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Adoption and Usage of New Technolofies in Farming: A Study Farmers in Coimbatore City

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ABSTRACT

Modern agricultural technology implementations such as precision agriculture and AI-powered monitoring but also drones and mobile applications have proven able to enhance production while reducing costs and enhancing operational efficiency. Indian agriculture remains the main economic driver while facing enduring problems which include low output and restricted market opportunities and climate-related risks. This research project investigates the current levels of new technological adoption and utilization by farmers located in Coimbatore City within the region of Tamil Nadu. The research used a survey to analyse how 110 farmers understood and felt about existing technologies and what challenges they encountered. The survey reveals that although 63.6% of farmers detect new technology their implementation faces barriers due to insufficient funding together with inadequate training facilities and inadequate infrastructure. While precision irrigation systems and weather forecasting mobile applications led all technological applications among farmers there is broad acceptance slowed by the high initial cost and insufficient digital abilities among users. Statistics show that farm size directly correlates with increased crop productivity together with better quality of production. Whether one received government farming programs was not determined by yearly income levels. Digital and automated farming solutions continue to grow in popularity though dilemmas such as insufficient technical know-how alongside insecure internet connectivity and financial shortfall act as barriers to widespread implementation. To minimize this gap the study advises authorities to enhance subside programs together with internet expansion efforts while training farmers through practical initiatives. The adoption process would likely gain even greater speed when networks get strengthened and specialized technology solutions are developed for each geographic area. Modern agricultural techniques in Coimbatore region will establish sustainable food security systems alongside economic stability through addressing these mentioned challenges.

Keywords: Agriculture, Technology Adoption, Precision Farming, Coimbatore, Farmer Awareness, Digital Agriculture.

INTRODUCTION TO THE STUDY

Millions of people in India depend on the agricultural industry for their lives, making it the foundation of the country's economy. Low productivity, restricted market access, and climate change susceptibility are just a few of the many issues facing the industry. Farmers must embrace new technologies that can boost

crop yields, lower expenses, and increase farming efficiency in order to overcome these obstacles. The use of modern technology in farming, including drones, satellite imagery, smartphone apps, and precision agriculture, has gained popularity in recent years. By giving farmers access to real-time data and insights that may guide their decision-making, these technologies have the potential to completely change the agriculture industry.

For example, precision agriculture uses GPS and sophisticated sensors to track temperature, moisture content, and other environmental variables, allowing farmers to maximize crop yields and minimize waste. Drones with cameras and sensors can also be used to measure crop yields, qaw3dfidentify pests and diseases, and monitor crop health. Farmers can use satellite imaging to make educated decisions about planting, irrigation, and harvesting by gaining important insights into weather patterns, soil moisture, and crop health. By giving farmers access to weather forecasts, market data, and professional guidance, mobile apps can help them make well-informed decisions regarding their farming operations.

Another issue is that many farmers may find it difficult to accept new technologies due to their high cost. The adoption and application of new technologies in farming may also be hampered by a lack of infrastructure and support services, such as internet access and technical assistance. Many farmers in Tamil Nadu's Coimbatore City are involved in a variety of farming pursuits, making it a significant agricultural centre. Although the city's textile industry is its most well-known sector, agriculture plays a vital role in the local economy. However, little is known about how Coimbatore City farmers are utilizing and adopting new farming technologies.

STATEMENT OF THE PROBLEM

The ability of farmers in Coimbatore city to increase productivity, efficiency, and profitability has been hampered by the adoption and use of modern technologies in farming. Many farmers in the area still use outdated techniques, which limits their access to markets, lowers their yields, and makes them less competitive, even in spite of the potential advantages of new technologies. The purpose of this study is to look at the factors that affect Coimbatore city farmers' acceptance and use of modern farming technologies.

OBJECTIVES OF THE STUDY

- To know the level of awareness of new farming technologies among farmers in Coimbatore city.
- To understand the existing farming practices among farmers.
- To know the level of improvement in production after the implementation of new technologies.
- To measure farmer’s level of satisfaction with the technologies they are currently using.
- To identify the challenges faced by farmers when using new farming technologies and practices.

SCOPE OF THE STUDY

The study's main objective is to investigate how Coimbatore City farmers are utilizing and adopting modern farming technologies. It looks at the variables affecting the adoption of technology and how it affects agricultural productivity. Only Coimbatore, Tamil Nadu, India, is included in the study. Farmers that have embraced modern agricultural technologies are the subjects of the study.

RESEARCH METHODOLOGY

A systematic research methodology is essential for conducting a structured and scientific evaluation of the research problem. The selection of appropriate methods enhances the reliability and accuracy of the study's

findings. This research aims to analyse the adoption and usage of new technologies in farming among farmers in Coimbatore City.

STUDY AREA

The data for the study was collected from respondents from Coimbatore.

COLLECTION OF DATA

Data collection is one of the most important aspects of the study. The data is collected from both primary and secondary sources by convenience sampling technique.

PRIMARY DATA

The primary data are those which are collected from the respondents through the questionnaire.

TOOLS USED FOR ANALYSIS

- Simple percentage analysis
- Chi-square Test
- One way Anova

LIMITATIONS OF THE STUDY

- The study is limited to farmers in Coimbatore city, which may not be representative of all farmers in the country.
- Considering only 110 surveys, the sample size is small and could not provide enough information for a thorough and in-depth study.

REVIEW OF LITERATURE

Sharma, P., & Reddy, P. (2020). Examines the impact of ICT tools on Indian agriculture. It focuses on mobile applications, digital platforms for market access, and online extension services. It finds that ICT tools are enhancing productivity but are hindered by low digital literacy and infrastructure gaps.

Rajendran, M., & Kumaravel, M. (2020). Explores how socio-economic factors influence the adoption of smart farming technologies such as automated irrigation systems and sensors. It concludes that factors such as farmers' income, access to training, and perceived profitability are key determinants.

Mahapatra, R., & Sahu, B. (2020). This paper investigates how digital extension services, including mobile-based applications and online platforms, have accelerated the adoption of new technologies among Indian farmers. It concludes that while digital services increase access to information, challenges like low internet penetration still persist.

Benefits of New Technologies in Farming

There are several advantages to using new technologies in farming. Precision agriculture, automation, and data analytics reduce labour and time, maximize crop yields, and eliminate waste, all of which boost productivity and efficiency. This leads to better crop yields and quality by empowering farmers to make well-informed decisions, spot issues early, and encourage healthy crop growth. Farmers may enhance agricultural yields, cut waste, and efficiently manage resources by using data analytics to obtain meaningful information on soil conditions, weather patterns, and crop health. Additionally, mobile

banking and digital payment technologies speed transactions, enhancing farmers' income and well-being, while digital platforms give farmers direct access to buyers, boosting profitability. All things considered, these tools improve farmers' productivity, ability to make decisions, and access to markets and financial services.

Future Directions and Trends in New Technology Adoption in Farming

Future agricultural practices could be significantly impacted by the adoption of new technologies. Farmers will be able to predict weather patterns and optimise crop production with the increased use of AI, machine learning, and data analytics. Automation and real-time farm operations monitoring will be made possible by the integration of Internet of Things (IOT) sensors and devices. The utilisation of robotics, drones, and satellite imaging will all continue to advance precision agriculture. Additionally, advancements like LED lighting and hydroponics will propel the growth of urban agriculture and vertical farming. These advancements will increase agricultural efficiency, sustainability, and productivity, ensuring future food security.

Challenges and Limitations of New Technologies in Farming

Adoption of agricultural technology is hindered by several obstacles and constraints. Adoption is hindered by high upfront costs and limited accessibility, particularly for small-scale farmers. Inadequate infrastructure exacerbates technological issues, such as poor internet connectivity and low digital literacy. Environmental concerns such soil erosion, water use, and potential contamination must also be taken into account. Social and cultural barriers, such ignorance and resistance to change, make the issue even more complex. The digital divide between urban and rural regions may limit access to new technology. To overcome these challenges, focused aid, inclusive laws, and capacity-building initiatives are essential.

ANALYSIS AND INTERPRETATION

SIMPLE PERCENTAGE ANALYSIS

AGE OF THE RESPONDENTS

Age	No. of Respondents	Percentage
18-30 years	11	10
31-45 years	44	40
46-60 years	49	45.5
60 and above	6	5.5
Total	**110**	**100**

(**Source: Primary Data)**

INTERPRETATION

The above table shows that out of 110 respondents, 10% of the respondents are in the age group of 18-30 years, 40% of the respondents are in the age group of 31-45 years, 45.5% of the respondents are in the age group of 46-60 years, and 5.5% of the respondents are 60 and above.

EDUCATIONAL QUALIFICATION OF THE RESPONDENTS

Education	No. of Respondents	Percentage
Primary education	23	20.9
Secondary education	49	44.5
Under Graduate	24	21.8
Post graduate	8	7.3

Diploma/ Certificate in agriculture	6	5.5
Total	**110**	**100**

(Source: Primary Data)

INTERPRETATION

The above table shows that out of 110 respondents, 20.9% have primary education, 44.5% have secondary education, 21.8% are graduates, 7.3% are postgraduates, and 5.5% have a diploma/certificate in agriculture.

MARITAL STATUS OF THE RESPONDENTS

Marital status	**No. of Respondents**	**Percentage**
Married	96	87.3
Unmarried	14	12.7
Total	**110**	**100**

(Source: Primary Data)

INTERPRETATION

The above table shows that out of 110 respondents, 87.3% are married and 12.7% are unmarried.

ANNUAL INCOME OF THE RESPONDENTS

Annual income	**No. of Respondents**	**Percentage**
Below ₹1,00,000	12	10.9
₹1,00,000- ₹3,00,000	59	53.6
₹3,00,000- ₹5,00,000	28	25.5
Above ₹5,00,000	11	10
Total	**110**	**100**

(**Source: Primary Data)**

INTERPRETATION

The above table shows that out of 110 respondents, 10.9% have an annual income below ₹1,00,000, 53.6% have an annual income between ₹1,00,000- ₹3,00,000, 25.5% have an annual income between ₹3,00,000- ₹5,00,000, and 10% have an annual income above ₹5,00,000.

AREA OF THE RESPONDENTS

Area	**No. of Respondents**	**Percentage**
Urban	47	42.7
Rural	54	49.1
Semi urban	9	8.2
Total	**110**	**100**

(Source: Primary Data)

INTERPRETATION

The above table shows that out of 110 respondents, 42.7% are from urban areas, 49.1% are from rural areas, and 8.2% are from semi-urban areas.

CHI SQUARE ANALYSIS

TABLE SHOWING THAT COMPARISON BETWEEN AGE AND AWARENESS OF NEW TECHNOLOGIES

AGE	AWARENESS OF NEW TECHNOLOGIES					Total
	Very much aware	Aware	Moderate	Not much aware	Not at all	
18-30 years	0	9	2	0	0	11
31-45 years	0	30	12	0	2	44
46-60 years	2	27	12	2	6	49
60 and above years	0	4	0	2	0	6
Total	**2**	**70**	**26**	**4**	**8**	**110**

(Source: Primary Data)

CHI-SQUARE TEST

Calculated value	Table value	Degree of freedom	Level of significance	Results
25.52	21.03	12	0.05	Rejected

(Source: Primary Data)

INTERPRETATION

The table deals with the calculated value of X2 **(25.52)** is greater than the table value **(21.03)** so the null hypothesis is rejected and the alternative hypothesis is accepted. Hence it can be concluded that there is a significant relationship between Age of the respondents and Awareness of new technologies.

TABLE SHOWING THAT COMPARISON BETWEEN EDUCATIONAL QUALIFICATION AND TECHNOLOGIES USED IN FARMING

EDUCATIONAL QUALIFICATION	TECHNOLOGIES USED IN FARMING					Total
	Autonomous Tractors	Ai- Powered crop monitoring	Precision irrigation systems	Automated farming equipment	Mobile apps for weather forecasting	

Primary Education	10	0	2	3	8	23
Secondary Education	19	6	8	4	12	49
Under Graduate	6	0	6	1	11	24
Post Graduate	0	0	2	4	2	8
Diploma/ Certificate in agriculture	0	0	2	0	4	6
Total	**35**	**6**	**20**	**12**	**37**	**110**

(Source: Primary Data)

CHI-SQUARE TEST

Calculated value	Table value	Degree of freedom	Level of significance	Results
34.52	26.30	16	0.05	Rejected

(Source: Primary Data)

INTERPRETATION

The table deals with the calculated value of X2 **(34.52)** is greater than the table value **(26.30)** so the null hypothesis is rejected and the alternative hypothesis is accepted. Hence it can be concluded that there is a significant relationship between Educational Qualification and Technologies used in farming.

ONE WAY ANOVA

RELATIONSHIP BETWEEN ANNUAL INCOME AND REDUCING LABOUR COSTS THROUGH TECHNOLOGY

ONE WAY ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.302	3	0.434	0.745	0.528
Within Groups	61.752	106	0.583		
Corrected Total	63.055	109			

(Source: Primary Data)

INTERPRETATION

The calculated value (0.528) is greater than the significant value (0.05), so the null hypothesis is accepted. Hence it can be concluded that there is no relationship between Annual income and Reducing labour costs

through technology.

RELATIONSHIP BETWEEN SIZE OF THE FARM AND IMPROVING CROP QUALITY THROUGH TECHNOLOGY

ONE WAY ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.568	4	2.829	2.525	0.045
Within Groups	120.286	105	1.146		
Corrected Total	131.855	109			

(Source: Primary Data)

INTERPRETATION

The calculated value (0.045) is greater than the significant value (0.05), so the null hypothesis is accepted. Hence it can be concluded that there is no relationship between size of the farm (in acres) and improving crop quality through technology.

SUGGESTIONS

- To increase farmers' confidence in implementing cutting-edge farming techniques, hold workshops, seminars, and practical training sessions to inform them about contemporary agricultural technologies.
- Increase subsidies, grants, and low-interest loans to help small-scale farmers while ensuring that cutting-edge agricultural equipment is accessible at affordable prices through cooperation between the public and private sectors.
- Increase internet access in agricultural areas to offer real-time weather information, market prices, and advisory services. Additionally, promote farming technology that are appropriate for the soil and climate of Coimbatore.
- To encourage the adoption of new technologies, assist farmer cooperatives and innovation hubs where farmers may exchange information, test new technologies, and work with government agencies and academic institutions.

CONCLUSION

This study investigates the factors influencing the adoption of new farming methods in Coimbatore City. Although awareness is growing, actual adoption is contingent upon training, financial support, farm size, and education. While income has minimal bearing on the advantages of government programs, age and education have a big impact on the adoption of technology. Farm size has a significant impact on crop quality and output, necessitating customized solutions. High upfront expenses and a lack of technical expertise, however, continue to be significant obstacles. Adoption is made more difficult by limited access to financial aid and government support. Farmers also have to deal with issues like bad connectivity and technical problems. Small-scale farmers find it challenging to adopt cutting-edge techniques because of these problems.

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