle the problem of distress selling. It aims to connect 585 and is in the country.
- **Rashtriya Krishi Vikas Yojna:** It is intended to encourage the states to allocate more funds and agriculture and allied sector and to incentivize the states to generate additional growth in agriculture and allied sectors by planning and undertaking appropriate growth- oriented projects.
- **Crop Insurance Scheme:** Government has approved the Pradhan Mantri Fasal Bima Yojana. In this scheme, a premium of 2% of the sum insured will be charged from farmers for all Kharif crops and 1.5% for all Rabi crops. The Government will cover the remaining insurance premium.

- **Prime Minister Krishi Sinchai Yojna:** The Government's also had plans to expand irrigation. In order to reduce dependence on the monsoon, the Government had approved a sum of Rs. 50,000 crore to be spent on setting up irrigation projects in rural areas. The major objective of the Pradhan Mantri Krishi Sinchai Yojana is to achieve convergence of investments in irrigation at the field level.
- **Institutions:** State government's department of agriculture, state agricultural universities, Krishi Vigyan Kendra's, regional research institutes, farmer-producers organizations, corporate/industrial/business houses and multinational companies engaged in manufacturing/production and distribution of farm inputs, farm equipment & machinery, rural financial institutions, insurance companies, among others, have a significant role and added responsibility to contribute their professional knowledge to develop digital ecosystem for agriculture and make available to farmers.
- **Mobile Apps and internet facility to farmers:** the Mobile phone is the preferred delivery medium under Digital India with a focus on m-governance and m-services. The greatest need is to deliver targeted and timely information to farmers based on their needs. The empowerment that comes from providing farmers with informed option is transformational. Mobile devices and the internet facility keep the farmers updated with all the relevant information related to farming. The call centers are also opened to help with the queries of the farmers instantly for the entire year.

Table-1
Demographic profile of the respondents

Variables		KNR	WGL	NLG	Total
Gender	Male	30	30	30	90
	Female	20	20	20	60
	Total	50	50	50	150
Age Group	25 to 45	20	20	20	60
	45 to 55	20	20	20	60
	Above 55	10	10	10	30
	Total	50	50	50	150
Category	General	18	15	16	49
	OBC	17	25	20	62
	SC	13	9	9	31
	ST	2	1	5	8
	Total	50	50	50	150
Ration Card	APL (white card)	13	15	12	40
	BPL (Pink card)	18	18	16	52
	AAY (Red card)	9	8	11	28
	None	10	9	11	30
	Total	50	50	50	150
Use of digital devices	Yes	34	37	35	106
	No	16	13	15	44
	Total	50	50	50	150

Source: Field Study

Table-1 shows that the demographic profile shown in the table above, 50-50 farmer respondents were selected from three districts in Telangana state. There is a total of 150 respondents, which includes 90 male and 60 female farmers. The age of the respondents is divided into three groups. The first group is aged 25 to 45 years, the second group is aged 45 to 55 years, and the third group includes farmers who are above 55 years of age. When looking at the categories, the highest number of respondents belong to the OBC category (62), followed by 49 from the general category, 31 from the CSC category, and 8 from the ST category. Regarding ration cards, 52 respondents have BPL cards (pink cards), 40 have APL cards (white cards), and 28 have AAY cards (red cards). Additionally, 30 respondents do not have any ration card. When it comes to the use of internet-based digital devices or smartphones, out of the 150 respondents, 106 have smartphones or other devices that can access the internet, while 44 do not have such devices. Most of these 44 respondents are above the age of 61 or are female, and they face several challenges such as lack of digital literacy, fear of technology, hesitation, and not owning a smartphone.

Table-2
Use any digital services to know various information

Use any digital services to know various information		KNR	WGL	NLG	Total
To check soil quality & seeds quality	Yes	5	9	7	21
	No	45	41	43	129
	Total	50	50	50	150
Agricultural loans	Yes	11	8	6	25
	No	39	42	44	125
	Total	50	50	50	150
Information related to pesticides & chemical fertilizers	Yes	6	7	4	17
	No	44	43	46	133
	Total	50	50	50	150

Source: Field Study

Table-2 reveals many efforts have been made by both the government and non-government groups to push for digital tools in agriculture. Farmers use internet-connected smartphones and services to get different kinds of agricultural information. In this study, looking at three districts in Telangana, the government has started organizing camps and setting up digital portals and apps in different places to test soil and seed quality. However, out of 150 farmers surveyed, only 21 use these digital services to check soil and seed quality. Farmers also use online services to get information about loans and to collect data from loan providers. About 25 of the surveyed farmers apply for loans using online loan and bank apps. Only 17 of the 150 farmers use digital tools for information on pesticides and chemical fertilizers. Right now, the use of online services for this kind of information is quite low. There is a need to educate farmers and encourage them to adopt digital practices in agriculture.

Table-3**Impact of the use of digital service on the increase in agricultural productivity**

District	Impact of the use of digital service on the increase in agricultural productivity					Total
	Strongly Disagree	Disagree	Moderate	Agree	Strongly Agree	
KNR	12	16	5	4	13	50
WGL	9	14	3	7	17	50
NLG	11	19	2	4	14	50
Total	32	49	10	15	44	150

Source: Field Study

This table-3 shows the use of digital services is affecting agricultural productivity in different districts. Out of 150 respondents, 32 farmers say digital services are helping increase productivity, while 49 disagree. 10 farmers Moderate, 15 have a Agree opinion, and 44 Strongly Agree. In karimnagar district, 12 farmers agree and 16 disagree. In Warangal, 9 agree and 14 disagree. Overall, it seems that digitalization is slowly improving productivity and awareness in the agricultural sector, but its impact is still quite small.

Table-4**Chi-Square Test**

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	3.986a	3	0.163

In the table-4 mentioned above, the researcher examined how the use of smartphones or other internet devices affects agricultural productivity in the farming sector. The results showed that the Pearson chi-square test had an asymptotic significance value of 0.163, which is higher than the commonly accepted threshold of 0.05. Because of this, the null hypothesis was accepted, and the alternative hypothesis was rejected. This means there is no significant link between using internet-based smartphones or other devices in agriculture and improvements in agricultural productivity.

- Among the people selected for the study, there are more male farmers than female farmers. Female farmers don't use smartphones for getting information related to agriculture and aren't aware of such options. Mostly, it's the male farmers who use digital services in the agricultural field.
- In this study, the farmers aged between 21 and 40 use information technology most frequently in the agriculture sector.
- As the age of the respondents increases, the use of digital technology tends to decrease. This might be because of factors like poor digital skills, lack of access to resources, fear of using technology, low literacy levels, and other similar reasons.

- About 70.66 percent of the respondents have access to a smartphone or other device connected to the internet, but they don't know how to use it properly.
- This shows a lack of awareness and training. There is also no information available about different online apps, portals, schemes, and how to use them.
- The low agricultural productivity in eastern Telangana is due to the traditional way of farming, where crops like paddy or wheat are still mainly grown.
- In the past, farmers used traditional methods like radio, newspapers, magazines, and TV to get information.
- However, they couldn't share their farming issues or ask questions. Now, because of digitalization, farmers can get help with their problems anytime and anywhere. The flow of information has become interactive and two-way.

6.Conclusion

The Government of India has promoted digitalization in agriculture through various policies and programs. But despite this, India is still falling behind in using digital technology in the farming sector. Most of the efforts so far have focused on governance and giving farmers information. However, any government project will only work well if farmers and rural people are actively involved. To bring innovation to agriculture, there is a need for accurate and up-to-date data on weather, soil type and quality, market prices, crop varieties, and crop yields. Creating a reliable and centralized digital database would help save time and money. To boost agricultural productivity, policymakers should support the development of digital infrastructure in rural areas, bring new technologies to farmers, and encourage the growth of agri-tech startups in every village council to enhance farming output.

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