



The Technological Advancement Role in Helping Indian Farmers and the Emerging Trends in Indian Farming.

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ABSTRACT

Agriculture is the most ancient of occupations, yet its relevance has only become bigger with the continued increase of threat of food insecurity. The most challenging issue, even in the 21st century that the most of the Indian farmers are dependent on monsoon rain and struggle to get the good price for their product. Even though the technology advancement has been slow, farmers have slowly started incorporating ai in their agricultural process. This has lead to increase in the yield. Technology is the solution to most of the problems faced by modern agriculture. The latest emerging trend is the use of blockchain in agriculture. This can be used for monitoring the crops and helping the farmers know beforehand regarding climate change. The agriculture sector will continue to be driven towards technological advancements by the difficulties created by the demand for food on a worldwide scale today and in the future.

Introduction

Technology is essential to Indian agriculture because it may help farmers manage their resources more effectively, work more efficiently, and produce higher quality crops. India's economy is heavily reliant on agriculture, and over time, technology has played a critical part in the transformation of the nation's agricultural industry. Following are some explanations on why technology is essential to Indian agriculture:

1. **Efficient Resource Management:** Irrigation systems, sensors, and drones are examples of technology that is assisting farmers in water conservation, waste reduction, and resource optimisation. Farmers can avoid misuse, save input costs, and save time by knowing exactly how much water, fertiliser, or herbicide to apply.
2. **Increased Yields:** Farmers are maximising their crop yields thanks to technological advancements like biotechnology, precision farming, and crop management systems. Farmers may enhance the health of their crops and boost productivity by utilising data to guide planting, watering, and other decisions.
3. **Information Access:** Technology is essential for providing timely and pertinent information to farmers. With mobile applications, websites, and other resources, farmers may obtain weather forecasts, market pricing, and best practises.
4. **Market Expansion:** Thanks to technology, farmers now have easier access to customers and a wider range of markets
5. **Rural Development:** New avenues for rural development and agricultural entrepreneurship are opening up as a result of technological advancements.

There has been a major shift towards technology, the emerging trends in Indian farming includes organic farming, sustainable agriculture, smart farming, value chain management and rural entrepreneurship.

Review of literature

The emerging trends like blockchain although not used widely by all the farmers in India and can see how useful it is (Vinay Surendra Yadav, A.R. Sing, Rakesh D. Raut and Usharani Hareesh Govindarajan 2019) based mobile app is put forward which is then classified into

Three modules called traceability, smart-contract-based monitoring, and informative system. Such a scheme may be

Put into practice by the government and its associated agency to enhance the farmer's status quo. Implies its importance in the emerging tech-based world which will find its way to farming too

In short, Blockchain is a decentralized digital format of a ledger that can ensure the immutability of data in all forms of business. It is a secure, transparent, and immutable technology that is highly useful for businesses that require accountability, transparency, and security in their transactions. One industry that is now exploring blockchain's potential is the farming industry.

Blockchain tech is being used in this way as mentioned below

Food traceability: it can be helpful in tracing the food from farm to table

Smart contracts: Smart contracts can be used highly to ensure more strong contracts are present in the market

Crop monitoring: Blockchain can be used to monitor crop yields and ensure increased probability of survival

Decentralized marketplaces: the blockchain can help farmers where they can directly sell their products to consumers.

In conclusion, blockchain can greatly help Indian farmer to achieve their full potential and ensure their adaptability of tech is also increasing by each day

Secondly, there is a need to understand climate patterns through technological advancement too which can greatly help Indian farmers in their pursuit of greater consistency and yield which is rightly stated in Knowledge and passive adaptation to climate change: An example from Indian farmers (Amarnath Tripathi, Ashok K. Mishra 2017) the main challenge, particularly in developing countries, is that farmers have the low adaptive capacity, as most of them are small and marginal

Farmers. It follows that autonomous adaptation cannot be expected; even if adaptation were autonomous, it would not

Be sufficient to offset losses from climate change. Hence, policy-driven incentivized adaptation is required. Adaptation is

A two-step process—first, perceiving climate change and its associated risks; second, responding to perceived changes to minimize

Their adverse impacts. Perception is a cognitive process that involves receiving sensory information and interpreting it.

The accuracy of perception is a necessary condition for a meaningful response, which eventually depends on knowledge and Experience.

These are some of the ways how climate knowledge can help Indian farmers Climate change is a pressing issue that affects all aspects of life, including agriculture. Indian farmers are particularly vulnerable to the impacts of climate change, such as changing rainfall patterns, rising temperatures, and extreme weather events. However, by increasing their knowledge about climate change, farmers can take measures to mitigate its impact on their crops and livelihoods.

Firstly, farmers can learn about changing weather patterns and use this knowledge to increase their yield.

Secondly, farmers can learn about sustainable agricultural practices that can reduce their imprint on the globe in form of carbon greenhouse gases in their farming systems.

Thirdly, farmers can learn about renewable energy and technology and incorporate in their practices to help them increase their sustainability.

In addition, farmers can learn about climate-smart agriculture, which can help them greatly adapt and be prepared for the future

In conclusion, by increasing their knowledge about climate change and adopting sustainable farming practices, Indian farmers can help themselves and help the human race by ensuring full compliance with the need of the sustainable world

We must acknowledge how the improvement of tech has greatly increased the ability and capacity of Indian farmers in the context of next-gen tech adaptability as rightly stated by Emerging Technologies in (Tolulope Joshua, Ashaolu and Saran M. Musa 2020) Agriculture plays a vital role in the social and economic development of most developing nations and is the main contributor to their economic growth and stability. Through the application of modern technologies, agriculture has undergone extensive changes during the past century. These technologies are producing new machinery and process techniques for production, postharvest handling, and agribusiness. They are also resulting in innovations in agriculture that make agriculture a sustainable, profitable, and competitive enterprise. The challenges posed by today's and tomorrow's global food demand will continue to push the agriculture industry toward technological innovations.

Several technologies can help Indian farmers increase their productivity and improve their livelihoods. Here are some examples:

Soil Testing: Several Indian startups offer soil testing services, including KisanHub, AgroStar, and SoilCares which can greatly help Indian farmers be sustainable .

Weather forecasting: tech such as acu weather can help Indian farmers greatly In their purspursuitgreen and precise farming

Mobile Apps: Several mobile apps have been developed to help Indian farmers. For example, Kisan Suvidha and mKisan provide information on climate dynamics and prices prevailing in the market which can be greatly helpful for the people

These are few examples of tech which can help people in the pursuit of greater yield

Apart from that we can see how nanotech can play a greater part in the upcoming generation of Indian farming as rightly stated in t a Article (J. C. Tarafdar,2011) A strong influence of nano-chemistry on wastewater treatment, air purification, and energy storage devices is expected. The scientists of

Banaras Hindu University have devised a simple method to produce carbon nano-tube filters that efficiently remove micro to nano-scale contaminants from water and heavy hydrocarbons from petroleum. The filters are carbon cylinders several centimeters long and 1-2cm wide with walls just one-third to one-half of an mm thick. They are produced by spraying benzene into a tube-shaped quartz mold and heating the mold to 900oC. The nano-tube makes the filters strong, reusable, and heat resistant and they can be cleansed easily for reuse. They can remove 25 nanometer-sized polioviruses from waster as well as larger pathogens such as Escherichia coli and Staphylococcus aureus bacteria. If it is used widely, we shall minimize waterborne diseases. Magnetic nanoparticles offer an effective and reliable method to remove heavy metal contaminations from waste water by making use of the magnetic separation technique.

Apart from that nanotech can have the following applications as Nano fertilizers: these technologically advanced fertilizer can greatly help the people in ensuring the right amount of nutrients are being delivered and the plans are not toxicated

Nano pesticides: these pesticides can work on only the pest and not on the plants

Soil remediation: the process involves increasing of the quality of the soil by the use of nanotech

Crop sensors: these sensors can be of great use by ensuring the right amount of everything is being served to the crops

These are some of the emerging technologies and how they can impact the farming industry in India in a big way

Research Methodology

The hypotheses was used as a guide to create a structured questionnaire. Students, professionals, and self-employed people who are taking part in this survey are the respondents. Using a google form, information was gathered from responders. 140 participants in this study have rudimentary understanding of Indian agricultural practices. In order to verify the reliability of the questionnaire and the measurement tools, two management students examined and improved the construct items. The students confirmed that the materials were accurate by checking them for spelling and grammatical mistakes. The management students suggested modest language adjustments be made to the social identity and satisfaction elements, but they advised keeping the original number of items. Based on the advice of the management students, the statements were revised, and the scales were improved. Data analysis and interpretation were done using the information gathered from the created questionnaire. The information was obtained using a closed-ended structured questionnaire that also contained construct statements that were scored on a Likert five-point scale. Google Form Analyzer was used to perform a percentage analysis for the opinions.

The population of farmers is ageing globally without being effectively replenished by the next generation. The average age of a farmer in the US is 58, whereas the average age of a farmer in Japan is 67. In Europe, a farmer is over 65 years old every third time. Farmers over the world are giving up farming, just like in India. For instance, 40% of farmers in Japan are expected to stop working in the industry during the next six to eight years. In reality, the Japanese government has launched a significant initiative to promote farming among those under the age of 45. Reviving India's agricultural sector may be the most crucial goal for the nation. India has never before faced such a significant issue in meeting its food demand. Out of India's predicted 1.9 billion people by 2050, over two-thirds will belong to the middle-income category. As a result, the demand for food will increase by 2 times. Aging farmers will probably have unpredictable and ambiguous effects on the development of agriculture. However, if the nation has the farmers and the necessary technological resources thanks to its sizable educational institutions, this desire might be turned into a significant economic opportunity.

Analysis of Data and Interpretation

An organised and well checked questionnaire with most of the closed ended questions was used for the collection of the data from 140 participants. This study aimed to know the weather the block chain and modern technologies can be involved to grow the efficiency of agriculture in India. While asked the respondent whether the blockchain technologies is not widely used by Indian farmers. 35.7 percentage of people responded as strongly agree and another 35.7 percentage of people were in support of Agree and 28.6 percentage people were neutral in their opinion. Another question from the responder were Is agriculture industry exploring the potential of blockchain in India. 7.1 percentage of people responded as strongly agree and another 42.9 percentage of respondent were in support of Agree and 21.4 percentage of respondent were neutral in their opinion.21.4 percentage of respondent disagreed and 7.1 percentage of respondent strongly disagree with this statement.

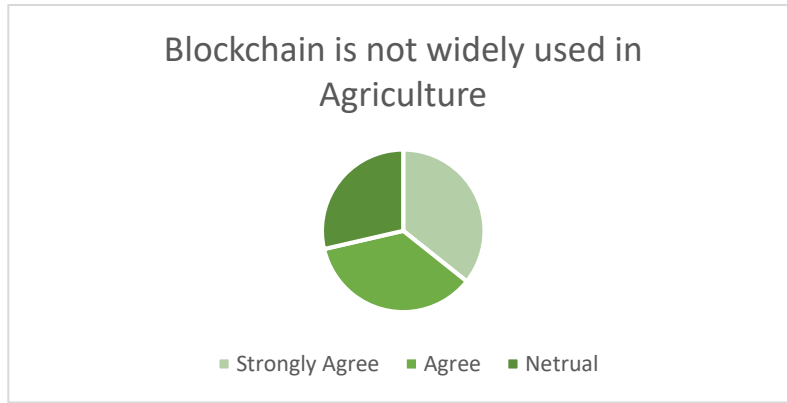


CHART 1

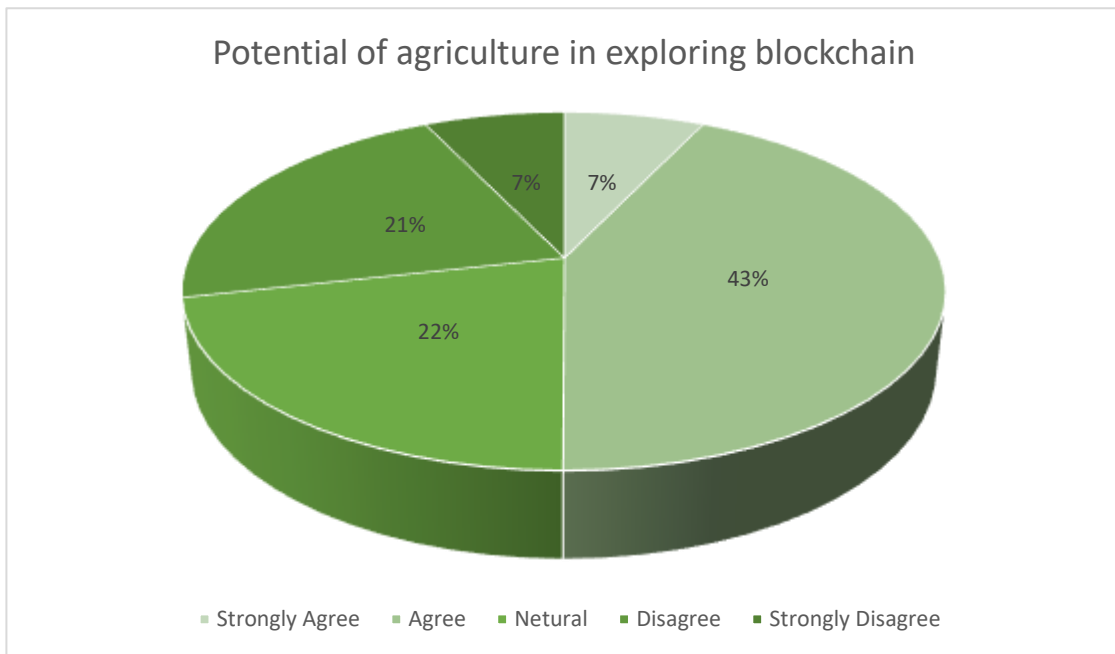


CHART 2

Demographic Profile of participants

Chart 1 represents the gender of participants who took the survey through google form.

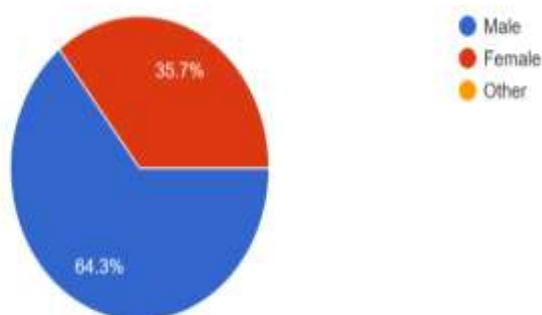


Chart 1 demonstrate that 64.3% are male indicated in blue colour and 35.7% are female participants indicated in red colour.

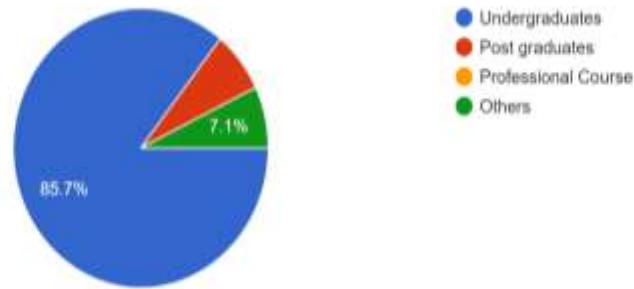


Chart 2

Chart 2 represents the educational qualifications. And it indicates that the mass participants are undergraduates.

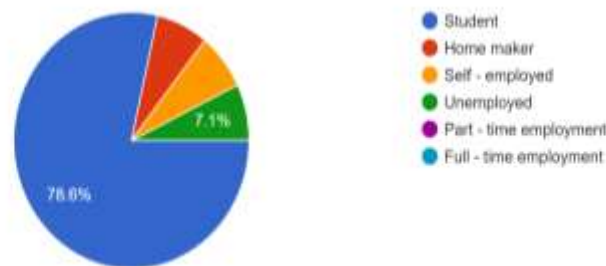


Chart 3

Chart 3 represents the employment type. And it indicates that the mass participants are students in this survey.

CONCLUSION

Tech has been a game changer in terms of the agriculture industry, the tech has provided people with new ways to improve their operations and increase their yields. Tech like sensors to drones provide real-time data which provides insight into the health of the crops and how the soil quality has improved or the soil quality is depleted. It also reduces labor costs and improves safety, the benefits of technology are numerous.

The first and most significant advantage of tech in agriculture would be to increase the quality and quantity of the farm yields/the tech of precision agriculture gets us insights into moisture level, nutrient factors, and other variables which can prove to be quite valuable to the farmer. They can monitor their lands to make better decisions regarding when to fertilise or plant and harvest their crops, leading to higher yields and greater profits.

Apart from this, tech can also help with labour costs and safety. Automated machineries like tractors and harvesters can perform tasks more efficiently and help the farmer grow. This in turn reduces the risk of accidents and injuries in the farmlands.

The ease of access that tech provides for access to new a=markets can also be substantial to analyse the trends price graph and also supply and demand variable in the market for a farmer to make informed decisions to increase profits substantially ecotechnological advancements that will revolutionize the way agriculture is done and also ensure the efficiency, effectiveness, and production of the farmlands are at the maximum.

1. Drones
2. Soil sensors
3. Automated irrigation systems
4. GPS technology
5. Farm management software
6. Precision agriculture
7. Automated harvesters
8. Livestock monitoring systems
9. Mobile apps

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10. Autonomous tractors
 11. Blockchain technology
 12. Artificial intelligence
 13. Electronic marketplaces
 14. Biotechnology
 15. Crop monitoring systems
 16. Robotic milking machines
 17. Hydroponics
 18. Smart pest management systems
 19. Renewable energy sources
 20. Vertical farming