Webology (ISSN: 1735-188X)
Volume 18, Number 6, 2021

Role Of Information Technology In The Agricultural Sector With Reference To Rice Cultivation In India

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Abstract

This paper aims to study the role of information technology in the agricultural sector with reference to rice cultivation and rice exports in India. Secondary data has been used from the Government of India publications to analyze the past five years data from 2015-16 to 2019-20. India is a country where more people rely on agriculture for their livelihood but still farmers face lots of challenges and problems. The problems faced by farmers are lack of information, lack of credit facilities, lack of labour and insurance. To overcome these problems, usage of modern methods and techniques is required to improve productivity. Lack of education makes the farmers use traditional methods which increases the cost of production and provides them with less income. The increasing demand for food caused due to the increased population has created a positive pressure on the agricultural sector to produce more yield with the existing conditions. The technology has also paved the way for the growth of agricultural output by implementing latest techniques like artificial intelligence, satellite images for agricultural areas, weather forecast, monitoring soil health and using drones to spray fertilizers for crops. The Government of India along with the World Bank has been taking various measures to provide credit facilities to farmers and provide information on government policies, schemes and market prices.

Keywords: agriculture, rice, export, production, technology.

1. INTRODUCTION

Agriculture is one of the main sources of income to about 50 per cent of India's population. Besides farming people engage in sub-sectors of agriculture like fishing, aquaculture, livestock production, forestry and others. The agriculture sectors accounts holds for about 20 per cent of the economy's gross domestic product according to the 2020 data provided by the government.

Industrialized agriculture and subsistence agriculture are the two types of agriculture. Industrialized agriculture refers to producing more food using machines for the purpose of sale. Chemical fertilizers and pesticides are used to increase the crop cultivation and give more yields. Whereas, subsistence farming is done on a small amount of land enough to feed their own household. Subsistence farming does not rely on chemical fertilizers but relies on natural manure from animals like goats and cows. India is a top producer for some of the agricultural products like spices, milk, and jute and is the second largest producer of sugarcane, rice, cotton and rice. India is a vast county with lots of resources and weather in favour of cultivation. While there are many constraints in the agricultural sector like depending on the monsoon, using traditional methods of cultivation, low investment and low productivity, there still remains a lot of untapped resources in the country which is can be improved by the government by offering subsidies and implementation of new technologies.

The major problems in the agricultural sector are reduced size of land holdings due to infinite sub-division of land holdings, lack of quality seeds, exhaustion of soil quality leading to low productivity, uncertain and unreliable rainfall, inadequate storage facilities, marketing of agricultural products and scarcity of capital to poor farmers. Most of the agricultural households in India are in debt, with more than 50 per cent of outstanding loan taken from banks, co-operative societies and government.

The Government of India has been taking various measures to regulate the institutional credit flow to small and marginal farmers. National bank for agriculture and rural development (NABARD) has been taking measures to provide loan at lower interest rates and offering incentives to farmers for their prompt repayment of the loan. The government of India has also introduced Kisan Credit Card (KCC) scheme for the benefit of farmers to avail agricultural inputs like pesticides and seeds. State Bank of India (SBI) also offers financing for agriculture related works. The bank offers credit through the KCC scheme. The bank also offers loans to purchase tractors, tillers and also provides assistance to cover poultry farming and fisheries. There are also other banks offering crop loan and loan for agriculture related activities like Axis bank, ICICI bank, HDFC bank and other banks.

India produces about four thousand varieties of rice out of the ten thousand varieties found around the world. Rice being the staple food in the southern and eastern parts of India, rice is grown in rain-fed areas that receive heavy rainfall. Basmati rice is one of the four thousand varieties of rice in India. It is a type of aromatic rice which expands in length after cooking. India has around twenty seven varieties of basmati rice. India exports basmati rice to many countries like Saudi Arabia, USA, Kuwait, UAE and Canada.

2. REVIEW OF LITERATURE

Priscilla, Laishram & Balakrishnan, Arsha & Lalrinsangpuii, Lalrinsangpuii & Chauhan, A.K., (2017) analysed the area, production and productivity for foodgrains, milk, egg and meat. Secondary data at all India level was used for 30 years from 1985-1986 to 2014-2015 and was further divided into three decades- Decade I from 1985-1986 to 1994-1995, Decade II from 1995-1996 to 2004-2005 and Decade III from 2005-2006 to 2014-2015. The

study revealed that area contributed to the production and thus suggestions were offered to improve their productivity through technology and other measures like agricultural extension services like offering better information and quality inputs to increase the productivity. **Wagh, Rahul & Dongre, Anil. (2016)** have analysed the current status of agriculture in India and have identified the challenges and role of agriculture in the Indian economy. Secondary data such as weekly and wholesale prices, farm harvest prices, and retail prices of essential commodities have been used for the study. The findings showed that agriculture contribution to the overall gdp has been reduced in recent years. And agriculture contributes to only 10 percent of the overall exports of the country. The study suggests government intervention in agricultural investment to overcome the challenges faced by uncontrollable environmental factors. **Lopamudra Lenka Samantaray (2015)** explored the link between the technological, structural, and institutional policy reforms for the success of sustainable agricultural development. Some of the drawbacks discussed in this study in the farm sector in India are productivity being far less than global standards, decrease in the number of cultivators, poor soil fertility and excess government interventions in domestic and international marketing which actually served as barriers to trade. **Robert E. Evenson, Carl E. Pray, Mark W. Rosegrant (1999)** revealed in their study that when India was more open to foreign technology, private research contributed to 22 percent of productivity growth. **Mason, R. H. P. and Caiger, J. G., (1997)** in their book have said that countries like China, Japan, India and Indonesia emerged as an agrarian economy and then started industrial revolution in the pursuit of economic development. Choudhri H.P., Singh G.P. and Supriya (2019) used primary data from 100 respondents to study the resource use efficient in maize cultivation. The marginal value productivity concluded from the study shows manure and fertilizers and human labour were significant and positive affecting the yield. **Meghwal Pankaj Kumar, et al., (2016)** based on their study, concluded the following problems faced by farmers such as, lack of information, shortage of cultivable land and unpredictable weather, high cost of technology, shortage of labour, poor access to market, lack of finance and insurance. **Upendra, R S & Umesh, I M & Varma, R B & Benchamardimath, Basavaprasad. (2020)** have analyzed the implementation of technology in agriculture. Various applications of technology in agriculture like crop management, digital agriculture, and big data analytics are taken for the study. There are a lot of benefits when technology is practiced in agriculture. The gap between farmers and technology has to be removed to promote higher yield. Technology not only provides higher yield but also helps in reducing the costs of production.

3. DATA & METHODOLOGY

The performance and growth of Indian agricultural sector has been analysed with special reference to rice for the past five years.

Table 1 showing top five states in production of rice in India for the past five years

No.	State / UT	KMS 2015-2016	KMS 2016-2017	KMS 2017-2018	KMS 2018-2019	KMS 2019-2020
1	West Bengal	159.54	153.03	149.67	162.42	155.70
2	Uttar Pradesh	125.01	137.54	132.74	155.45	155.24

3	Punjab	118.23	115.86	133.82	128.22	117.82
4	Andhra Pradesh	74.89	74.52	81.66	82.35	86.38
5	Tamil Nadu	75.17	23.69	66.39	61.31	71.81

Source: Ministry of Consumer Affairs, Food & Public Distribution, dated 12 Feb 2021

Areas used for rice cultivation and favourable weather conditions have always made West Bengal the top among the states in the production of rice in India. Das Arghya deep and Kumar Sanjay (2018) analysed the rice cultivation in West Bengal from 1994-1995 to 2013-14 and found that total cultivable area and cropping intensity showed positive and significant but coefficient of rainfall showed negative and significant.

Table 2 showing export of rice (other than basmati rice) and basmati rice in India for the past five years (Values in USD $ Million)

No.	Commodity	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
1	Rice (other than basmati)	2,525.19	3,636.60	3,038.16	2,031.25	4,794.54
2	Rice –basmati	3,208.60	4,169.56	4,712.44	4,372.00	4,018.64

Source: Ministry of Commerce and Industry, Government of India

The Department of Commerce under the Ministry of Commerce and Industry have always taken steps to boost the exports in agricultural products and diversify the export basket thus enabling farmers to avail the benefit of export opportunities in overseas market.

4. DISCUSSION

The findings are as follows, firstly, apart from weather conditions and soil fertility, the farmers in India face financial struggles which hinder them from using the technology in their farming. The second problem is the fall of agricultural prices which makes farmers falls back into debt. The third problem is the lack of education of farmers to use new technologies and thus rely on traditional methods for cultivation purposes. Low productivity in agriculture makes lives difficult for farmers and thus causing poverty among farmers. The fourth problem faced by the farmers is drought, crop failure and flood which have caused low productivity for the farmers.

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Based on the research done using technology, farmers can make decisions on what crop to grow, identify the variety of seed to use and best practices to follow to produce higher yield. Some of the latest technologies used in agriculture are implementation of Artificial Intelligence in agriculture (AI), weather forecasting, and usage of drones to spray pesticides. Monitoring the growth of crops with the use of technology helps in detecting problems at an early stage. This brings profit and better yield to farmers. Satellite images help in monitoring weather changes and ocean behaviour which enables farmers to save time and money. Drones can detect any infection in plants and help farmers by providing real-time information regarding the condition of the crops. Mobile applications have been lately used by farmers for irrigation purposes.

In recent days technology has changed the way of farming from using traditional methods into modern methods. The use of satellite imagery, usage of drones for fertilizers, farming software and online data, and GIS software are widely being used now by the farmers. The use of technology requires financial assistance and training of farmers to make use of modern machines and techniques in cultivation. Crop rotation is another method which can be used to grow other types of crops according to the changes in weather conditions, which thus enables the farmers not to rely on a single commodity for their living. Crop failure can be overcome by using better fertilizers, better irrigation methods and quality seeds.

Vertical farming is one of the latest methods used in urban farming. It saves water and space, where farming requires a lot of land area to cultivate crops. Genetic engineering has been in use in recent years to protect the crops from diseases. It helps in monitoring the growth of crops at every stage.

The government of India have been taking various measures to provide information, and secure farmers against low prices. Direct payments to farmers are being done to secure the farmers. Export subsidies are also being offered to farmers to encourage production. Professional training in agriculture can help farmers make use of modern methods in cultivation and thereby improving productivity and better prices for their crops.

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