

Analyzing the Factors Influencing the Adoption of Technological and Management Innovations by Farmers

Dr. Anil Tiwari¹, Pallavi Ravindra Patil², Dr. Anil Kumar³, Dr. B. Hemavathi⁴,
Rahul Kantilal Pawar⁵

¹Assistant professor RNB GLOBAL UNIVERSITY BIKANER

²Assistant professor MBA Management Institute-R.C. Patel Pharmaceutical Education and Research, Shirpur (Autonomous) District-Dhule City-Shirpur State-Maharashtra

³Designation: Head & Assistant Professor Department: P.G. Department of Chemistry Institute: Sahibganj College Sahibganj District: Sahibganj City: Sahibganj, State: Jharkhand

⁴Designation: Assistant Professor in Zoology (On Contract) Department: Biosciences and Sericulture Institute: Sri Padmavati Mahila Viswavidyalayam, Tirupati District: Tirupati City: Tirupati State: Andhra Pradesh

⁵Assistant Professor. Civil. R. C. Patel Institute of Technology. Dhule. Shirpur. Maharashtra

Abstract: The use of innovative machinery depends on several types of factors as financial factors, technological factors, awareness factors and usability. The analysis of the most important effects that decrease the potentiality of the farmers is important. Fruitful use of resources increases the capability of the farmers to use innovative products. The financial capabilities of farmers from developed countries are better than those of developing countries and this brings change to the use of farming technology. The farmers need to understand the usefulness of the agricultural products and machinery. Thus, this determines an important factor which affects the use of innovative technology in farming.

Keywords: Innovative technology, financial sources, different patterns of agriculture, and awareness

1. Introduction

Farming and agricultural activities are demarcated as a primary activity. This helps to generate different raw materials for different industrial sectors. Agriculture contributes 26.4% to employment and 4.3% of global GDP and the productivity of the agricultural sector is increasing with increasing technological advancement. This study has analysed the factors that are affecting the adaptation of modernised management systems and technology in farming activities. The effective factors have been analyzed as well as the suitable methods that could help farmers to implicate modernised technology in farming activities. The most important factors that inversely affect in use of modernised technology are related to the availability of employees and capital investment of the farmers.

2. Methods

Analysing data

The analysis of the agriculture-related data helps to find the factors which effect on using the modernised agricultural methods. Agricultural data helps to determine the causes which affect the sales and use of the machinery used in agriculture. Most dominant agricultural products are produced by a few organisations all over the world.

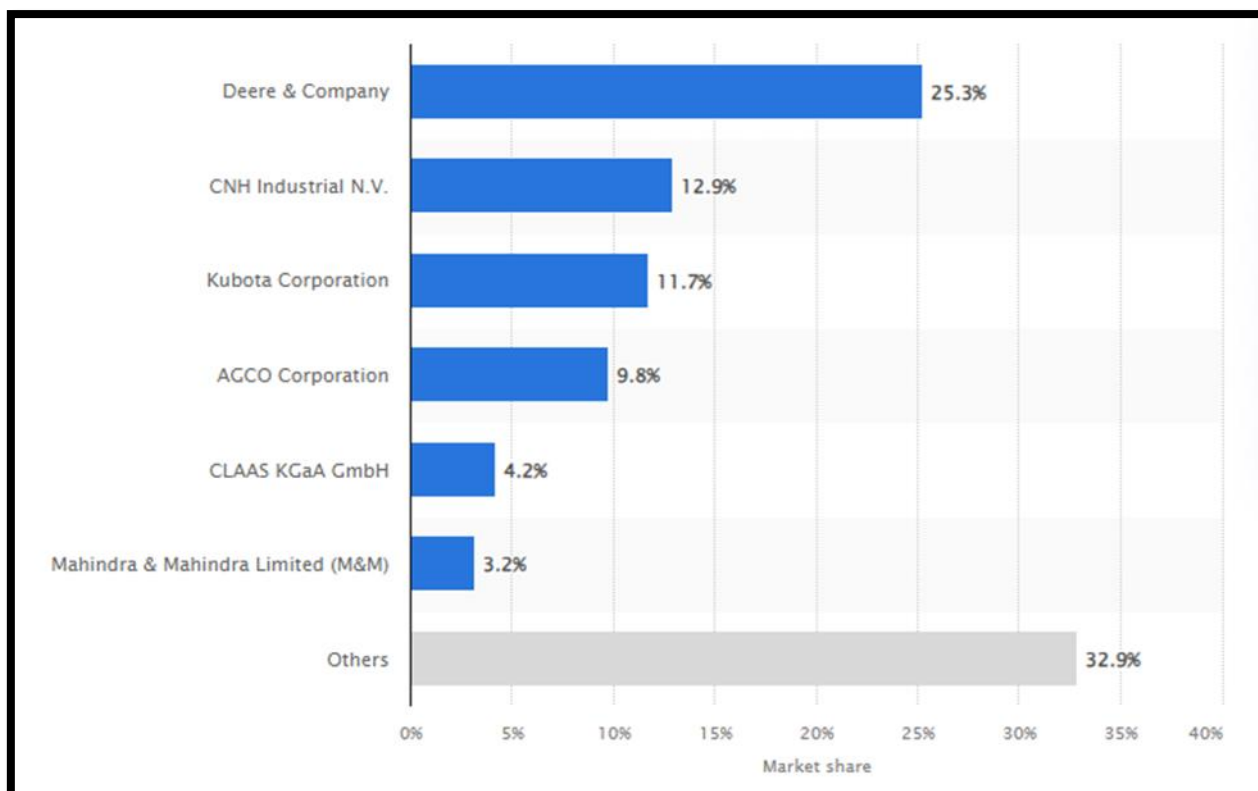


Figure 1: market share of the agricultural machinery producer companies

(Source: Statista, 2023)

The above data represents the sales of the most dominant companies which produce agricultural products. The sales of Deere and Company are highest in the global market of agricultural and farming machinery as this has a 25.3% market share in the global market (Statista, 2023). This determines that the product of Deere and company is comparatively superior and the farmers of the US are quite adapted to the technology. On the other hand, the market share of Mahindra and Mahindra Limited is only 3.2% despite being an Indian company which is an agricultural-based country. This denotes that the farmers of India are comparatively less compatible with the modernised technology of farming. The use of technology differs from one region to another region based on preference and different terms and conditions (Ostapenko et al. 2020). This data helps to determine the difference of farmers from one region to another region and also helps to know the importance of data analysis.

Agricultural growth in terms of the economy

The adaptability of modernised technology depends on the financial background of farmers and other important conditions like land size, knowledge of the farmers, cost of management, market value analysis, return from farming and planning. The earnings depend on the input value and return from the business (Gu & Wang, 2020). Thus, the determination of the economic growth of the agriculture sector is important to analyse to understand the factors which affect the use of innovative management and technology.

3. Results

The result of this study represented the important factors that influence the adaptability of modernised technology and suitable ways to manage the obstacles of using innovative technology.

Factors affecting the adaptation of innovative technologies in farming activities

Financial capabilities of the farmers

The financial capabilities of the farmers are the most essential factors which affect the purchasing power of the farmers. The price of technology and innovative farm management systems is increasing and it creates barriers to the use of innovative machinery. The management and machinery costs need to be marginalised to increase the

revenue from business (Pan et al. 2020). Thus, the farmers of developing countries face several challenges in managing the cost of innovative agricultural products.

Availability of technologies

The availability of resources and technology is an important factor to affects the rate of adaptability of innovative farming products. Fruitful management and use of resources are important to increase the success rate in any kind of economic activity(Han et al. 2021). This denotes that the management of the resources is important and it creates differences in the capabilities of the farmers. The advanced and innovative technology developed through conducting deep research and development activities. The implementation of technologies in economic activity depends on the availability of the technology and affording capabilities (O’Hara & Low, 2020). Thus, the availability of resources is an important thing and sometimes it creates obstacles in purchasing innovative technology. On the other hand, the availability of different kinds of products increases the choice-making power of the farmers as farmers can choose the best product for their use.

Land size and practice

Land size is an important factor as large-sized machinery like tractors and harvesters are not able to perform with their potentiality on small land. Land resources are important factors that affect the adaptability of innovative technology in the agricultural sector. The management and availability of resources are the most critical activity in economic activities (GuoHua & Wei, 2021). This determines that the pattern of resources affects the use of technologies. On the other hand, the practice of farming is also affected by the use of innovative farming technologies.

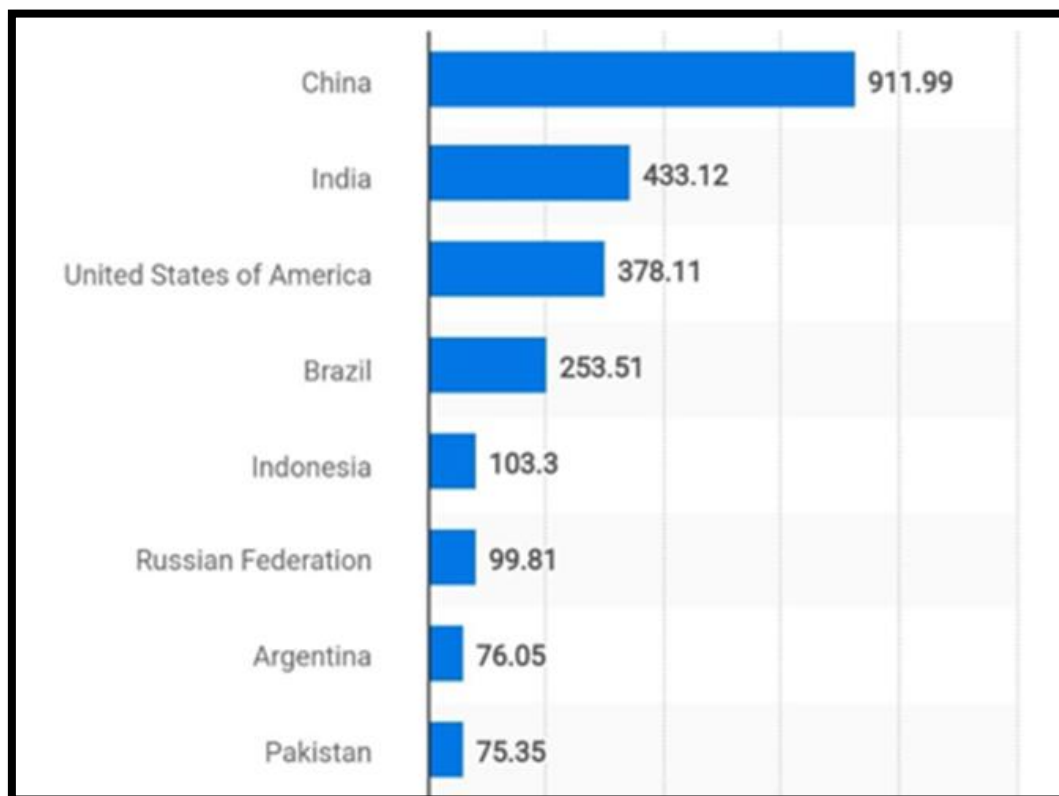


Figure 2: value of agriculture production in the global market

(Source: Statista, 2022)

The above figure helps to understand the values of agricultural products in the global market. The values of agricultural products are more in the countries which have a large scope of agriculture. China produces 911.99 billion US dollars and India produces 433.12 billion US dollars in agricultural products (Statista, 2022). This data helps to determine that the sales of agricultural innovative machinery depend on the scope and practices of agricultural activities.

Rainfall and weather conditions

The adaptability of innovative technology and management systems is affected by the weather differentiation from one region to another region. The needs of the customers differ from one place to another place as the requirements of the people vary (Yang et al. 2021). This denotes that the sales of the commodities depend on the real-life conditions of the customers. The large-size harvester machines are not able to enter the weight land and this affects the sales of the automated harvesters in the high rainfall areas. On the other hand, the requirement for the farmers to manage the farming activities changes as per the weather conditions. On the other hand, the requirements of the farmers vary as per the pattern of farming.



Figure 3: Different sizes of agricultural products used in different farming

(Source: Influenced by Pallathadka et al. 2023)

The above figure of different sized machinery helps to understand the requirements of the farmers differ as per need. The left side image represents small-sized agricultural vehicles and the right side image represents big-size tractors that are used to fulfil separate objectives. The requirement of the technological product varies as per the demand (Pallathadka et al. 2023).

Awareness and knowledge of the farmers

Farmers need to know about the innovative technologies which could increase their farming production. The knowledge and awareness of the customers are important for understanding the usability of modernised and innovative products (Wang et al. 2021). Thus, the conduction of awareness programmes is important for increasing the sales of farming technology. Awareness of the customers helps to increase the durability and productivity of the machines (Kwilinski et al. 2022). This is necessary to understand the features and benefits of innovative management systems and technology used for farming activities.

Suitable Methods to implicate innovative management and technologies in Farming Activity

The adoption of modern technologies is more important for the farmers to enhance production, productivity and profits. In the farming sector, two factors are more valuable such as the source of capital and the knowledge of technologies. The policies based on agriculture help to enhance production in the agricultural sector. Agricultural research as well as extension services can help improves the production of agricultural farms (Gu & Wang, 2020). Diverse objectives have been found in agriculture and these objectives have included international competitiveness as well as the high quality of production. High-quality productivity can meet the sustainability goal of the market (Pan et al. 2020). Farmers have faced many problems as well as many opportunities in the global market. The choice of advanced technologies has created difficulties among the farmers.

The agricultural sectors need to advance to enhance the capacity of production in the global market. The adoption of technologies can represented as an investment to the farmers. Technological change can improve agricultural productivity as well as agricultural development. Research has an impact on the productivity of farming systems (Han et al. 2021). Agricultural innovation can improve the economic sector and can able to enhance the profit in the market. Technological advancement can help the agricultural sector by controlling pests over time in the agricultural sector. These pesticides are less toxic as well as less persistent.

The implication of monitoring systems and knowledge-related systems can reduce the cost of computers and electronic sensors. Farmers have used two traditional methods to provide nutrition to the roots of the plants such as maturing and burning. The use of inorganic fertilizer can improve crop production based on animal husbandry and can enhance the development of feed ingredients (O'Hara & Low, 2020). The research based on soil can

improve the formulated fertilizers as well as feeds. Technologies have been used to irrigate the crops and old irrigation methods waste the water in the agricultural sectors (GuoHua & Wei, 2021). The greater application of technologies can improve fertilization and crop management in the field of agriculture. Technologies can reduce wastage based on harvesting and the demand for agricultural commodities has developed based on producers as well as final consumers. History has shown that farmers are dependent on their own experiences and adopt the best practices in the farming process. Farmers can choose the appropriate technologies to maintain sustainable farming and these best agricultural practices help to improve the productivity in the market.

4. Discussion

The use of innovative technology and management systems in agriculture and farming activities varies as per the demand of farmers. Sales of the commodities depend on the needs of the customers (Suharyanto et al. 2021). Thus, the demand for innovative technology varies from one country to another country. The modernised machinery is used in the big firms of the USA as their lands are big and they have higher financial stability in comparison to the farmers of other countries. On the other hand, unstable weather conditions are affecting agriculture and farming activities and these increase the challenges for the farmers. The most important factors that create problems among the farmers to use innovative technology are economic problems, problems of resources, land size, and awareness of the farmers. The customers need to be aware of the product to understand the capability of the products (Ostapenko et al. 2020). The most suitable ways to make the farmers more capable of using innovative technology are by providing subsidies, being aware the farmers about technological advancements, fruitful utilisation of available resources and development electrical connections. The development of the farmers is important for the economic development of the world as this falls under the primary activity and produces the resource material of secondary activities. On the other hand, farming activities help to increase the production of food products too.

5. References

1. Gu, H. Y., & Wang, C. W. (2020). Impacts of the COVID-19 pandemic on vegetable production and countermeasures from an agricultural insurance perspective. *Journal of Integrative Agriculture*, 19(12), 2866-2876.
2. GuoHua, Z., & Wei, W. (2021). Study of the Game Model of E-Commerce Information Sharing in an Agricultural Product Supply Chain based on fuzzy big data and LSGDM. *Technological Forecasting and Social Change*, 172, 121017.
3. Han, J. W., Zuo, M., Zhu, W. Y., Zuo, J. H., Lü, E. L., & Yang, X. T. (2021). A comprehensive review of cold chain logistics for fresh agricultural products: Current status, challenges, and future trends. *Trends in Food Science & Technology*, 109, 536-551.
4. Kwilinski, A., Hnatyshyn, L., Prokopyshyn, O., & Trushkina, N. (2022). Managing the logistic activities of agricultural enterprises under conditions of digital economy. *Virtual Economics*, 5(2), 43-70.
5. O'Hara, J. K., & Low, S. A. (2020). Online sales: A direct marketing opportunity for rural farms?. *Journal of Agricultural and Applied Economics*, 52(2), 222-239.
6. Ostapenko, R., Herasymenko, Y., Nitsenko, V., Koliadenko, S., Balezentis, T., & Streimikiene, D. (2020). Analysis of production and sales of organic products in Ukrainian agricultural enterprises. *Sustainability*, 12(8), 3416.
7. Pallathadka, H., Mustafa, M., Sanchez, D. T., Sajja, G. S., Gour, S., & Naved, M. (2023). Impact of machine learning on management, healthcare and agriculture. *Materials Today: Proceedings*, 80, 2803-2806.
8. Pan, D., Yang, J., Zhou, G., & Kong, F. (2020). The influence of COVID-19 on agricultural economy and emergency mitigation measures in China: A text mining analysis. *PloS one*, 15(10), e0241167.
9. Statista, 2022. Value of agricultural production worldwide in 2020, by country. Retrieved on: 9th March 2024 from: <https://www.statista.com/statistics/1332343/the-leading-producers-of-agricultural-goods-worldwide/>
10. Statista, 2023. Distribution of the global agriculture equipment market value in 2021, by company. Retrieved on: 9th March 2024 from: <https://www.statista.com/statistics/1365903/global-agriculture-equipment-market-share-by-company/>
11. Suharyanto, A., Hartono, B., Irwansyah, I., Tuwu, D., & Umanailo, M. C. B. (2021). Marginalization socio farm laborers due to conversion of agriculture land. *Cogent Social Sciences*, 7(1), 1999563.
12. Wang, L., Xu, L., Zheng, Z., Liu, S., Li, X., Cao, L., ... & Sun, C. (2021). Smart contract-based agricultural food supply chain traceability. *IEEE Access*, 9, 9296-9307.

13. Yang, X., Li, M., Yu, H., Wang, M., Xu, D., & Sun, C. (2021). A trusted blockchain-based traceability system for fruit and vegetable agricultural products. *IEEE access*, 9, 36282-36293.