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A Review on Future of Information Technology in Agriculture

Dr. Yudhishther Singh Bagal[1], and Jyoti Gulati[2]

[1,2] RIMT University, Mandi Gobindgarh, Punjab, India
Correspondence should be addressed to Dr. Yudhishther Singh Bagal; yudhishthersingh@rimt.ac.in

ABSTRACT- Agriculture and the industrial sector in industrialized nations continue to confront issues such as the need to increase food production and output, as well as the creation of employment possibilities for poor and rural people. Economic patterns as well as fast changes have an impact on the agricultural industry. The results revealed that there is a significant need for information technology to be utilized to solve issues, enhance production, and promote agriculture. However, information technology (IT's interest in agriculture was not fully utilized. The adoption of modern information technology in the rural and agricultural sectors has been slower than in other economic sectors where it has been adopted at a faster pace. The purpose of this study is to look at the function, capability, and involvement of information technology in this industry, as well as to show how information technology may be used in various sectors of agriculture. Their findings were based on existing literature and economic theory, and they found that information technology has enormous potential in assisting farmers and stakeholders in improving agricultural performance, effectiveness, and profitability. Players, on the other hand, have additional disadvantages and challenges when it comes to the use and use of information technology. There are a variety of ways that information technology could be used to share data, including digital kiosks that not only provide essential resources such as telephone, schooling, health care, agriculture and irrigation, electronic banking, municipal services, and so on, as well as specialist networks that help define marketing options and optimum approaches. The use of information technology allows for accurate crop physiology forecasting in agriculture. The study of leaf protein is an intriguing subject that aids in the treatment of protein deficit and malnutrition. The present research focused on the role of information technology on agricultural productivity.

KEYWORDS- Agriculture, Agribusiness electronic commerce, Farm-level Intelligent Decision Support system, Information Technology.

I. INTRODUCTION

Agriculture has played a significant part in the majority of developing nations' social and economic development. Justifications include concerns about people's safety and welfare, as well as the need to maximize production and improve food quality. Each country's agricultural development has significant challenges, not just in fulfilling rising food demand, but also in reducing hunger and malnutrition. As a result, issues such as agricultural industry development while maintaining environmental conservation must be addressed in a sustainable manner [1-5].

In the present scenario, farmers are experiencing narrower profit margins, since the cost of several inputs such as fertilizer and gasoline has increased, while output prices have remained relatively stable or decreased. Excessive foreign commerce and market deregulation in developing nations have put a strain on a number of smallholder farmers. The pricing, markets, and export procedures of agricultural products are being reviewed in order to fully harness the effect of structural changes. Simultaneously, technological transfer procedures under changing conditions must be reviewed and reinvigorated. It is an important sector in India that would benefit much from ICT application in bringing about change in the poor's backward-looking social and economic situation [6-9].

Agriculture is a source of income for most rural dwellers, who rely on rain-fed agriculture and a weakened forest for survival. Due to inadequate communication facilities, farmers in the village region often struggle with failing crops and animal illnesses, and solutions to their issues stay out of reach. ICT's service position will enhance rural residents' prospects by improving their access to market information and raising transaction costs for impoverished merchants and farmers [10-13].

Although India has a significant and quickly expanding information technology sector, rural regions have limited access to integrated circuit technologies. In Indian society, present IT adoption levels are far from sufficient. The National Farmers Policy emphasizes the use of information and communication technology (ICT) in rural areas to reach farmers with appropriate guidance and information. The article discusses the degree of farmers' views about ICT applications in agriculture, as well as the impact of ICT applications in agricultural, using background information.

In past decades, the agricultural industry underwent significant transformation. Agriculture used to be driven by bidding, but now it is driven by competition. They may, however, believe that future agricultural output will be guided by this knowledge. To take advantage of future

incentives and generate revenues, new information must reach end-users quickly. Crop, nutrient, soil, and plant safety knowledge are all important aspects of successful farming. The key element in sustainable agricultural growth would be accurate knowledge-based and information-intensive farming techniques. Farmer should be aware of the benefits of the internet and other forms of knowledge and ICT that provide information services that are critical in the management of food production. In agriculture, the economic benefit of ICT usage is not fully realized. In certain cases, precision farming and livestock management are examples of how ICT may help farm-related business managers and policymakers make better decisions [14, 15].

Reduced pricing, increased output, and increased productivity are all examples of potential contributions of ICT to agricultural industry. Farmers' data needs, in particular, should be assessed and reported, and suitable information systems (IS) developed. The focus of the programs is on new issues that have arisen as a consequence of agriculture sector liberalization and globalization [16-19].

As previously mentioned, the research's goal is to offer a theory-based approach to the study of the significance and potentials of ICT in providing knowledge support to the agricultural sector, with a particular focus on e-commerce, as well as flaws in ICT application and how to overcome them. To do this, the paper is divided into six parts. Following the introduction, the knowledge basis for agricultural production is presented. The contributions of ICT to agricultural growth from inside and outside the EU are briefly addressed, while the fourth part of the study focuses on ICT usage in EU agriculture. In the fifth part of the essay, the possibilities of using internet technology to use agricultural products in electronic commerce are discussed. The paper's sixth part discusses the limitations of agricultural ICT applications and possible solutions to the issues. The report's conclusion on ICT usage in agriculture is addressed in the last part.

A. Information Technology and Marketing of Agricultural Production

For the growth of all agricultural regions, reasonable quality knowledge is a must. Knowledge is particularly valuable in nations on the brink of entering larger markets. It is the case in many Balkans and former communist nations in Eastern Europe, for example, where EU membership is a source of worry. Agricultural output in such nations is faced with globalization, which is a natural extension of the cycle of integration into the European Union, emphasizing the need of timely and accurate data.

Enhanced connection and access to information directly contribute to any country's socioeconomic development. Agribusiness is a new sector with a lot of promise for using ICT to help the agricultural (community) people and rural regions develop socially and economically. Farmers, on the other hand, have a hard time getting critical information in a manner that allows them to make informed choices about improving agricultural output. Farmers should be able to make better choices and earn more money with improved data verification, thorough cost analysis, and sophisticated marketing strategies. In addition, the adoption and use of ICT will significantly enhance their husbandry's competitiveness.

IT is a popular topic these days. It is software that enables information to be exchanged rapidly and simply. Because of technological advancements, the distance between countries has shrunk, as has the gap between them, and the globe has become a global village. Technology provides possibilities for developed and developing countries to improve their strategies and compete with one other.

The key to every market's development is awareness. This is not an exception. Agriculture may benefit greatly if the appropriate and relevant information is given at the right time. It assists in taking suitable actions, planning plans for the next season or year, focusing on market developments, and avoiding unfavorable circumstances. Agricultural growth may therefore be contingent on timely and appropriate information being provided to end users. There are many conventional methods for delivering data to end consumers. They're largely inoculated, they're late, and there's only one method to reach them. The data will take a long time to process, and the end user will be notified [20].

B. Impact and Contribution of ICT in Agricultural Production

Precise farming, which is popular in emerging nations, is centered on the high need for ICT and directly contributes to the production of agricultural commodities. To enhance agricultural production, remote sensing technologies, with the use of satellite technology, geographic information systems (GIS), agronomics, and geotechnical engineering are used. Farmers may use ICT to monitor and respond to weather changes on a daily basis.

Farmers' computers may be connected to solar-powered meteorological field systems to get data on current air and soil temperatures, rainfall, relative air humidity, leaf moisture, soil moisture, daylight length, wind speed, and sun radiation. Many of these precision farming techniques and technologies require large financial expenditures, which larger farms can afford. They are excellent for commercial farming, but not so much for small companies and farms.

It's worth noting that ICT has a variety of programs for both economic and social growth. An effect evaluation was deemed necessary for evaluating whether or not there has been any substantial change in the behavior of farmers in agriculture as a result of ICT applications. It should be mentioned that after his ICT Application in Agriculture, a change may occur in the farmers that he did not have before his ICT Application in Agriculture. The researcher identified eight economic and social qualities that farmers may or may not have in Agriculture prior to their ICT use based on his observations and contact with the farmers. As a result, for the purposes of the research, better production, avoidance of credit purchases, comfortable living, poverty reduction, and

altered family, progressive spending, enhanced lifestyle change, and child support are among the economic and social features [21].

C. Indirect Contribution of ICT to Agricultural Production

ICT's indirect impacts manifest themselves in farmers' ability to make choices that should be considered in future agricultural output. Farmers need timely and reliable information from the sources listed in the preceding part of this article. Growers are now dependent on conventional sources of incorrect information and lack trustworthy data. Farmers confront changes in the agricultural climate that make knowledge valuable but also necessary for them to remain competitive and thrive in a globalized world.

If farmers are unable to utilize ICT, efforts to incorporate the information will be ineffective. Farmers must have a basic understanding of computers in order to use the Internet to find useful information and communicate with one another. They may use the internet to monitor prices and communicate with colleagues all around the globe as often as they wish. They may exchange ideas, ask questions, and get comments on a variety of topics. Expert advice on raising crops and animals from academics and agronomists is especially valuable. ICT helps to bridge the gap between agricultural researchers and farmers, resulting in highly integrated agriculture that benefits both the local economy and civilization.

D. Role of IT in Agriculture

In terms of agriculture, information technology (IT) capacity will be narrowly evaluated under two headings: (a) as a direct contribution to agricultural produce, and (b) as an indirect tool for enabling farmers to make quality and informed decisions that may have a positive impact on how agricultural and related activities are carried out. Precision farming, which is popular in industrialized nations, makes significant use of technology to directly contribute to agricultural production. Satellite technology, geographic information systems, and soil science are all being utilized to improve agricultural production via remote sensing techniques. This technique is both capital demanding and beneficial when large swaths of land are involved [22, 23]. Figure 1 shows the role of information technology in agriculture such as farm operation, new varieties, farm inputs, etc.

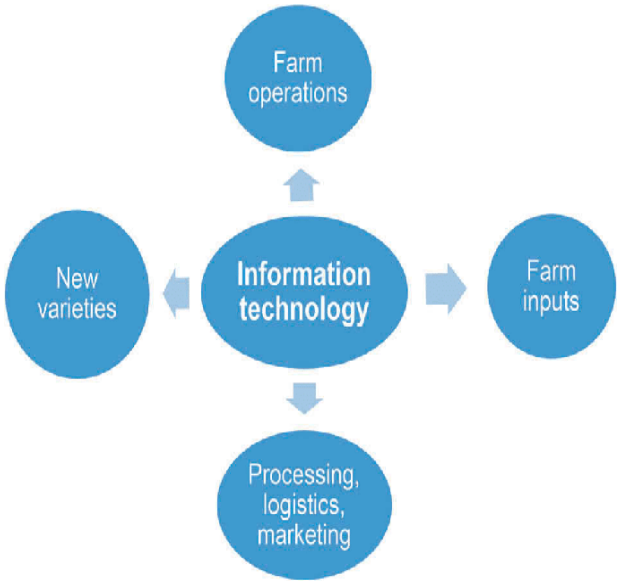

Figure 1: Illustrates the role of information technology in field of agriculture

As a consequence, it's more suited to corporate farming. Information technology's indirect benefits are significant, and it is still used to empower Indian farmers. Indian farmers need dependable and timely sources of information input in order to make choices. In reality, the farmer depends on slow and inefficient methods. Information is not only helpful in the changing climate that Indian farmers are experiencing, but it is also necessary to stay competitive.

E. Role of IT in Plant Physiology

Plant response to managerial and environmental interventions, as well as changes in physiological structure and function. Plant structural and functional models integrate 3D representations of plant architecture with physiological function. The FSPM is divided into two sections: an architectural part for the plant construction and a process section for the plant operation. The first dealt with the initial kind of organ that is started and how it is linked (topology), the second with organ expansion dynamics coordination, and the third with geometric variables (e.g., leaf angles, leaf curvature, and microbial biotechnology). Any physical or physiological process that has an impact on plant development and growth will be included in this section of the process. Leaf protein contains cyanocobalamin, ascorbic acid, and folic acid (Vitamin B9), as well as LPC thiamin, riboflavin, and pyridoxine (Vitamin B6) (e.g. photosynthesis, distribution of C) [24].

F. Introduction of Precised Agriculture via Animal Breeding Technology and Informatization of Cultivation

Plant for agricultural output that is networked. The greenhouse climate network is being measured and monitored. Tomatoes and cucumbers were chosen as target crops. In real time, the building's control and alarm system are automated. Grain storage facilities with remote management of higher-quality agricultural goods. The environment may be controlled remotely through the

Internet. Temperature fluctuation in the storage facility is monitored and evaluated in real time. Database of livestock and a method for analyzing individual data. Dairy cattle information and a personal recognition program are kept in a personal register. Establishment of the agricultural facility's automation. A yield forecasting software that makes use of the farm facility's climatic information.

System for remote control and measurement of agricultural facilities. Greenhouse network utilizing mobile communication technology to monitor the climate. Collect and disseminate agricultural growth and pest information using GPS (Global Positioning System). Create a gadget that provides mobile information services. Agricultural product quality may be improved by automating post-harvest management. Environment management for horticulture goods. System for environmental maintenance and management that is optimal. Accurate agricultural implementation made use of cutting-edge high-tech equipment. Techniques for detecting plant nutrient deficiencies using chloroplast analysis, as well as the best fertilization recommendations. Plant lot quality control using GPS. Controlling agricultural production using a site-specific approach.

II. DISCUSSION

As shown in the preceding chapters, it is technologically feasible to build an appropriate system to fulfill the information needs of Indian farmers. User-friendly systems may pique the attention of farmers and other grassroots workers, especially when it comes to local language information. Dedicated networks will be constructed, or the Internet's capacity will be harnessed to provide comparable services to all parts of the nation. During the previous administration, it was recommended that concentrating more on certain agricultural goods would help preserve an indisputable competitive edge for exports. This need urgent action in the form of remote sensing, bioengineering, GIS, and other technologies. India's satellite technology has advanced rapidly. Agricultural quality can be efficiently monitored using remote sensing and GIS technology. This will not only aid in the preparation, informing, and tracking of plant status, but it will also aid in the rapid response to crop pressure and natural catastrophes.

Stress in crops, soil issues, and natural disasters may all be successfully handled with these technology. Precision farming will be promoted on larger plots of land, allowing our country's export potential to be tilted in our favor. When creating these programs, keep in mind that robots are unfamiliar with the vast majority of the target population. This puts a premium on user friendliness, and adopting touch screen technology to improve user comfort levels may be beneficial. With its intuitive approach, touch screen kiosks are often found to offer a platform for faster training and greater engagement. Dissemination of information is a significant problem after the necessary software packages and databases are in place. NGOs and other cooperative organizations may be utilized to set up data kiosks. Involvement of private business in such initiatives is also required. The kiosks will offer information on other areas of interest, such as information and education, for which people must go a long distance, such as government offices, courts, and so on. Email services, posing queries to specialists, and uploading electronic films to draw professional attention to location-specific problems are all possibilities.

Farmers and policymakers working to develop agricultural production should be able to effectively use ICT to adapt to current conditions, which include: full and selective deregulation of the agricultural market, reductions in government protectionist policies, opening of the agriculture market, volatility in the agricultural climate, and development of export opportunities. Village life may be improved by providing trustworthy information that allows for better decision-making. ICT will play a key role in supporting rural and agricultural transformation to address these problems and growing digital disparities that divide rural and urban regions.

To deal with the developing situation of complete or partial deregulation and decrease in government security, opening up agricultural markets, agricultural environment instability, and exploiting potential export possibilities, Indian farmers and those working for their welfare need to be e-powered. The quality of life in rural areas may be enhanced through better information inputs that allow for better decision-making. Village India's transformation procedures will rely heavily on information technology to overcome the challenge and remove faster-growing divisions. The writers of this research came to the conclusion that the Indian government is corrupt.

Quick domain advancements enabled the development and distribution of electronic agricultural resources. The state strategy will be developed for both introduction and implementation in agriculture. Global organizing institutions with a deliberative role in the formulation process will act as a catalyst. In rural and village regions, no one institution will be able to police the law effectively on its own. As a result, industries with significant agricultural influence, such as fertilizer and food, should work together to promote and ease the use of ICT in agricultural production.

A remarkable achievement is being made, particularly in the field of agriculture, by providing farmers with a variety of facilities, including ICT services, to assist farmers in understanding new methods of cultivation, the availability of agriculture inputs, irrigation sources, pesticides and fertilizer, and other factors that affect productivity and production. The creation of a suitable revenue model for the distribution point is critical to the success of any IT service in rural India. The 'clicks and mortar' rural kiosks should be integrated with the 'bricks and mortar' business to make them lucrative ventures by giving them a portal to rural India. Knowledge kiosks will earn income from the industry by providing and distributing the required goods. The IT revolution in rural India will not need crusaders if these sites of distribution show to be commercially feasible.

III. CONCLUSION

The use of information technology has allowed traditional agriculture to evolve into contemporary agriculture. The application of information technology in the agricultural process from start to finish has a positive impact on the success of agriculture. According to this research, ecommerce and sensor technologies have grown popular in e-agriculture deployment. The majority of agricultural technology research is carried out in China. They do research on anything from an agriculture method that can enhance agricultural production to how agriculture might improve its marketing. The next item on our agenda is to create a framework for mapping agricultural operations with the potential for information technology to be used in improved agriculture processes.

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