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A Study On The Adoption Of New Technologies In Agriculture And Their Impact On Reducing Unemployment And Preventing Migration - A Case Study Of Marginal And Small Farmers In Kanke Block, Ranchi

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***Abstract*:** This study examines the adoption of new technologies in agriculture and their impact on reducing unemployment and preventing migration, with a focus on marginal and small farmers of Kanke Block in Ranchi district. Kanke Block is an inspiration for the underdeveloped regions on the global stage. The aim of this study is to evaluate how modern agricultural practices and technological innovations affect productivity, income generation, and employment opportunities. It also examines whether these advancements can effectively resolve rural unemployment and migration issues.

***Keywords*:** agriculture, agricultural technology, unemployment, migration, marginal and small farmers

I. INTRODUCTION

1.1 Background of the study

Agricultural technology has been adopted by several countries around the world such as the United States, the Netherlands, Israel, China, India, Germany, Brazil, and Australia. These major countries have effectively utilized technology in the agricultural sector. The United States has extensively used modern agricultural machinery. The Netherlands is leading in greenhouse farming, Israel is leading in drip irrigation technology, while India is an inspiration for all developing countries regarding agricultural technology. The adoption of new technologies has developed as an important tool to improve agricultural practices in the face of challenges such as low productivity, poor reach to resources, and climate change. The adoption of new technologies such as Mobile Apps and Digital Platforms, Mechanization, Irrigation Techniques, and Improved seeds and fertilizers has contributed to the dependence on agriculture in rural areas such as the Kanke Block, located in Ranchi, the capital of Jharkhand, a mineral-rich state of India. However, issues of unemployment and migration remain a matter of concern.

Kanke Block is a model for the underdeveloped regions of all developing countries in the world. The economy of this block is mainly based on agriculture. The region faces significant challenges in terms of unemployment and migration, especially among the young population. Farmers here practice small-scale farming and depend on traditional methods. The use of new technologies in this sector has been limited, but it is now slowly gaining momentum. Birsa Agricultural University (BAU) located in Kanke Block has proved to be a panacea for local farmers. From here, new facilities such as Improved seeds and equipment are available to farmers, which is highly beneficial for their development.

Mostly, marginal and small farmers are found in Kanke Block. According to the Department of Food, Public Distribution & Consumer Affairs, Government of Jharkhand, those farmers who cultivate less than 2.471 acres of agricultural land are called marginal farmers and those farmers who cultivate between 2.471 and 4.942 acres of agricultural land are called small farmers. [1] These marginal and small farmers are largely tribal and indigenous. Most farmers here engage in agriculture for livelihood, while about 5.88% are involved in farming for business purposes. [2] At present, farmers here have adopted new technology on a small scale, and their impact is becoming visible.

1.2 Objective of the study

A. To study the adoption of new technologies in agriculture by marginal and small farmers in Kanke Block.
B. To study the impact of new technologies on reducing unemployment and preventing migration.

1.3 Scope of the Study

This study is mainly limited to marginal and small farmers of Kanke Block in Ranchi district, aiming to serve as an example for the underdeveloped regions of developing countries at global level. It examines the role of various adopted agricultural technologies such as Mobile Apps & Digital Platforms, Mechanization, Irrigation Techniques, and Improved seeds & fertilizers.

II. LITERATURE REVIEW

The literature review offers valuable insights into prior research work and idea generation. The study aligns with the ideas of the following scholars and helps to prepare the road map for this article.

Nooruzzaman (2002) studied the impact of technological change on agricultural development. It was found that the use of various inputs such as irrigation, fertilizers, pesticides, HYV seeds, machinery & tools, and literacy are responsible for increasing crop production. [3]

G. Arundhati Suvaraj (1988/2015) studied the impact of new agricultural technology on income distribution. The benefits of new technology generally reach small farmers and backward regions only, when inter-regional and intra-regional income inequalities in irrigation, land concentration, and imperfect factor markets are resolved. Irrigation-related problems can be resolved through government initiatives. The unequal distribution of land can also be effectively resolved. [4]

Anita Kumari (2016) conducted a valuable study in the context of agriculture. Traditional agriculture plays a vital role in ensuring sustainable livelihood security for the rural people of Kanke Block. The farmers here prefer the agrisilvicultural system. Most of the people in this block practice agriculture and animal husbandry. The majority of them have medium-sized land plots. New technology is being promoted to increase income and employment. [5]

III. ADOPTION OF NEW TECHNOLOGIES IN AGRICULTURE

The adoption of new technologies by marginal and small farmers of Kanke Block is a revolutionary initiative. Earlier, the farmers in all three zones of Kanke Block- Kanke Main/Kanke, Pithoria, and Kanke East/Mesra used to practice farming in traditional ways. At present, farmers here are using technologies, especially for business farming. As a result, Pithoria zone is leading in vegetable production and Kanke East/Mesra is leading in farming through the drip irrigation system. Kanke is a little behind Pithoria and Mesra, as people here depend on other sources of livelihood.

3.1 The basic technologies for modern agriculture are as follows:

3.1.1 Mobile Apps and Digital Platforms

Earlier, due to the lack of mobile apps and platforms, farmers here practiced farming with the help of experienced farmers, which resulted in less accurate farming decisions compared to technology. At present, after adopting these technologies in the agricultural sector, farmers have achieved significant success.

Mobile apps, e-market platforms, and weather forecasting services have played an important role in farmers' decision-making.

3.1.2 Mechanization

Earlier, farmers here used wooden ploughs and other traditional tools for farming, which resulted in high agricultural cost and below-average productivity. At present, farmers have adopted tractors, ploughs and harvesters for agricultural work, which has reduced labour costs and significantly increased productivity. Various machineries such as Birsa Rider, Birsa Seed Drill, Birsa Potato Digger, Birsa Lac Sheller, Birsa Dry Land Weeder, Birsa Dutch Hoe, Birsa SRI Marker, Birsa Seed-cum-Fertilizer Drill, Birsa Zero Till Seed Drill, Birsa Bullock Cart, and Birsa Yoke are available for farmers developed by BAU, Kanke, Ranchi.[6]

3.1.3 Irrigation Techniques

Mostly, the farmers here are dependent on the monsoon for Kharif crops. Whereas for Rabi and Zaid crops, they depend on ponds, wells, tubewells, and dams. However, direct use of water from these sources often results in wastage and increases costs. At present, Drip Irrigation Systems, Rainwater Harvesting Systems, and Solar-Powered Pumps are used to improve water use efficiency.

3.1.4 Improved seeds and fertilizers

Earlier, farmers used simple varieties of crops such as Sita, RA64, Bhojni, Kaitka, and Kalamdani, whose productivity was below average. At present, after the introduction of hybrid seeds, the yield has increased significantly. Various new crops varieties such as Birsa Marua-3, Birsa Arhar-2, Birsa Urad-2, Birsa Soybean-3, Birsa Baby Corn-1, Birsa Gehun-4, Linseed-Divya, Linseed-Priyam, Birsa Tisi-1, Birsa Bhabha Mustard-1,and Birsa Chianki baigan-1 are available for farmers developed by BAU, Kanke, Ranchi.[7] Earlier, farmers used fertilizers made from animal dung and household waste, due to which productivity could not increase. At present, fertilizers such as Urea, DAP, Potash, and Phosphorus are being used extensively, along with developed organic fertilizers, which have increased productivity.

3.2 IMPACT ON REDUCING UNEMPLOYMENT

The advent of technology in Kanke Block has directly contributed to reducing unemployment.

3.2.1 Increased Agricultural Productivity and Labor Demand

The adoption of technologies such as high-yielding seeds and mechanized farming resulted in a large-scale increase in crop production, in which BAU, Kanke has played an important role. The university has developed advanced seeds and farming equipment. Farmers here are cultivating crops on a large scale using drip irrigation methods, which is clearly visible in Kanke East/ Mesra. The credit goes to Sukhdev Oraon, a resident of Rendo village in Kanke East/ Mesra, who has returned after receiving training from Israel. As a result, employment opportunities have been created for rural workers.

3.2.2 Growth of Allied Agricultural Activities

In areas such as Kanke/ Main Kanke, Pithoria, and Kanke East/ Mesra, the adoption of new technologies has increased productivity in primary agriculture, along with the development of allied agricultural activities such as animal husbandry, fishery, agroforestry, beekeeping, poultry farming, sericulture, and horticulture. As a result, farmers' incomes have risen and these activities have also created new employment opportunities in rural areas.

3.2.3 Growth of Agri-Business and Rural Entrepreneurship

At present, the farmers of Kanke Block are using digital platforms and mobile applications to reach customers and markets directly. Rural enterprises such as Sidhi Vinayak Tools Pvt. Ltd (Rice mill), Mesra; Kisan Vermicompost Production & Supplier, Rudiya, Mesra; West Well Polytube Pvt. Ltd, Chandwe, Pithoria; and Sashanka Agro-Tech Park, Chetar, Pithoria have been established in the Kanke Block. These initiatives have generated employment opportunities, particularly for the youth in this area.

3.2.4 Government Schemes & Skill Development

Government schemes such as Pradhanmantri Krishi Sinchai Yojna, Mukhyamantri Solar Pump Yojna, Jharkhand Krishi Yantrikaran Yojna, Kisan Dron Sahayata Yojna, Jharkhand Smart Agriculture Program,

and E-NAM have improved employment opportunities. Trained and skilled youth in these technologies are obtaining employment opportunities both within and beyond the agricultural sector.

3.3 IMPACT ON PREVENTING MIGRATION

Migration often results from a lack of sufficient livelihood opportunities, but it can be prevented through the adoption of agricultural technologies.

3.3.1 Improved Income Stability in Agriculture

The use of technologies by farmers in Kanke Block has increased agricultural productivity and profitability. As a result, agriculture has now become a sustainable livelihood option. Earlier, due to the lack of stable income, rural youth used to migrate to other states such as Uttar Pradesh and Bihar to work in brick kilns and a large number of them also went to work in the tea gardens of Assam.

3.3.2 Creation of Rural Employment Opportunities

The adoption of new technologies in agriculture has created employment opportunities in the rural areas of Kanke Block, which has reduced migration to other states. Post-harvest activities such as food processing and packaging provide additional employment. Moreover, new technologies in fish farming, poultry farming, and cottage & small-scale industries have also generated employment opportunities. At present, youth in Kanke Block are particularly interested in poultry and fish farming and the mobile rice mill (locally known as the “Bhula Machine”) plays an important role in promoting self- employment.

3.3.3 Reduced Seasonal Migration

Seasonal migration was a major issue in Kanke Block, as marginal and small farmers were limited to Kharif crops and had to migrate for employment during the rest of the year. The adoption of new technologies in the agriculture sector has brought revolutionary changes. As a result, multi-cropping, greenhouse farming, and off-season vegetable cultivation ensure year-round employment for farmers, minimizing seasonal migration.

3.3.4 Social Stability and Improved Living Standards

Modern agriculture has increased the income of farmers in Kanke Block, resulting to improvements in healthcare, education, and overall quality of life. When basic needs are fulfilled locally, the tendency to migrate is significantly reduced.

3.4 CHALLENGES

3.4.1 Lack of Awareness

Most farmers here do not have sufficient knowledge about the benefits of new technology and are also unaware of their methods of operation. The main reason for this is the limited literacy levels among farmers. Many of them still depend on traditional farming practices, as they are hesitant to take risks to adopt new methods. Some farmers install agricultural equipment, but if a technical fault arises, the equipment often remains unused due to a lack of technical know-how.

3.4.2 Lack of Capital

The farmers here mostly belong to marginal and small landholding classes, with limited financial resources. The high cost of new agricultural technology makes it difficult for them to adopt such innovations. As a result, they often face financial barriers in purchasing and installing advanced equipment.

3.4.3 Climate and Land Problems

Kharif crops in this region are highly dependent on the monsoon, which is often uncertain. If there is no timely rainfall, farmers face major losses. Most of them practice small-scale farming, which limits the proper utilization of new technologies.

IV. CONCLUSION

Kanke is a great example for underdeveloped regions on the global stage. In terms of technology, Kanke has received support from agricultural institutions like BAU (Birsa Agricultural University) and farmers like

Sukhdev Oraon, who have changed the agricultural scenario. The adoption of new agricultural technologies in the Kanke Block of Ranchi district has created new employment opportunities in agriculture and its allied activities, agribusiness, and rural entrepreneurship, As a result, rural unemployment has reduced; and improved income stability and rural economic development have made agriculture a sustainable and profitable business, As a result, migration has been prevented. Today, farmers here prefer to work in their own area by adopting new agricultural practices.

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