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A REVIEW ON IMPACT OF TECHNOLOGY IN AGRICULTURE OF INDIA

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Abstract

The aim of this paper is to highlight the present scenario of use of technology in agriculture industry. There are several challenges in the current agriculture sector in India. Benefits of use of technology in agriculture and the initiatives by corporate, government and local bodies to incorporate technology into agriculture show a promising future. The ground level problems faced during the adoption of technology needs to be addressed and the possible solutions for it are to be determined.

Keywords: Agriculture, Technology, Microsoft, Trringo, SEWA, FarmArt, ME3, Enam, Mechanization.

I. Indian Agriculture Scenario

India is the country with second largest arable land in the world. It has 159.7 million hectare of land that is arable. This is 52.6% of the total land area of the country. With this huge capacity of arable land, it is the second largest production of wheat. The Indian agricultural industry is estimated to be of USD 1.62 billion which ranks third in farm and agriculture output globally. It is also the largest producer, consumer and exporter of spices and related products. Agricultural exports constitute 10 percent of the country's exports, and is the fourth-largest exported principal commodity. More than 50% of the 1.62 billion n populations are involved in agriculture and its associated field of horticulture and animal husbandry. With 68% of population residing in the rural area of the country, the major occupation of rural

population is still agriculture. Despite these many opportunities, the yields in n agriculture industry are not adequate.

II. Objectives

The objective of this research article is to find out the current scenario of use of technology in agriculture field of India. This also aims at looking for the benefits from use of technology and mechanization in agriculture and its utter need in the present day. Several initiatives by the corporate companies, schemes launched by government and local innovations that incorporate technology into agriculture are discussed here the problems in use of technology in agriculture and possible solutions for it are looked after.

III. Research Methodologies

This research article is descriptive in nature and gives a review about the current situation about use of technology in agriculture inIndia . The available data are gathered from various secondary sources like research articles, published scholarly papers, white papers form companies, books, journals, annual reports, and databases available on various websites. The data available were analyzed as per its nature.

IV. Findings

A. Challenges in Indian agriculture

Despite the large arable land and huge part of the population engaged in agriculture, there are lots of challenges in the n agricultural industry. The government of witnessed some key challenges for the sector before initiating the twelfth five year plan (2012-17). The major are shortage of farm laborand youth participation. In agriculture along with inadequate mechanization. Introduction of better

equipment's and improvement in the techniques of agriculture in the process of globalization increased the production in terms of quantity as well as quality.

i. Fragmented land holdings

As much as 67 percent of 's farmland is held by the marginal farmers with holdings below one hectare, against less than 1 percent in large holdings of 10 hectares and above, according to the USDA 2012 census of agriculture data:

There are approximately 2.1 million farms in America; the average size is 434 acres, the net area under cultivation is close to 141 million hectares. However, its immensity diminishes with the fact that a vast number of land holdings are fragmented to an extent of being rendered economically unviable. Division of land by the virtue of inheritance has given rise to the problem

Sub-division and fragmentation of the holdings is one of the main causes of our low agricultural productivity and backward state of our agriculture. A lot of time and labor is wasted in moving seeds, manure, implements and cattle from one piece of land to another. There are more than 500 million family farms globally operating on less than 1 hectare of cultivation area. 126 million of these farms are found in and 47 percent of them grow on less than half a hectare.

ii. Lack of storage facilities

Estimates say that 9.3% of the produce gets wasted because of improper storage and maintenance and storage facilities in the rural areas are either totally absent or grossly inadequate. Under such conditions the farmers are compelled to sell their produce immediately after the harvest at the prevailing market prices which are bound to be low. Such distress sale deprives the farmers of their legitimate income.

The parse committee estimated the post-harvest losses at 9.3 per cent of which nearly 6.6 per cent occurred due to poor storage conditions alone.

iii. Agricultural marketing

Agricultural marketing still continues to be in a bad shape in rural. In the absence of sound marketing facilities, the farmers have to depend upon local traders and middlemen for the disposal of their farm produce which is sold at throw-away price.

According to an estimate 85 per cent of wheat and 75 per cent of oil seeds in UttarPradesh, 90 per cent of jute in west Bengal, 70 per cent of oilseeds and 35 per cent of cotton in Punjab is sold by farmers in the village itself.

Many market surveys have revealed that middlemen take away about 48 per cent of the price of rice, 52 per cent of the price of groundnuts and 60 per cent of the price of potatoes offered by consumers.

iv. Lack of sufficient irrigation facility

After china, has the largest cultivated area that has irrigation facility. However, it covers only one-third of the total cultivated area. A major proportion of farming activities still depends on the monsoon. The irregularities of the monsoon can destroy the crops and cause hefty losses to the farmers. The country has some 195 m ha under cultivation of which some 63 percent are rained (roughly 125m ha) while 37 percent are irrigated (70m ha).

Over-dependence on traditional crops causes the lack of higher quality and quantity of procedure.as mentioned before, produces rice and wheat in abundance. Some regions can easily adapt to facilitate the growth of new crops that can yield a higher quantity of produce. Farmers are resistant or hesitant to give it a try.

v. Lack of mechanization

In spite of the large scale mechanization of agriculture in some parts of the country, most of the agricultural operations in larger parts are carried on by human hand using simple and conventional tools and implements like wooden plough, sickle, etc.

Little or no use of machines is made in plugging, sowing, irrigating, thinning and pruning, weeding, harvesting threshing and transporting

the crops. This is specially the case with small and marginal farmers. It results in huge wastage of human labor and in low yields per capita labor force.

There is urgent need to mechanize the agricultural operations so that wastage of labor force is avoided and farming is made convenient and efficient. Agricultural implements and machinery are a crucial input for efficient and timely agricultural operations, facilitating multiple cropping and thereby increasing production.

Some progress has been made for mechanizing agriculture in after independence. Need for mechanization was specially felt with the advent of green revolution in 1960s. Strategies and programmers have been directed towards replacement of traditional and inefficient implements by improved ones, enabling the farmer to own tractors, power tillers, harvesters and other machines.

A large industrial base for manufacturing of the agricultural machines has also been developed. Power availability for carrying out various agricultural operations has been increased to reach a level of 14 kw per hectare in 2003-04 from only 0.3 kw per hectare in 1971-72.

This increase was the result of increasing use of tractor, power tiller and combine harvesters, irrigation pumps and other power operated machines. The share of mechanical and electrical power has increased from 40 per cent in 1971 to 84 per cent in 2003-04.

Uttar Pradesh recorded the highest average sales of tractors during the five year period ending 2003-04 and/west Bengal recorded the highest average sales of power tillers during the same period.

Strenuous efforts are being made to encourage the farmers to adopt technically advanced agricultural equipment's in order to carry farm operations timely and precisely and to economize the agricultural production process.

B. Initiatives

a) Corporates

ICRISAT adopted MicrosoftCortana intelligence suite including machine learning and power bi or business intelligence, to empower farmers and government officials with technology, and promote

digital farming practices in the state. The personalized village advisory dashboard has been especially developed to enable officials to better manage programs of scale. Using powerful bi tools, this dashboard provides important insights around soil health, fertilizer recommendations, and seven-day weather forecasts derived from the world's best available weather observations systems and global forecast models. This data is then downscaled for the highest possible accuracy at the village level, to transform how small holder farmers tackle climate change to drive effective decision-making for their crops.

The app sends sowing advisories to participating farmers on the optimal date to sow the best part - the farmers don't need to install any sensors in their fields or incur any capital expenditure. All they need is a feature phone capable of receiving text messages," the company said.

To calculate the crop-sowing period, historic climate data spanning over 30 years - from 1986 to 2015 - for the Devanakonda area in Andhra Pradesh was analyzed using AI. To determine the optimal sowing period, the moisture adequacy index (MAI) was calculated. MAI is the standardized measure used for assessing the degree of adequacy of rainfall and soil moisture to meet the potential water requirement of crops.

b) Government

Since the government realized the need of mechanization in agricultural practices, it has launched several schemes to promote use of technical equipment's by the farmers.

Rashtriyakrishivikasyojna (RKVY), mission for integrated development of horticulture (MIDH), national mission on agricultural extension and technology (NMAET) are few of the government schemes aimed to strengthen the extension machinery and utilize it for synergizing the interventions under these schemes. The government is therefore promoting farm mechanization by subsidizing purchase of equipment as well as supporting bulk buying through front-end agencies. The government also provides credit and financial assistance to support local manufacturing of farm

mechanization equipment. Agricultural loans are also available to farmers for a multitude of farming activities through public sectors banks in India.

In April 2016, prime minister Narendramodi launched Enam (national agriculture market), an online platform for farmers that integrates agricultural markets online. This allows farmers and traders alike to view all agriculture produce market committee-related information and services, commodity arrivals and prices, and buy and sell trade offers, thus helping farmers bid for the best prices across markets.

Custom hiring center (CHC) promotes the idea of cooperative farming among small and marginal farmers so that these 'cooperatives' can together fund farm equipment and use concurrently. Act as a point-of-sale for second-hand equipment as well as hubs for after-sale service. This works on a 'hub-and-spoke model wherein last-mile outreach is established by having smaller outlets at the village level.

Farm machineries/equipment available at CHCS include tractor, rotavator, multi-crop thresher, plough, cultivator, leveller blade, blade harrow, seed cum fertilizer drill, knapsack sprayer, power weeder, winnowing fan, electronic balance, repairing tools. These units are generally located in close proximities to large and small land holdings, which supply machinery and equipment to villages close to it reducing transport cost and transportation time.

States such as Punjab, Haryana, Uttar Pradesh, Uttarakhand, Gujarat, Maharashtra, Karnataka and Tamilnadu, which are highly mechanized, have maximum number of registered and unregistered catering to the machinery and equipment requirements of the farmers.

Enam is all electronic trading portal which aims at to form a unified national market for agricultural products by making a network for the markets related to the existing agricultural product marketing committee (APMC).

The government aims at developing a national agriculture market so as to transport the agricultural product from one market to another in a smooth way, to save the producers from a number of market duties and to provide agricultural product to the consumers on a fair price. 595 markets will facilitate the transportation of agricultural products to the market by March, 2019. The farmers will obtain more alternative to sell out their products. The transparency will be increased due to online platform and farmers will get better return.

This is a latest technology card that contains the knowhow of the new trend in the soil and accordingly the required quantity of fertilizers in the soil. Through this card, the farmers will know the fertility and quality of their fields. The expert will sort out the problem concerned with soil. Though this card the farmers will monitor the change of quality related to the soil after use of the farms in digital agriculture process and they will benefit from the soil card to maintain the health and quality of the soil. This will enable farmers to obtain more products on their farms.

c) Local

Self-employed women association in Ahmedabad is a group of women working in the field of agriculture since 1978. This group of enthusiastic women support other peer women and are involved in agricultural process.

Despite the availability of farming technical equipment's, there have been cases where the local innovations have been of more importance and brought more benefit to the farmers.

The innovator of tractor-mounted, PTO-powered groundnut digger was awarded at the 7th national award function of the national innovation foundation in 2013. Groundnut growing farmers are facing an arduous task of collecting leftover groundnut pods under the soil which are picked up manually consuming lot of labour and time. The yield of the crop is affected as up to 20 percent of pods are left underground during harvest. Complete digging out of all the

groundnut pods from the soil is not possible as manual labour is scarce, costly and other means are not available. Innovator Yusuf Khan observed the problem as he himself is a farmer and developed groundnut digger to solve the problem faced by the farmers.

Other innovations results sowing of sugarcane buds in field is cumbersome. By not maintaining uniform distances between the buds and varying the depth while sowing manually, may result in less productivity. As an attempt to address these issues, the sugarcane bud planter was born, which is a tractor operated bud planter. Using this planter the plantation cost is estimated to reduce to about INR 800/acre from about INR 6,000/acre using labor.

The plant-to-plant sowing distance can also be adjusted according to the requirements. It can also be used for simultaneous

Solar powered water pumps use the abundant solar power available to pump water from the ground. These provide an energy-efficient way to farmers for irrigating their land. These also have the potential of providing additional income to the farmer. The saved power on the farms can be sold back to the grid. Taking a cue from countries such as Japan and China, both of which invest heavily in research and development for technological innovation in farming, must also take more steps to promote and foster an innovative environment in agriculture. This can help the country in achieving higher penetration levels as well as a more productive labor force.

C. Problems

There are several challenges in increasing the penetration of technology in agriculture. There is absence of proper maintenance facility center in rural areas. There is lack of facility for the upgrading and monitoring of agricultural tools and equipment's. This discourages the farmers to adapt to the use of technical tools. Other than that most farmers are stuck to traditional way of farming. They are not aware about the use of them and are skeptic about its benefits. They also lack training on how to use these equipment's. It was also observed that sufficient training for the use of equipment's in the farm is to be imparted to the farmers.

It is seen that only 47% of labor in farm is women. But women are not open to use of technology in farm. Women participation in the use of technical equipment's is very low.

D. Recommendations

It is recommended that the farmers should be made aware about the use of technology in agriculture. Proper trainings should be provided to them on how to use these equipment in fields. When the new technical equipment's are introduced to the farmers, they need to be trained properly for the use of those equipment.

The farmers should be first introduced to the areas that are already using the farm.

CSR funds can be used for capacity building initiative in the farm equipment space as well as promoting a sustainable agricultural ecosystem. Companies that are directly involved in the agriculture equipment industry and are unable to invest in to corporate social activities in line of their business, could use the funds for initiatives such as 'Adopt a Village' and promote, through capacity building, practices such as precision agriculture, skill development and micro irrigation. This would ensure that the agricultural ecosystem is built in a sustainable manner. Companies in this industry could approach others not directly involved in farm machinery and pitch the idea of investing their CSR funds into promoting farm mechanization through capacity building initiatives as well as infrastructure creation in order to help in skill development and establish custom hiring centers. Fund with a purpose

The government should provide or launch more projects to provide equipment at subsidized rates to the farmers. The farmers can rent tools and infrastructure that they have on sequential basis so that they can have maximum utilisation of the tools in a season. Normally, the tools are used by a single owner only once in a season. If the tools are rented, it can be used by several farmers in the same season and the owner can also gain more return from it. Also, other farmers don't have to spend money in buying it if they are getting it on rent.

The proper trainings should be conducted to encourage women for use of technical equipment's in the fields. Women should be encouraged to use the technology in agriculture.

V. Conclusion

The food requirement is going to rise to 333 million tons in 2020. More than 40 percent of youths in India and rural part of the country. Use of technology in agriculture can lure them to work in the field of agriculture. There needs to be a change in the agricultural procedures in India to increase the food production. And use of technology will disrupt the agricultural process. Now, there is only a limited amount of use of technology in agriculture. Support from the government, private companies and local bodies is required to make it happen soon.

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