International Journal of Early Childhood Special Education (INT-JECSE)
DOI: 10.48047/INTJECSE/V14I1.490 ISSN: 1308-5581 Vol 14, Issue 01 2022 PP: 3999-4005

THE IMPACT OF TECHNOLOGY ON MODERN FARMING PRACTICES

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ABSTRACT
The purpose of this research was to determine how much of an impact modern farming techniques had on harvest success. When compared to their predecessors a century ago, today's most basic agricultural instruments hardly seem revolutionary. The quality of planters and harvesters has increased as a result of technological development. The latest version of the combine may be bought for close to $250,000 USD and is mechanically similar to older versions. Technology advancements like GPS locators have allowed modern tractors and equipment to be more efficient and waste-free in their application of fuel, fertilizer, and seed. Automated farming tools might soon be available to the public thanks to electronic sensors and global positioning system maps. The research also reveals that the 'never poor' category of rural women (TLI = 1423) benefits the most from the program, followed by the ‘sometimes poor' (TLI = 793) and 'always poor' (TLI = 503) groups. the impact of modern agricultural practices on the earnings of rural women 'Usually disadvantaged' women's perspectives should be included into plans for rural areas' economic security.
Keywords: Modern Technology, Gross Domestic Product, Pesticides, Crop Sensors, Biotechnology and Inorganic Fertilizers, Livelihood

INTRODUCTION

The agricultural industry today has seen more substantial progress than at any point in previous history. Increasing provisioning costs, a shortage of jobs, and shifting consumer preferences toward transparency and sustainability pose serious challenges for businesses. The agricultural sector is beginning to accept the need for solutions to these problems. Over the last decade, investment in agricultural innovation has skyrocketed, with the last five years seeing $6.7 billion invested and the most recent year seeing $1.9 billion. Indoor vertical farming, automation and mechanical technology, domestic animals' innovation, modern nursery practices, precision farming and artificial consciousness, and the supply chain are all examples of areas where this industry has seen significant innovation in recent years. Despite the persistently increasing need, the research says we need to produce 70% more food by 2050. Meanwhile, a sizable portion of GDP has shrunk to 3%, down from 33% only a few years ago. The destructive effects of desire are felt by almost 800 million individuals worldwide. In addition, by 2030, 8% of the global population, or 650 million people, will be undernourished even if current trends continue.

There has been absolutely no progress as of late, nothing to indicate that food scarcity and need will not be a problem in the next several years. Governments, wealthy benefactors, and innovative agricultural developments are all going to have to work together to solve these problems. Reliable field-wide application of water, compost, and pesticides is essential to Agriculture 4.0. Farmers will use the minimum amounts necessary and focus on narrow fields. The paper goes on to say that, as a result of technological advancements like sensors, gadgets, machinery, and information creation, farming and agricultural operations need a novel approach to management. Robots, temperature and humidity sensors, aerial photographs, and GPS technology are just some of the cutting-edge innovations that will be incorporated into the agriculture of the future. Farms may now benefit their surrounding communities and the environment via the use of general contraptions, precision agriculture, and mechanical constructions.

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agricultural innovation has skyrocketed, with the last five years seeing $6.7 billion invested and the most recent year seeing $1.9 billion.

Indoor vertical farming, automation and mechanical technology, domestic animal innovation, modern nursery practices, precision farming and artificial intelligence, and the supply chain are only some of the areas where there have been significant technological developments in recent years. Despite the persistently increasing need, the research says we need to produce 70% more food by 2050. Meanwhile, a sizable portion of GDP has shrunk to 3%, down from 33% only a few years ago. The destructive effects of desire are felt by almost 800 million individuals worldwide. In addition, by 2030, 8% of the global population, or 650 million people, will be undernourished even if current trends continue. There has been absolutely no progress as of late, nothing to indicate that food scarcity and need will not be a problem in the next several years.

LITERATURE REVIEW

Upendra, R S et.al (2020). Countries like India see optimization of agricultural methods for increased crop output as a crucial phenomenon. Optimising agricultural operations is now a need in order to bolster the economy and fulfill the food demand of an ever-increasing population. It was previously believed that India's very changeable weather and geographical circumstances were the primary barrier to agricultural strategies aimed at increasing crop output. Climate change, geographical diversity, the prevalence of established agricultural techniques, and the current economic and political climate all pose serious threats to India's agricultural sector. Another big issue is the country's potential economic loss owing to a lack of data on agricultural output productivity. The use of cutting-edge technology in farming may help farmers get past these obstacles. Smart farming, digital agriculture, and Big Data Analytics are just a few of the emerging practices that researchers have found to be very helpful in understanding the elements that affect crop yields and making reliable predictions about future harvests. With accurate yield forecasts, farmers may reduce economic losses by better planning cultivation, implementing a crop health monitoring system, and managing crop yields. Because of this, farming has become a hugely lucrative industry. Digital Agriculture, Smart Farming, or the IoAT, Crop Management, Weed and Pest Control, Crop Protection, and Big Data Analytics are only few of the areas that are explored in this study.

Pradhan, Durgesh et.al (2018). This paper's focus is on the current state of agriculture's technological landscape. The modern agricultural industry in India has a number of difficulties. The future of agriculture looks bright because to the efforts of corporations, governments, and communities to integrate technology into the sector. Problems at the ground level during technology adoption must be addressed, and potential solutions must be identified.

Rajagopal, Sivakumar et.al (2021). Today, agriculture plays a crucial role in the economies of both emerging and established countries by providing raw materials for food, creating jobs, and fueling economic growth. As a result, it has been widely recognized as a crucial and pivotal industry. The Food and Agriculture Organization of the United Nations (FAO) estimates that global population might reach 8 billion in 2025 and 9.6 billion in 2050. The primary cause of this is the mandatory global rise in food material production to 70% by 2050. Several biotic and abiotic variables throughout the world are making it difficult to grow crops, which in turn reduces the output and productivity of a number of commercially relevant plants. Therefore, it is essential to build efficient production and security technologies to bring about maximum output. The Internet of Things (IoT) and machine learning (ML) are two examples of the cutting-edge technologies that have recently emerged and are having a significant influence on the farming industry. They are facilitating the use of data-driven techniques in agriculture, which will improve the precision and profitability of food product manufacturing by making better use of available water and nutrients. Researchers have been aided by the development of ML and IoT in applying these techniques to crop production (quality and quantity assessment), pest and disease identification, soil and water management, and livestock production and management, all of which stand to boost agricultural output and prosperity. This chapter provides an introduction to the agricultural applications of current technology, including an outline of their history, a summary of their potential future uses, a discussion of the obstacles in the way, and a detailed explanation of how to overcome them. Finally, some potential future prospects for ML and IoT applications in agriculture are presented.

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Singh, R.K.P. & Singh, K. & Kumar, Abhay. (2015). Ineffective transmission of agricultural technology is a major causative cause for poor performance in agriculture, along with socio-economic, technical, and managerial reasons. In the past, difficulties with technology transfer have prevented progress toward goals. The scope of agricultural extension institutions, the challenges encountered by extension workers, and the rate of adoption of modern agricultural technology in Bihar are all topics covered in the present research. Surveys of farm families, agricultural scientists, and extension officials in Bihar provided the basic data for this study. According to the research, agricultural development programs only reach a small number of communities, and line departments continue to have the upper hand when it comes to transferring technological know-how. The scope of operations for organizations like ATMA and KVK was narrow. Despite the relatively high adoption rate of artificial insemination thanks to the involvement of co-ops and the commercial sector, less than a quarter of farmers in Bihar were able to embrace cutting-edge horticulture and contemporary crop seeds. The greatest barrier to the widespread implementation of cutting-edge horticulture practices in Bihar has been identified as the state's small land holding sizes and fragmented terrain. Small and medium-sized farms had a relatively high rate of adoption of contemporary kinds of key crops, according to the analysis. Adoption of contemporary technologies relies on widespread dissemination of information about current agricultural development programs and plans. While ATMA and KVK have done a good job of getting the word out, there are significant barriers to the transmission of technology in Bihar due to a lack of trained personnel, occasional monitoring, and accessible transportation.

Sharma, Rajeev & Singh, Gurpreet. (2015). This essay makes an effort to address, from an Indian perspective, the effect that a lack of access to contemporary technology has on the standard of living of farmer families. Assuming its significance for comprehensive policy formation, an effort has also been made to evaluate this topic for various areas of India, providing a comparative picture. The standard of living in rural India may be gauged by looking at how much money is spent on consumables per person. To achieve this goal, we make use of data obtained by the National Sample Survey Organization (NSSO) in 2003 (59th Round) from individual farm family units. Almost 60% of farmer families, according to descriptive research, had no access to any source of knowledge on contemporary technology. Adopting modern agriculture technology is associated with improved performance on the outcome variables of per capita consumption (income) spending. Logistic regression research finds that having access to contemporary technology significantly improves rural Indian households' consumption expenditures, even after accounting for other household factors. Policymakers should prioritize the expansion of opportunities for low-income farmers to boost their incomes via the use of cutting-edge agricultural technologies.

MODERN AGRICULTURAL TECHNOLOGY AND MACHINERY USAGE IN AGRICULTURE MODERN TECHNOLOGY AND MACHINERY IN AGRICULTURAL EMPLOYED TODAY IS BELOW WITH DETAILS;

1. Autopilot Tractors

These modern GPS-equipped tractors and sprayers can navigate the field without human intervention. By driving a short distance and marking A and B on the computer system's board, the user may indicate the width of the route that a certain piece of machinery will traverse. After receiving a line to follow, the GPS system extrapolates it into parallel lines, each spaced out by the width of the instrument being used. The tractor's steering is connected to the tracking system, so it will stay on course without any input from the driver. The operator is freed up to pay more attention to other aspects of the system. In tillage, guidance is helpful because it eliminates wasteful overlap caused by human mistake, therefore conserving resources like time and energy.

2. Crop Sensors

Fertilizer absorption may be greatly improved with the use of crop sensors by farmers. Detecting the health of your crop and lowering the risk of contamination of ground water via leaching and runoff. This is a major step forward for the technology of variable rates. Crop sensors relay real-time data to application equipment, eliminating the need for a prescription fertilizer map to be created before heading out to the field. The quantity of light reflected back to an optical sensor may be used as a proxy for the plant's potential demand for fertilizer.

3. VRT and Swath Control Technology

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VRT and swath control technologies represent a turning point in guidance's ability to generate a profit. That's exactly what swath control does. The swath width is determined by the farmer and may be adjusted as needed. Less seed, fertilizer, pesticide, and other inputs used means more money saved. Due to the uneven nature of field sizes and shapes, overlap is inevitable in most implementations. The field equipment's GPS tracking system remembers its previous locations, and the swath controller disables the overlapped parts of the applicator as it approaches them. The same is true with VRT. A farmer may create a prescription GPS map for an input based on past productivity and soil testing.

4. Monitoring and Controlling Crop

Smart-Phone-Controlled Irrigation Systems The use of mobile devices is becoming more crucial in the management of agricultural irrigation systems. With this cutting-edge equipment, a farmer may manage his fields' sprinkler systems without physically visiting each one. Soil moisture sensors can relay data on the moisture content of the soil at various depths. Irrigation pivots can apply inputs like as water and fertilizer with greater precision because to this enhanced adaptability. Together with other technologies, such as variable rate technology (VRT), this allows farmers precise control over watering schedules. The goal is to make better and more efficient use of existing resources.

5. Biotechnology

Although genetic engineering (GE) and biotechnology have been around for a while, there is still a great deal of untapped potential in these fields. Most people have heard about genetic engineering to create crops resistant to herbicides. Toxins that target certain pests may be expressed in crops. Several use a poison that is also used in organic insecticides. This eliminates the need for the farmer to go over each field individually to apply pesticide, which not only saves pesticide but also time, money, and resources. Another perspective is that farmers who irrigate their crops may reduce water consumption without a noticeable drop in production. The concept of nitrogen usage efficiency is quite similar, only that water is replaced with fertilizer.

6. Documentation of Fields via GPS

Every year, on-board monitoring and GPS make it simpler and more accurate to record harvests and application rates. In fact, farmers are starting to have so much useful data at their fingertips that they need to figure out what to do with it all. A farmer's favorite form of documentation is the colorful yield map, which displays the results of an entire year's worth of labour. Rolling harvesting equipment measures yield and moisture using GPS coordinates as it moves around the field. When the yield map printing is complete, the field is printed. Many people refer to these charts as "heat maps." The farmer may now compare yields across circumstances to see which cultivars performed best. A farmer may use this kind of map to assess the drainage system in his land.

7. Ultrasounds for livestock

In addition to monitoring unborn animals, ultrasound may be used to assess an animal's potential meat quality before it is sold. Producers may benefit from identifying animals with strong pedigrees and other desired features via DNA testing. This data will be useful to the farmer in his efforts to raise the standard of his herd.

8. Usage of Mobile

Imaging Hardware and Software Farmers and ranchers use the various social media sites for a wide variety of purposes, and mobile technology and cameras play a large part in that. There are some that use tools like Foursquare to track workers' whereabouts. Increasing numbers of farmers are installing security cameras in their fields. Cameras are being installed in livestock facilities such as barns, feedlots, and pastures, with the footage being sent to a central point such as an office or home computer. When they are gone or sleeping, they may keep a closer check on the animals.

Top Fifteen Countries using Modern Agricultural Technology with Agricultural Outputs in 2015

The top fifteen countries using modern agricultural technology with agricultural outputs in 2015 with GDP in million USD are mentioned in table 1.

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Table 1. GDP Millions of USD

Serial No.	Country Name	Year	Agricultural outputs in USD Billions	GDP Millions of USD
1	China	2015	1,088	10,356,508
2	India	2015	413	2,051,228
3	European Union	2015	333	18,527,116
4	United States	2015	290	17,348,075
5	Indonesia	2015	127	888,648
6	Brazil	2015	110	2,346,583
7	Nigeria	2015	106	573,999
8	Pakistan	2015	63	246,849
9	Turkey	2015	62	798,332
10	Argentina	2015	59	543,061
11	Japan	2015	51	4,602,367
12	Egypt	2015	51	286,435
13	Thailand	2015	47	404,824
14	Russia	2015	47	1,860,598
15	Australia	2015	46	1,442,722

Graphically agricultural outputs and GDP are shown in figure 1 and figure 2.

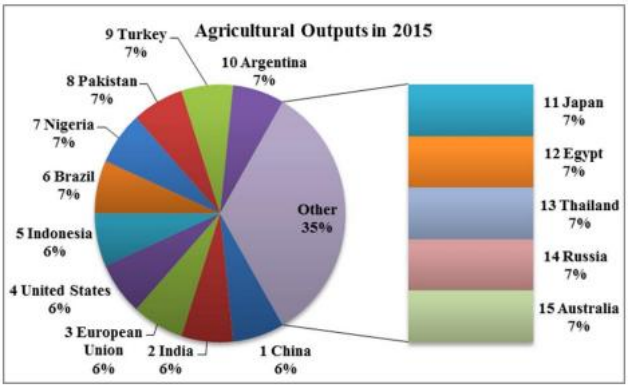

Figure 1. Top Fifteen Countries with Agricultural Outputs in 2015 Data Source: IMF and CIA Fact book 2015

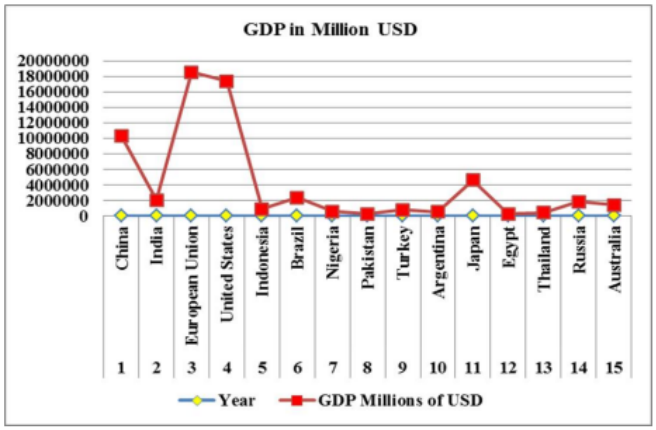

Figure 2. Top Fifteen Countries GDP in Million USD Data Source: IMF and CIA Fact book 2015

IMPACT OF MODERN AGRICULTURAL TECHNOLOGIES ON THE LIVELIHOODS OF DIFFERENT CATEGORIES OF RURAL WOMEN

On the basis of the most significant livelihood indicators, the effect of contemporary agricultural technology on the living standards of 'usually poor,' 'sometimes poor,' and 'never poor' rural women was calculated. Results show that the 'never poor' group of rural women (TLI = 1423) and the 'sometimes poor' category (TLI = 793) gain the most from the use of modern agricultural

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methods. Table 4 shows that the total level of influence (TLI) for the group of 'typically impoverished' rural women (TLI = 503) is small.

Table 2. Overall impacts on the livelihoods of rural women

Category of Impact	Range of Livelihood Index	Frequency of the respondent
Poor impact	0-32	7
Moderate impact	33-64	24
Good impact	65 and above	19

Table 2 reveals that 19 of the 50 female respondents consider the research to have had a "good impact," while 24 consider it to have had a "moderate impact." Only 7 people said that the effect was bad. This suggests that most women (86%) in the research region have seen a "moderate impact" or "good impact" from the use of modern farming methods. The research also shows that the lives of rural women have greatly improved over the last fifteen years thanks to the widespread use of cutting-edge agricultural technology in the region.

Livestock and poultry production technology (LPPT) had the highest livelihood index (1384) among the three chosen modern agricultural technologies, followed by home vegetable production technology (HVPT) (1092) and crop production technology (CPT) (403) (Table 3).

Table 3. Impact of modern agricultural technologies on different livelihood aspects of rural women

Technology	Income	Food security	Wellbeing	Women empowerment	Reduced vulnerability	Access to institution	Total livelihood index
CPT	67	29	31	105	80	91	403
LPPT	175	163	212	304	265	265	1384
HVPT	135	179	171	227	183	197	1092

Table 4. Impact on the livelihoods of different categories of rural women

Category	Income	Food security	Well-being	Women empowerment	Reduced vulnerability	Access to institution	Total livelihood index
Usually poor	87	15	38	113	142	108	503
Occasionally poor	124	33	118	236	131	151	793
Never poor	121	272	254	288	229	259	1423
Cumulative livelihood index	332	320	410	637	502	518	2719

The results show that across the board, rural women have made great strides in terms of economic independence (Cumulative livelihood index, QLI = 637), institutional participation (QLI = 518), vulnerability reduction (QLI = 502), and overall family well-being (OLI = 410). There has been significant progress in both the economic independence of women (OLI = 332) and the food security of families (CU = 320) (Table 4).

CONCLUSION

There are two main goals that have guided the development of today's agricultural technology: maximization of output and maximization of financial gain. Application of inorganic fertilizer, irrigation, intense tillage, monoculture, chemical pest control, and enatic manipulation of crop plants are the six fundamental and significant methods that have become the backbone of production in agriculture. Production's backbone is on technologies like autopilot tractors, crop sensors, VRT, and swath control; smartphone-based crop irrigation monitoring and control; GPS-based field documentation; and biotechnology and ultrasounds for animals. The research shows that the chosen contemporary agricultural technology has had a "moderate impact" to a "good impact" on the lives of the people who have adopted them. Those rural women who fall into the "never poor" or "occasionally poor" groups stand to gain the most from adopting modern farming technology, according to the report.

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REFERENCES

1. Upendra, r s &umesh, i m &varma, r b &benchamardimath, basavaprasad. (2020). Technology in indian agriculture -a review. Indonesian journal of electrical engineering and computer science. 20. 1070-1077. 10.11591/ijeecs. v20.i2. pp1070-1077.
2. Pradhan, durgesh&kasera, mayur. (2018). A review on impact of technology in agriculture of india.
3. Rajagopal, sivakumar&thangaraj, sonairajan&jeyabalasingh, paul&prabadevi, b. (2021). 5 technological impacts and challenges of advanced technologies in agriculture. 10.1515/9783110691276-005.
4. Singh, r.k.p. &singh, k. &kumar, abhay. (2015). A study on adoption of modern agricultural technologies at farm level in bihar. Economic affairs. 60. 49-57. 10.5958/0976-4666.2015.00005.4.
5. Sharma, rajeev&singh, gurpreet. (2015). Access to modern agricultural technologies and farmer household welfare: evidence from india. International journal of asian studies. 6. 19-43. 10.1177/0976399614563222.
6. Garg a, balodi r, “recent trends in agriculture: vertical farming and organic farming”, adv plants agric res. 2014volume 1, issue 4, pp.142-144. Doi:10.15406/apar.2014.01.00023
7. Gosling p, hodge a, goodlass g et al. “arbuscular mycorrhizal fungi and organic farming agriculture, ecosystems and environment”, volume 113, issue 1, 2019, pp. 17-35.
8. Manida m, nedumaran g, “the theoretical study of green marketing in tamilnadu: its importance and challenges”, the international journal of analytical and experimental modal analysis, volume 11, 2019, pp. 3833-3840. Issn no: 0886-9367.
9. Nedumaran g, manida m, “green marketing impact of the agriculture products”, international journal of advance and innovative research, volume 6, issue2, 2019, issn: 2394-7780.
10. Nedumaran g, manida m, “trends and impacts of e-nam in india”, 2019, isbn: 978-81-8094-323-2.
11. Manida m, pandiyaraj p k, “a study on consumer behavior towards usage of green products”, april 2015, doi: 10.13140/rg.2.2.28781.13286.
12. Nedumaran g, manida m, “impact of fdi in agriculture sector in india”, international journal of recent technology and engineering, volume 8, issue i10, 2019 doi: 10.35940/ijrte.c1081.1083s19.
13. Nedumaran g, manida m, “e-marketing strategies for organic food products”, international journal of advance and innovative research, volume 6, issue 2, 2019, pp. 57-60, issn: 2394-7780.
14. Nedumaran g, manida m, "green marketing on customer behaviour towards usage of green products", international journal of advanced scientific research and development, volume 8, issue 7, 2018, pp. 67-73.
15. Willer h, lernoud j, the world of organic agriculture. Statistics and emerging trends in 2014, 15th ed. Switzerland, 2014, pp. 25-32.