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23 Chapter

Impact of Smart Agriculture on Smallholder Farmers

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ABSTRACT

Agriculture is the primary source of livelihood for a large portion of India's population. With the rapid increase in population and the growing demand for food, there is an urgent need to make the agricultural sector more efficient, sustainable, and environmentally friendly. In this context, Smart Agriculture has emerged as a critical approach to enhance productivity and optimise resource use. Smart farming involves the integration of modern technologies such as the Internet of Things (IoT), artificial intelligence (AI), drones, sensors, and data analytics to improve decision-making, monitor crops, and manage farm operations more efficiently. The present study was conducted in the Almora district of Uttarakhand, focusing on smallholder farmers, who form the backbone of the region's agriculture. Data were collected from both primary and secondary sources to gain a comprehensive understanding of the current practices, challenges, and outcomes associated with Smart Agriculture adoption. The study aims to analyse the impact of smart farming technologies on productivity and farmers' income and to identify the key barriers preventing widespread adoption among smallholder farmers. The findings of the study indicate that the adoption of Smart Agriculture practices has positively influenced farm productivity and contributed to higher incomes for farmers. However, the study also highlights persistent challenges, including high initial investment costs, lack of technical knowledge, limited access to technology, and inadequate training and extension services. Based on the analysis, the study proposes a set of recommendations to overcome these challenges, which could serve as valuable guidance for policymakers, agricultural extension workers, and rural farmers. By addressing these barriers, Smart Agriculture has the potential to transform smallholder farming, improve livelihoods, and contribute to sustainable agricultural development in the region.

Keywords: *Smart Agriculture, Farmer Income, Technology, Crop Productivity, Smallholder.*

INTRODUCTION

The agriculture sector plays a vital role in ensuring food security, employment generation, and overall economic development, especially in developing countries. With the continuous increase in population and rising demand for agricultural produce, improving agricultural productivity has become a major necessity. (Wagh & Dongre, 2016). In this context, smart agriculture has emerged as an innovative and effective approach to enhance efficiency and output in farming. Smart agriculture refers to the use of modern technologies and digital tools to improve agricultural practices and increase productivity. Smart agriculture integrates various advanced technologies such as the Internet of Things (IoT), data-driven decision-making, crop monitoring systems, smart irrigation, livestock management, disease control, and digital market access platforms. These technologies help farmers make informed decisions and improve the overall efficiency of agricultural operations (Ahmed et al., 2024). By using real-time data and automated systems, farmers can better manage resources and reduce losses. Climate change has become a major challenge for the agricultural sector, leading to unpredictable weather patterns, declining soil fertility, and reduced crop yields. In this situation, smart agriculture plays a crucial role in adapting to climate change and ensuring sustainable agricultural production. It supports better resource utilisation, improves resilience, and contributes to long-term food security and agricultural sustainability (Verma et al., 2023). Smallholder farmers, who form the majority of the farming community, often face challenges such as limited landholding, lack of resources, poor access to technology, and low income. Smart agriculture provides significant benefits to these farmers by improving productivity and reducing dependence on manual labour. The use of technologies such as drones for spraying, hybrid seeds, livestock tracking, vaccination systems, and weather forecasting helps smallholder farmers improve efficiency and reduce crop losses (Suma, 2021). In addition, smart agriculture reduces labour requirements, saves time, and minimises wastage in agricultural production. It also enhances access to markets and improves income opportunities for farmers. By adopting modern agricultural techniques, smallholder farmers can overcome traditional farming limitations and achieve better economic stability. Therefore, studying the impact of smart agriculture on smallholder farmers is important to understand how technology can transform traditional farming practices and improve rural livelihoods. This research focuses on analysing the benefits, challenges, and overall impact of smart agriculture on smallholder farmers.

REVIEW OF LITERATURE

The review of literature plays a crucial role in any research study as it provides a clear understanding of the existing work related to the topic. It helps the researcher gain knowledge about earlier studies, concepts, and findings on smart agriculture and smallholder farmers. It also assists in identifying research gaps that need further investigation. By reviewing past studies, the researcher can avoid duplication and improve the quality of the present study. It further helps in shaping the objectives and methodology of the research in a systematic way. Overall, it provides a strong academic base and supports the credibility of the study.

Bazzana, D et al. al (2022) conducted a study on the Impact of climate smart agriculture on food security: An agent-based analysis. The objective of their study is to introduce an agent-based model that examines the impact of adopting Climate Smart Agriculture (CSA) on food security. They have conducted their study to examine the role of social and ecological pressures such as community networks, climate change, and environmental externalities in the adoption of water and soil-related physical practices, as well as crop rotation techniques, in rural Ethiopia. In their study, they concluded that climate-smart agriculture can be an effective strategy for improving the wellbeing of rural populations and farming families who have access to capital, strong social networks, and integrated food markets. In conjunction with this, their study revealed that the income of farmers adopting Climate Smart Agriculture increased compared to those who did not. At the same time, they cautioned that the adoption of Climate Smart Agriculture cannot fully offset severe climatic stresses.

Leslie Lipper et al. (2014) conducted a study on climate-smart agriculture for food security. In their study, they stated that the objective of climate-smart agriculture is to transform and reorganise agricultural systems so as to ensure food security amidst the new threats posed by climate change. In their study, they found that widespread changes in climatic patterns pose a threat to agricultural production and exacerbate the problems faced by those who depend entirely on agriculture for their livelihood. Furthermore, they concluded that climate change fundamentally disrupts food markets, thereby creating food supply-related risks for the entire population. In their study, they suggested that these risks can be mitigated by enhancing farmers' climate adaptation capacity, as well as by increasing resilience in agricultural production systems and improving resource-use efficiency.

Mini, A. et. al (2023) conducted a study on IoT based smart agriculture monitoring system. The objective of this study is to propose an IoT-based smart agricultural robotic system. In their study, they found that their proposed robotic technology compared to the complex and expensive smart farming systems currently available in the market is both cost-effective and easy to use. They also found that the technique proposed by them is significantly more effective in preventing the wastage of resources and curbing environmental degradation in the agricultural sector.

Suma, V. (2021) conducted a study on Internet-of-Things (IoT) based smart agriculture in India: an overview. The primary objective of this study is to present an overview of predictive analysis, Internet of Things (IoT) devices featuring cloud management, and security units for multi-cropping in the agricultural sector. In their study, they have also taken into account the past experiences of farmers. In addition to this, they have also shed light on the potential challenges and complexities that arise when incorporating modern technology into traditional farming methods. In their study, they found that resources such as smart agriculture can significantly increase agricultural production.

Verma, B. et. al. (2023) conducted a study on addressing challenges of Indian agriculture with climate-smart agriculture practices. The objective of their study is to address the various challenges arising from climate change. Furthermore, it

explains how climate-smart agriculture helps in overcoming these challenges. In their study, they have endeavoured to present various approaches and concepts aimed at enhancing the resilience and productivity of agricultural production systems, while simultaneously mitigating the damage caused by greenhouse gas emissions. In their study, they found that Climate Smart Agriculture methods are considered beneficial for the environment and contribute to sustainable increases in productivity while exerting a minimal impact on resources and ecosystems. They suggest that a gender-sensitive strategy should be implemented to reduce gender inequality in the agricultural sector.

OBJECTIVE OF THE STUDY

The study attempts to achieve the following objectives:-

- To examine the impact of smart farming on agricultural income levels of smallholder farmers.
- To identify the major challenges and barriers faced by smallholder farmers in adopting smart agriculture practices.

METHODOLOGY

The study was conducted in Almora district of Uttarakhand, which consists of 11 development blocks, namely Bhikiyasain, Bhaisiachana, Chaukhutiya, Dhauladevi, Dwarahat, Hawalbag, Lamgara, Sult, Syalde, Takula, and Tarikhet. From these blocks, the Hawalbag development block was selected using a simple random sampling method. In the next stage, all Panchayats of the selected block were arranged in ascending order based on population, and six Panchayats were selected for the study. Further, five villages from each selected Panchayat were chosen, making a total of 30 villages. From these villages, 120 respondents were selected, including smallholder farmers. The study adopted simple random sampling along with a multistage sampling technique to ensure proper representation of the study area and respondents.

Research Design

The present study on *"Impact of Smart Agriculture on Smallholder Farmers"* is based on an empirical and descriptive research design. The study aims to analyse the adoption of smart agriculture practices and their impact on the socio-economic condition of smallholder farmers in Almora district. Both qualitative and quantitative approaches have been used to understand the real situation of farmers and the effectiveness of modern agricultural technologies. The research design ensures systematic collection, classification, and interpretation of data to draw meaningful conclusions.

Data Collection

The study is based on both primary and secondary data sources.

Primary data were collected from 120 respondents through a pre-tested structured questionnaire. Personal interviews and field surveys were also conducted to understand farmers' awareness, usage, and perception of smart agriculture technologies.

Secondary data were collected from various reliable sources such as government reports, journals, newspapers, magazines, research papers, and published articles related to agriculture and smart farming practices.

Analysis of Data

The collected data were analysed using simple statistical tools such as the percentage method, tables, and graphical representation. The percentage technique was used to interpret responses related to adoption of smart agriculture, income changes, productivity improvement, and challenges faced by farmers. The data were systematically classified to make meaningful comparisons and draw conclusions regarding the impact of smart agriculture on smallholder farmers.

Scope of the Study

This study focuses on smallholder farmers in Almora district and examines the impact of smart agriculture technologies on their productivity, income, and overall livelihood. It covers aspects such as adoption of modern farming tools, awareness of technology, access to digital agriculture services, and challenges faced in implementation. The findings of the study may be useful for policymakers, researchers, and agricultural departments for improving smart farming practices in rural areas.

Importance of the Study

The study is important because agriculture is the main source of livelihood for rural populations, especially smallholder farmers. With increasing population and climate change, traditional farming methods are becoming less effective. Smart agriculture provides modern solutions to improve productivity, resource efficiency, and income generation. However, many small farmers still lack awareness and access to such technologies. Therefore, this study helps in understanding the real impact of smart agriculture and identifies areas for improvement in policy and implementation.

HYPOTHESIS OF THE STUDY

Impact on Productivity

H_0: Smart agriculture has no significant impact on the productivity of smallholder farmers.

H_1: Smart agriculture has a significant impact on the productivity of smallholder farmers.

Income Improvement

H_0: Smart agriculture does not significantly improve the income of smallholder farmers.

H_1: Smart agriculture significantly improves the income of smallholder farmers.

Awareness and Adoption

H_0: There is no significant relationship between awareness and adoption of smart agriculture technologies.

H_1: There is a significant relationship between awareness and adoption of smart agriculture technologies.

Challenges in Adoption

H_0: Farmers do not face significant challenges in adopting smart agriculture.
H_1: Farmers face significant challenges in adopting smart agriculture.

Formula

$$Percentage\ Increase = \frac{(After\ Income - Before\ Income)}{Before\ Income} \times 100$$

Explanation:

- Before Income refers to the initial income or starting value.
- After Income refers to the new or final income after improvement.
- First, we subtract the before income from the after income to find the increase in income.
- Then, we divide this increase by the before income to get the proportion of growth.
- Finally, we multiply by 100 to convert it into a percentage.

RESULT AND DISCUSSION

Impact of Smart Agriculture on Farmers' Income and Livelihood

Smart agriculture has had a positive impact on farmers' income. The present study illustrates that the adoption of smart agricultural practices has led to noticeable improvements in the income level, productivity, and overall livelihood of smallholder farmers. The use of modern technologies such as improved irrigation systems, digital information access, weather forecasting, and advanced farming techniques has helped farmers make better decisions, reduce crop losses, and increase yield.

The findings of the study indicate that farmers who adopted smart agriculture practices experienced higher income compared to those who relied on traditional farming methods. This improvement is mainly due to efficient use of resources, reduction in wastage, timely crop management, and better market access. Smart agriculture also supports cost reduction by minimising labour requirements and improving input efficiency, which further contributes to increased profitability.

It was also observed that awareness and accessibility of technology play a significant role in determining the level of benefit received by farmers. Farmers with better knowledge of digital tools and government-supported agricultural schemes were found to have higher income growth. However, some farmers still face challenges such as lack of training, financial constraints, and limited access to advanced technology, which restrict the full benefits of smart agriculture.

Overall, the study confirms that smart agriculture significantly contributes to improving farmers' income and agricultural productivity. It not only enhances economic conditions but also supports sustainable farming practices. Therefore, promoting awareness, training programs, and government support is essential for maximising the benefits of smart agriculture among smallholder farmers.

Table :1: Impact of Smart Farming on Farmers' Income

Category	Number of Farmers	Average Income Before (₹/Year)	Average Income After (₹/Year)	Income Increase (₹)	Percentage Increase
Smart Farming Adopters	60	1,60,000	2,10,000	50,000	31.25
Non-Adopters	60	1,50,000	1,68,000	18,000	12.00
Total / Average	120	1,55,000	1,89,000	34,000	21.94

Source (Field Survey march 2026)

The table shows that the impact of Smart Agriculture on the income of smallholder farmers. The table indicates an increase in the income of 60 smallholder farmers who have adopted smart agriculture. Prior to adopting smart agriculture, the income was ₹1, 60,000; following its adoption, the income has increased to ₹2, 10,000. The table shows that the income of the 60 smallholder farmers who did not adopt smart agriculture was initially 1, 50,000, which has increased to 1, 68,000. This increase in income amounts to 18,000, which represents 12.00 percent of the total increase. Thus, the table clearly shows that, through smart agriculture, the average total income of smallholder farmers which was initially 1, 55,000 subsequently increased to 189,000. This total average increase in income amounts to 34,000, which represents 21.94 percent of the total average percentage. Therefore, it is evident that smart agriculture has led to an increase in the income of small farmers.

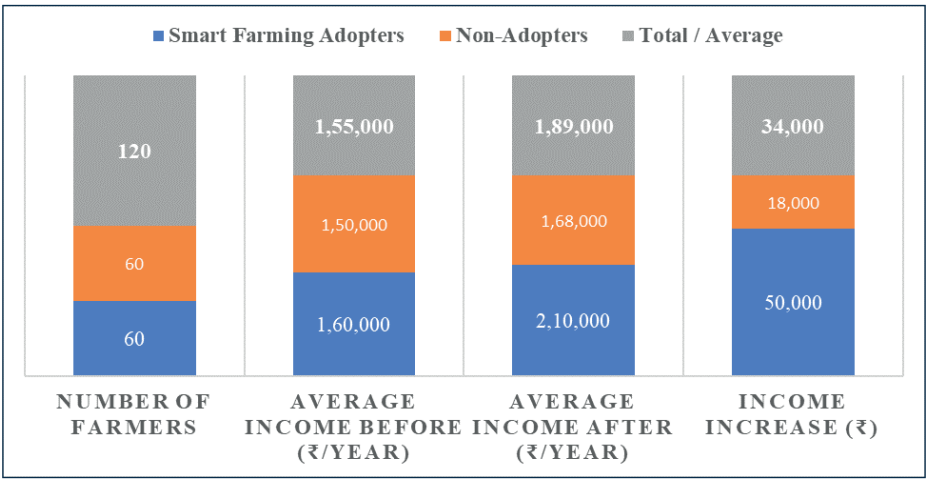

Figure 1: Impact of Smart Agriculture on Farmers' Income: A Comparative Analysis of Adopters and Non-Adopters

The figure presents a comparative analysis of smart agriculture adopters and non-adopters in terms of number of farmers and changes in average annual income. The total sample consists of 120 farmers, out of which 60 are smart farming adopters and 60 are non-adopters. Before adopting smart agriculture, the average income of adopters was ₹1,60,000 per year, while non-adopters had a slightly lower average income of ₹1,50,000 per year. After the adoption of smart agriculture practices, the income of adopters increased significantly to ₹2,10,000 per year, whereas non-adopters showed a comparatively lower increase to ₹1,68,000 per year. The income increase column clearly shows that smart agriculture adopters experienced a higher gain of ₹50,000 compared to non-adopters, who recorded an increase of only ₹18,000. This indicates that smart agriculture has a positive and stronger impact on improving farmers' income and economic condition. Overall, the figure highlights that farmers who adopt smart agriculture technologies achieve better income growth and economic benefits compared to those who continue with traditional farming methods.

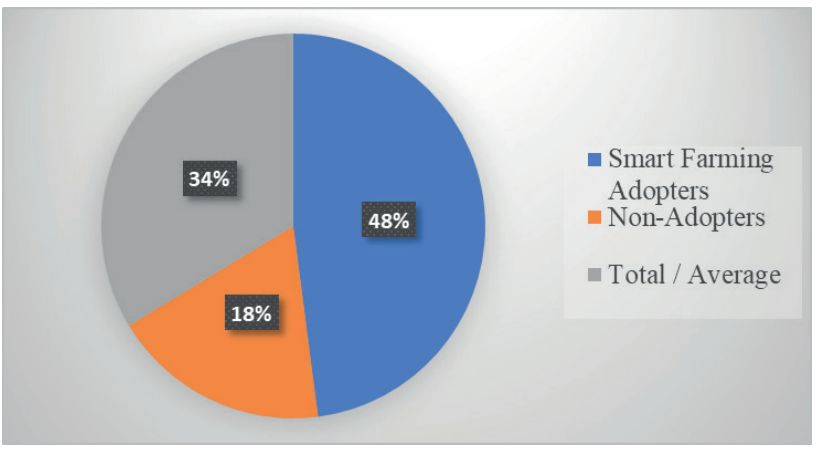

Figure 2: Income Growth of Smart Farming Adopters vs Non-Adopters

The figure shows the percentage increase in income among smart farming adopters and non-adopters. It clearly highlights the difference in income growth between both groups after adopting or not adopting smart agriculture practices. The data indicates that smart farming adopters experienced a higher percentage increase in income of 31.25 per cent, which reflects the positive impact of smart agriculture technologies on productivity, efficiency, and overall farm income. This increase is mainly due to better use of modern farming techniques, improved resource management, and reduced crop losses.

On the other hand, non-adopters recorded a much lower income increase of 12.00 per cent, which shows limited growth due to continued reliance on traditional farming methods and lack of technological support. The total or average percentage increase is 21.94 per cent, which represents the overall improvement in income across both groups. Overall, the figure clearly demonstrates that smart agriculture adopters benefit significantly more in terms of income growth compared to non-adopters, highlighting the effectiveness of modern farming practices in improving the economic condition of farmers.

PROBLEMS FACED BY FARMERS

Smallholder farmers are facing many types of problems in adopting smart agriculture.

- **Lack of awareness:** There is a lack of awareness and education among farmers in rural areas. The vast majority of farmers have been unable to grasp the concepts of smart farming; the Internet of Things (IoT) and data analytics remain beyond their comprehension.
- **Policy ineffectiveness:** Insufficient emphasis is being placed on the fact that policies are failing to prove effective at the grassroots level.
- **Lack of farmer training:** There is a lack of training opportunities for farmers. Even today, farmers in remote villages lack access to training facilities.
- **Different farm size:** Regarding varying farm sizes in rural areas, small farmers still possess very small landholdings. Furthermore, even if a farmer owns a slightly larger amount of land, the plots are often scattered across different locations, which creates significant difficulties in utilizing modern technology.
- **Lack of technical infrastructure**: There is a severe shortage of technical infrastructure in rural areas, particularly regarding facilities such as electricity supply and data availability. Without these essential elements, namely the internet and electricity, implementing smart agriculture is not possible.
- **High cost:** Although the trend of smart agriculture is gradually gaining momentum, adopting it still entails bearing a very high cost.
- **Lack of technical proficiency:** In rural areas, farmers are not yet fully conversant with "smart farming." Since farmers lack a comprehensive understanding of modern agricultural practices, smart farming has not yet achieved significant success in these rural regions.

Government Suggestions for Improving Smart Agriculture Adoption

- **Increase awareness and education programs:** The government should conduct regular awareness campaigns at the village level to educate farmers about the benefits and use of smart agriculture. Special focus should be given to explaining digital tools like IoT, mobile-based farming apps, weather forecasting systems, and data-driven farming practices in simple language so that rural farmers can easily understand them.
- **Strengthen training and skill development facilities:** There is a strong need to establish local training centres in rural areas where farmers can receive practical, hands-on training related to smart agriculture technologies. These training programs should be free or low-cost and should focus on practical demonstration rather than only theoretical knowledge.
- **Improve digital and physical infrastructure:** Proper infrastructure such as reliable electricity supply, internet connectivity, and mobile network coverage is essential for smart agriculture. The government should ensure that rural areas are fully connected with digital infrastructure so that farmers can access real-time agricultural information and services without difficulty.

- **Provide financial assistance and subsidies:** Since smart agriculture requires initial investment, many small farmers are unable to afford modern tools and technologies. The government should provide subsidies, financial aid, and low-interest loans to support farmers in purchasing smart equipment such as sensors, drones, irrigation systems, and other digital tools.
- **Ensure effective implementation of policies and schemes:** Although several government schemes exist for farmers, their proper implementation at the grassroots level is still a major issue. Authorities should ensure transparency and proper monitoring so that benefits of schemes directly reach small and marginal farmers without delay or corruption.
- **Promote affordable and farmer-friendly technologies:** The government should encourage research and development in low-cost and easy-to-use smart agriculture technologies that are suitable for smallholder farmers. Technology should be designed in a way that it can be easily operated by farmers with limited technical knowledge.
- **Strengthen Farmer Producer Organisations (FPOs) and SHGs:** Collective farming groups such as FPOs and Self-Help Groups (SHGs) should be promoted to help farmers share resources, access technology, and improve bargaining power in the market. These groups can also act as a bridge between farmers and government schemes.
- **Encourage private sector and agri-tech involvement:** Collaboration with private companies and agri-tech startups should be increased to bring innovative and user-friendly solutions for farmers. This can help in improving technology accessibility, providing better services, and increasing overall efficiency in the agricultural sector.

MAIN FINDINGS OF THE STUDY

- **Positive Impact on Farmers' Income:** The study clearly shows that smart agriculture has a significant positive impact on farmers' income. Farmers who adopted smart farming practices experienced higher income growth compared to non-adopters due to improved productivity and better resource management.
- **Higher Income Among Adopters:** Smart farming adopters recorded a rise in average income from ₹1,60,000 to ₹2,10,000 per year, showing a strong improvement. This indicates that modern agricultural technologies directly contribute to increasing farmers' earnings.
- **Limited Growth Among Non-Adopters:** Non-adopters also showed income growth, but it was comparatively lower (from ₹1,50,000 to ₹1,68,000). This proves that traditional farming methods are less effective in increasing income levels.
- **Significant Income Increase Difference:** The income increase among adopters (₹50,000) is much higher than non-adopters (₹18,000), clearly showing the effectiveness of Smart agriculture in enhancing financial outcomes.

- **Higher Percentage Growth in Adopters:** The percentage increase in income is 31.25 percent for adopters, while it is only 12.00 percent for non-adopters. This highlights the strong economic advantage of using smart farming technologies.
- **Role of Technology in Productivity Improvement:** Technologies such as IoT, smart irrigation, weather forecasting, and digital tools help farmers make better decisions, reduce crop losses, and improve overall productivity.
- **Importance of Awareness and Training:** The study finds that farmers with better awareness and access to training programs benefit more from smart agriculture. Lack of knowledge limits the adoption and benefits for many farmers.
- **Challenges Still Exist:** Despite positive outcomes, farmers still face challenges such as high cost, lack of infrastructure, limited training, and poor digital literacy, which restrict full adoption of smart agriculture.

HYPOTHESES TESTING RESULTS

The hypotheses formulated in this study were tested on the basis of data collected from 120 respondents and analysed using percentage and comparative methods. The results clearly show the impact of smart agriculture on productivity, income, awareness, adoption, and challenges faced by smallholder farmers. In the case of productivity, the findings reveal that smart agriculture significantly improves agricultural output among adopters compared to non-adopters. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. Similarly, for income improvement, the study shows a clear increase in the income level of farmers who adopted smart agriculture, indicating that H_0 is rejected and H_1 is accepted.

Regarding awareness and adoption, the analysis indicates that farmers with higher awareness levels are more likely to adopt smart agriculture technologies. This confirms a significant relationship between awareness and adoption, leading to the rejection of H_0 and acceptance of H_1. In terms of challenges faced by farmers, the study identifies several barriers such as lack of training, high cost, poor infrastructure, and low technical knowledge. Hence, H_0 is rejected and H_1 is accepted, confirming that farmers face significant challenges in adopting smart agriculture. Overall, the study concludes that all null hypotheses (H_0) are rejected, and all alternative hypotheses (H_1) are accepted. This clearly indicates that smart agriculture has a positive and significant impact on smallholder farmers in terms of productivity, income, awareness, and adoption, while also highlighting the existing implementation challenges.

CONCLUSION

The study concludes that smart agriculture has a significant positive impact on smallholder farmers by improving their income, productivity, and overall livelihood. Farmers who adopted smart agricultural practices achieved better results compared to non-adopters due to efficient use of resources, reduced crop losses, and improved decision-making. The use of modern technologies such as IoT, smart irrigation, and digital farming tools has helped farmers increase

their agricultural output and income. However, the study also identifies several challenges such as lack of awareness, insufficient training, high cost of technology, poor infrastructure, and low digital literacy among farmers. These challenges limit the full adoption of smart agriculture in rural areas. It is also observed that farmers with better awareness and access to government schemes benefit more from smart farming practices. Therefore, proper training, awareness programs, and strong policy implementation are necessary for wider adoption. Overall, smart agriculture is an effective approach for sustainable rural development and improving the socio-economic condition of farmers.

REFERENCES

Ahmed, B., Shabbir, H., Naqvi, S. R., & Peng, L. (2024). Smart agriculture: Current state, opportunities, and challenges. *IEEE Access, 12*, 456–478.

Bazzana, D., Foltz, J., & Zhang, Y. (2022). Impact of climate-smart agriculture on food security: An agent-based analysis. *Food Policy, 111*, Article 102304.

Klerkx, L., Jakku, E., & Labarthe, P. (2019). A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda. *NJAS: Wageningen Journal of Life Sciences, 90–91*, Article 100315. https://doi.org/10.1016/j.njas.2019.100315

Lipper, L., Thornton, P., Campbell, B. M., Baedeker, T., Braimoh, A., Bwalya, M., & Torquebiau, E. F. (2014). Climate-smart agriculture for food security. *Nature Climate Change, 4*(12), 1068–1072.

Mini, A., Anuradha, M. S., Asha, G. S. R., Rekha, J. S. S., Kamble, S., & Kulkarni, M. (2023). IoT based smart agriculture monitoring system. *International Research Journal of Engineering and Technology, 10*(4), 1442–1448.

Rose, D. C., Chilvers, J., & Smith, L. (2018). The rise of digital agriculture: Challenges and opportunities for sustainable farming. *Agricultural Systems, 165*, 1–8.

Suma, V. (2021). Internet-of-things (IoT) based smart agriculture in India: An overview. *Journal of ISMAC, 3*(1), 1–15.

Verma, B., Porwal, M., Agrawal, K. K., Behera, K., Vyshnavi, R. G., & Nagar, A. K. (2023). Addressing challenges of Indian agriculture with climate smart agriculture practices. *Emerging Trends in Climate Change, 2*(1), 11–26.

Wagh, R., & Dongre, A. P. (2016). Agricultural sector: Status, challenges and its role in Indian economy. *Journal of Commerce and Management Thought, 7*(2), 209–217.