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RESEARCH ARTICLE

TECHNOLOGY TRANSFORMING THE INDIAN AGRICULTURAL SECTOR

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Abstract

The Digital Age has transformed the ways in which we function in any and every sphere of our lives. It has cracked open the doors of all the possibilities of innovations and the unending scope of transformation which technology can bring about in our lives. Though it is the truth that technology does not always have a positive impact on human lives, but the humans can also not deny the ease and efficiency it is capable of bringing about in the overall development of their personalities and the progress of their nations. Today, technology is spreading its roots to all sectors of economy, and the major impact of the same is seen in the boost it has given to the Agricultural Sector. With flying drones to giving advisory services to farmers in the remotest areas of the countries to even digitalizing their finances to facilitate easy access to low-cost technology; digitalization has come as a blessing to us. This paper is thus an in-depth analysis of the role played by Technology in the Agricultural sector, whereby, the author shall also delve into the details of the policies and technological innovations that have changed the ways in which the agricultural-sector operates today.

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Introduction:-

Today technology has become an integral part of almost all the areas of our lives. With the advancement towards digitalization, we have welcomed various perks associated with it into our lives, ranging from the ease of doing business, carrying out smooth trade, maintaining accounts, conducting research and development of new innovations, everything is just a click away. As already stated above, many sectors have witnessed enormous growth due to technology, and Agricultural Sector is no exception to this.

Technology has played and would continue to play a vital role in boosting the growth of this sector, and developing it in a way which pushes it towards a progressive development in future as well. Agriculture is a crucial contributor to the economy of India. As per the Economic Survey of 2020-21, the share of this major sector of economy to the gross domestic product (GDP) in India is 19.9 percent.

The Agricultural Sector in India is vast, and provides employment to a multitude of people in the country. In 2020, 41.49% of the total employment in India was provided in the Agricultural Sector. The Maximum employment generated from this sector till now was recorded to be 62.56% in 1991.

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Current challenges in the Indian agriculture sector

Situations of Small and Landless Farmers

Although the small farmers contribute almost half of the agricultural output in India, but they tend to have it the worst. It is hard enough to have to work on merely four to five acres of land, but finding land that also comes with a lot of resources such as good soil is insurmountable. They are challenged by a lack of land holdings as not all land is the same.

Maintenance of Land

There are many problems that come with maintaining land. The supply from these farmers is directly proportional to the demand from 1.36 billion people as both are substantial. To meet this demand, the farmers' land goes through soil erosion and chemical degradation of soil, and there is nothing they can do to hold it back as they need to earn a living too. This can potentially increase the prices of remaining land that is rich in soil as the supply of it is finite and decreasing.

Agricultural Production Risks

Factors like the lack of availability of access to natural resources in the specific geographical regions of cultivation in various parts of the country further contribute to the misery of farmers who find it difficult to ensure proper yield of produce on their lands. The situation is even worse for the small farmers, as they do not have a permanent land, and on top of everything they also lose on the miniscule production of their crops to natural calamities like floods, droughts, etc.

Uncertain Climatic Conditions and Lack of Efficient Resources

Lack of resources to handle certain harsh climates can make it arduous. Spending money on crops just for a drought or a flood to come and sabotage the investment is much more than just unfortunate, it can mean that the farmers do not have a proper pay-check to live off of.

Crop Failures

This also happens to be one of the major consequences of unforeseeable weather conditions and lack of resources to fight with the drastic impact it has on the crops. Small farmers are relatively more affected by these crop failures than farmers that are well-off as they have the resources, the equipment and the land for it to not do any sizable damage to their money supply.

Poor and Insufficient Pricing

Farmers can be affected by poor pricing in the current economy, which would mean that they may even be losing money every time they sell. Due to a lack of resources and the vast supply of agricultural goods, farmers lose the power to bargain for better prices which leaves a lot more money on the table.

Lack of Government Attention

The agricultural sector of India lacks proper government attention. They tend to treat all farmers and land the same when that is not the case, all land is different, some get more rainfall than others, some get more pest outbreaks. A majority of the farmers lack proper education and credit history, which not only makes it hard for them to get a job in any other field but it also makes it unattainable to get loans from banks and proper financial institutions. As they lack resources, they are not able to afford expensive equipment to make their work more efficient or be able to reduce their marginal costs. It is like an advantage for larger farmers as with the money they save with the use of this expensive equipment, they are able to improve their production by investing in better crops or better land.

Impact of Technology in Agricultural sector

The constant need to improve and increase the productivity, efficiency and the production, technology has constantly played and is playing the major role in advancing towards the above stated goals. Major transformations have been witnessed in the Indian agricultural sector ranges from the installation of efficient mechanism for boosting the productivity of land, or ensuring an adequate preservation of the crops in granaries, and also tapping the previously uncontrollable area of weather forecasting, which has greatly enabled the farmers around the world to work on their lands with all-time preparedness.

Technological Innovations in Indian Agriculture sector

Technology is one of the most important factors which take the top-most position in the list of factors affecting agricultural production. This phenomenon has acted as a boon for the industrial sector, where it runs like a golden thread connecting the stages of transformation towards a “Digital India”. It has sped up the process of expansion of “Internet of Things”, thereby opening various new frontiers for the possibilities of introducing the wonderful human creation of Artificial Intelligence and Machine Learning, it has also gradually become an integral part of all important domains of functioning.

Following is a brief account of the major contributions made by technology to Agriculture:

Income Security for Farmers

Earlier, many farmers faced a problem of conveying the issues they faced from the bounds of remote areas of their cultivation areas of the country, but now the situation has taken a turn.

E-Mandis

E-Mandis is a unique concept that has been introduced in the agricultural markets, as they ensure a greater amount of connectivity amongst the farmers, buyers, and even the corporate entities. This ensures the stakeholders in securing the best deals for themselves and also to maintain good connections through the connectivity chains established with the E-Mandi system.

Mobile Applications for sustainable environment

Numerous mobile applications are available at present which make it easier for the farmers to understand the sensitive issues like the impacts of their activities like that of ‘crop-burning’ upon agriculture. Some examples are: i-Khet, e-prevent, etc. Such initiatives by the app-creators using AI-technology ensure a sustainable balance between agricultural production and environment protection.

Storage-Facilities

Crops and Grains are of perishable nature, they cannot be kept stored for a long time, therefore at many occasions the farmers were forced to sell them at the prices, however low, as quoted by the buyers in Mandis. This, to a great extent contributed to the exploitation of farmers in the country, for a long period of time. But with the advent of technology, the installation of many modern innovations for the purpose of ensuring the least number of losses of grains and crops came to light. The storage system modifications have not yet been witnessed in India to a great extent yet, but there is an efficient storage system that is prevalent and widely adopted in countries like Ghana, Sri Lanka, Sudan, etc., and that system is known as the ‘Hermetic Storage’, wherein the oxygen levels in the storage are lowered to 1-2%, thereby ensuring more time for the crops/grains to stay fresh.

Weather Forecasting

This has proved to be the most important and most efficient gifts of technology to Agriculture, as it enables the farmers and other field-workers to be prepared for the uncertain weather conditions, and adapt their fields to the probable changes in the weather. Weather forecasting is not only important for the better crop yield, but also for the maintenance of livestock. It helps in proper planning for the operations to be made on the field and alerts the farmers to carry out their operations in accordance with their suitability to the weather conditions. The climate varies from State-to-State in India; therefore, weather forecasting becomes all-the-more important for the farmers of the different States.

Drip-Irrigation

In areas where water is scarce, Drip Irrigation is a good way of saving water and at the same time make adequate provision for the same to the crops. This is an innovation of man which has lifted the weight off the chests of many farmers across the country, who faced several difficulties due to the inadequacy of water in their areas of cultivation.

Tractors and Other Agricultural Equipment

Access to good Agricultural Equipment has served a great deal in improving the crop yield for the farmers in India. There are several bodies and organizations which are currently working for ensuring the availability of such equipment to the farmers at low or at least affordable prices. Some examples for this are: Syngenta Foundation, Pragati Farm Stors, etc.

The list of benefits which have accrued from Technology to Agriculture are innumerable, therefore it is almost impossible to provide an exhaustive list of the same. The fact which is important to note is that even though technology has eased the process of carrying out agricultural production, but there is still a long way to go in reaping the maximum benefits out of it.

Drawbacks and Advantages

Largescale production and farmer welfare are one of the fundamental consequences of a technology driven process of agriculture. These advantages prerequisite an efficient transportation system across the state and technological diffusion to a greater extent in the region. Developing countries generally lack in terms of the latter. Introduction of new technological systems in farming is a challenge to developing nations. These modern systems may require high yielding varieties of crops and fertilizers, fresh and unfamiliar methods of farming, and escalating water requirements. This may come as a challenge to the farmers unaccustomed to such practices, who will first have to engage themselves in the learning process of understanding such machineries and thereby equipping themselves with the requisite knowledge of operating such systems; further, revising their cost versus profit ratio accordingly. All this cannot happen within a short span of time. Moreover, a lot of developing nations lack in terms of such farmers possessing appropriate proficiency and experience while handling technologies. When a person is tech-savvy, he is easily capable of understanding additional information behind new technologies. These circumstances may prove less advantageous to the farmers of the developing nations.

Massive production if on one hand can be of profit to the farmers, can also on the other hand accelerate the process of soil erosion in some cases, which can ultimately prove fatal to the long-run productivity of the system. This constrains the requirement of a technology that can manage such sustainability complications implying towards a simultaneous development of such technologies that can counter the detrimental effects of already developed agriculture technology on the ecosystem. Thus, an integrated plan of action for technology advancement based on a diagnostic evaluation of the agroecosystem as a whole is needed.

Conclusion:-

India contributes greatly to the world's food basket, but the sensitization of the masses to the agricultural sector is still not optimal. There are several challenges which this sector faces in the era of digitalization as well. Due to the lack of awareness about the technological innovations in the field, the remote areas end up becoming more remote; completely alienated from their progressive counterparts, and the latter move even further in their advancement, thereby widening their gaps with these remote areas of the country.

Unlike the ancient era, the notion of the 'farmer' of today stretches afar from the notion of the 'kisan' of the olden days, as most of them are now technologically advanced and are reaping optimal benefits out of the various efficient technological innovations introduced from time to time. Therefore, even though, technology has transformed the way the entire agricultural sector operates today, but many factors still stand in the way of its optimal utilization.

Some instances accountable for these obstructions are: (i) Lack of Efficient means to access the technological Innovations; (ii) Poverty; (iii). Unawareness of the uses which such technological equipment can be put to; (iv) Hesitation on the part of the stakeholders in moving away from the traditional methods of carrying out agriculture, etc.

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