

A Technical Analysis of the Impact of Green Revolution in India

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Abstract

Ever since from classical times, the Indian economy is totally dependent on agriculture. During the 1950s, India experiences a terrible food crisis that is identified as the Bengal Famine. Agricultural planning has also resulted in a relative increase in crop yield. This advancement is known as the “Green Revolution,” a modern phase of agricultural growth. The green revolution denotes an increase in agricultural output through the use of high-yielding seed varieties (HYVS), water management, chemical fertilisers, insecticides and pesticides, and high technological assistance, among other things. The Green Revolution had a significant positive influence on the state’s agricultural industry. Despite a huge positive impact, the majority of people in India suffer from over usage of fertilisers, malnutrition and poor health. This study attempts to analyse the positive and negative impacts of Green Revolution.

Key words: Green revolution, agriculture, hunger, crop production, High-yield varieties

Introduction

Agriculture is considered the fundamental and necessary occupation of human beings. Within its broad scope, agriculture includes all types of social production like fisheries, horticulture, and farming. Agriculture holds a prominent role in people’s lives. The term ‘Agriculture’ is derived from the Latin term’s ‘ager’ and ‘cultural.’ ‘Ager’ refers to the field, and ‘cultural,’ to cultivation. Altogether it denotes ‘cultivation in the fields.’ According to Encyclopaedia, Agriculture is defined as ‘the science of the art of farming the land, planting and harvesting crops, and keeping livestock for business purposes.’

The Green Revolution is a movement that began in the early 1960s when innovations in agricultural productivity were aided by international funding organisations. The term ‘Green Revolution’ is created by Willian Gaud who is later considered the Father of the Green Revolution. Norman E. Borlaug, an American agricultural scientist, and a crop pathologist contributed a lot to the emergence of the Green Revolution. The need for this revolution was the vast population growth worldwide. As the population increases rapidly, there arouse a scarcity in food production. Subsequently, people are pushed into a situation to put forth something new in agriculture. During the 1940s, he conducts research in Mexico, where he generated a new disease-resistant that gives high-yield to wheat types. By integrating Borlaug’s wheat variety with advanced agricultural technologies, the country Mexico produces an enormous amount of wheat than required by its people. This leads the country to export a large amount of wheat by the 1960s.

Soon after the accomplishment of the Green Revolution, its methods and ideas expanded throughout the world in the 1950s and 1960s. In particular, the United States imported around fifty percent of its wheat in the 1940s, but after implementing Green Revolution advances, it becomes self-reliant in the 1950s and also switches as an exporter by the end of the 1960s. Further research was sponsored by the Rockefeller Foundation, the Ford Foundation, and numerous government organisations around the world proceeded with the Green Revolution technology to generate more food. Mexico sets up an international research institute called The International Maize and Wheat Improvement Centre in 1963 with the support of this foundation.

In 1943, India experiences a terrible food crisis that is identified as the Bengal Famine. It is estimated that the Bengal Famine results in the deaths of approximately four million people in eastern India due to hunger and starvation. However, after the Indian independence in 1947, the government focused primarily on widening farmlands until 1967. Despite that, the population increases much faster than the production of crops. Due to the fast-increasing population and unemployment, India was on the verge of widespread starvation and hunger in the early 1960s. To rectify that, The Government of India invited a team of American specialists from the Ford Foundation and the Rockefeller Foundation to study the current problem of food crops and suggest remedies to prevent it to increase agricultural productivity. In that year, they submitted a

report captioned 'India's Food Crisis and Response Strategies.' The report emphasised the need to refocus food plans and programmes, recommending efforts to concentrate where the greatest results are obtained. The team also recommended increasing agricultural productivity by adding additional inputs to areas where higher yields were expected. They develop a new rice variety, IR8 that yields more grain in a single plant when planted with irrigation and fertilisers.

Green Revolution brought a new phase in the country's agricultural development. It becomes a golden age of agricultural prosperity in India. Later on, the Government of India initiated the Green Revolution in 1965 with the assistance of geneticist M.S. Swaminathan who is widely recognised as the Father of the Green Revolution in India. This revolution is a massive success as it transforms the country's rank from the world's substandard and poorest agricultural country to one of the most profitable countries in the world. It spanned from 1967 to 1978. Presently, India is one of the nation's leading rice-producing countries. The use of IR8 rice spread across Asia in the succeeding decades made a powerful India.

Positive Impacts

1. Productive Growth in Crops

Since India's independence, the country's agricultural production has come a long way. At those times, India experienced a massive famine, which resulted in a food shortage. Green Revolution intends to increase food production, particularly in poor nations, by growing new varieties of crops on larger farms using machinery and chemicals. The poor condition of the people in India is resolved only after the Green Revolution. Prof. Norman S. Borlaug and his team created high-yielding varieties (HYVs) on short-stemmed wheat which is fast-maturing, pest resistant, and, most importantly, high yielding. As an effect, wheat tonnes per hectare resulted in a tremendous increase which is an unimaginable one previously in the past. This same approach was used in the development of rice miracle seeds also. A few years after the launch of advanced High-yield varieties of wheat and rice crops for agriculture in irrigated regions in India, it was clear that the average yield ratios in high-yielding varieties greatly exceeded the highest possible output of indigenous kinds. Consequently, these HYVs of wheat and rice rapidly

displaced older varieties, resulting in a huge breakthrough in wheat and rice growth across the country.

The first phase of the green revolution's accomplishment was its increase in food production that meets the rising demands connected with population growth and income gain in most developing countries during the last two generations. As the Green Revolution revolutionised agriculture around the world, Global grain production grew by more than 250 percent between 1950 and 1984. Production of crops increased from 51 million tonnes in the 1960s to a massive 264 million tonnes in 2014-15. To say it concisely, agriculture has remained relatively stable and uprising. Crop production has changed significantly over time.

2. Shrink in the Imports on Food Grains

At the time of independence in India, the agricultural sector was plagued by a severe food crisis, which at times resulted in terrible famine. Many farmers who had been feeding their families using sustainable ways that had worked for centuries were forced to become buyers and those who are poor are unable to buy imported foods. However, to deal with this, India has to rely entirely on the imports of food grain at that time. Soon after the introduction of the Green Revolution, in the mid-1960s the use of innovative technology to support farming can significantly enhance productivity. India became self-sufficient in terms of food in the mid-1970s, and by the mid-1990s, it had an enormous stock of food crops. Over the past six decades, India's agricultural industry has undergone a substantial transformation. India is now not only self-sufficient in grain production but also exports them to many countries. Presently, India has emerged as a significant producer and leading exporter of food, mainly due to the widespread adoption of high-yielding cultivations, advances in irrigation, increased fertiliser usage, and the supply of institutional finance supported by a successful pricing regime and assured markets.

3. Farmer's tangible benefits

The Green Revolution directly influenced the progress of the nonfarm economy. Its benefits on poverty eradication and entire economic development have continued to be irrigated. By strengthening the economic growth across the country, the Green Revolution lifted innumerable farmers and other labourers out of poverty and hunger. It results in various developments such as an increase in income, nutritious food, and the standard of living for the large and small

farmers, and also the landless poor. Millions of people have been rescued because of a result of the Green Revolution, which has also increased the yield of food crops. It had a significant impact on the farmers' financial status and their way of living. With the increase in farm production, the earnings of the farmers increased and they became prosperous.

4. Industrial Advancement

Many changes occur over time as agricultural productivity increases. In the 1980s, for example, yield-producing technology acts as the dominant source of agricultural expansion. Switching from lower to higher-value crops was the key factor in the growth of the agricultural sector 1990s. Mechanised harvesters and other machinery were not recent to agriculture. For example, the McCormick reaper was designed in the nineteenth century. The Green revolution enforces a drastic change in agriculture. It converts the hard human labour into smooth cultivation by advancing the use of industrial machinery to automate every productive agricultural process.

The Green Revolution generated a great number of jobs, not only for agricultural workers but for industrial workers, by establishing industries and hydroelectric power plants. Lifting multitudes of rural people in these countries out of absolute poverty and deprivation within a specified time frame requires a strong public policy that promotes agricultural growth and creates more job possibilities. In recent times, the advent and spread of technological advances have resulted in tremendous progress in agricultural output in India.

5. Career Opportunities for rural people

Agriculture provides a living for a considerable part of the rural people. Rural poverty has declined dramatically over the last 50 years. Uttar Pradesh, Punjab, West Bengal, Bihar, Maharashtra, Andhra Pradesh, and Tamil Nadu were the biggest contributors to India's crop production in the 1980s. It contributes over 70% of the sector's growth. Maharashtra was the leading contributor to nationwide agricultural growth throughout the 1990s which is followed by Uttar Pradesh, West Bengal, Rajasthan, and Gujarat. In the 2000s, Gujarat, Madhya Pradesh, and Bihar provided the largest sources of nationwide crop yields that produce a rate of more than 6% per year, significantly greater than the national average rate.

Negative Impacts

1. Boundless use of chemical fertilizers

The Green revolution increased the use of fertilisers to the next level. Pesticide use has multiple harmful health impacts on labourers who spray them, especially to those who reside nearby or downstream from the application region, and consumers who consume pesticides that stay on their food are also dangerous. The chemicals injected in the field may wash off and wind up in rivers and lakes, or they may drain into groundwater resources that are hazardous for human beings. To be specific, the fertiliser can infuse into the soil and spread to the rest of the areas if there is rainfall. It ultimately reduces the soil quality by increasing reliance on synthetic fertilisers rather than natural and organic fertilisers, which allow for nutrient replenishment. The rise in mono-cropping has harmed soil quality. Because of mono-cropping, the nutrients in the soil could not be removed. The use of huge machinery compacts the soil. Pesticides pile up in higher organisms after passing through the food chain. It can pass through the food chain and development in higher organisms. Some of them remain in the soil, air, groundwater, and surface water for lengthy periods and remain to contaminate them. Long-term pesticide exposure usage sometimes promotes cancer. Because of environmental degradation, the Green Revolution is an ineffective short-term remedy for food insecurity. Presently, it reduces crop 'bio-diversity' around the globe. Before this revolution, there were 30,000 separate rice varieties. But, only eleven modified rice types are currently in use. If the climate continues to change, the sickness would increase, the epidemic begins to spread, and the whole system would be crippled.

2. Affects health and the environment

The Green Revolutions' high agricultural outputs have had a severe negative influence on the environment and human health. For instance, toxicity in pesticides and nitrates in drinkable water is verified and proved to be harmful to human and animal health. Pesticides and herbicides remain a substantial source of pollution, as well as the main cause of water pollution. Despite the fact that the harmful toxic chemical is causing cancer. Critics claim that the Green Revolution degrades soil quality in the long run. This is caused due to a number of reasons including increased salinity in the soil, which increases salt in the soil. The increased salinization of irrigated fields, the toxic chemicals nitrous oxide and methane that leads to global

climate change, and the usage of pests and viruses resistant to the available control techniques are some of the consequences that damage the environment. Some of these harmful effects eventually have a serious and negative impact on agricultural production.

Land fertility loss due to over-mining of fertilisers, rapidly disappearing of groundwater level due to the over-exploitation of underground reservoirs, soil salinity due to agricultural production and poor drains, biodiversity loss due to monocropping, and increased agro-chemicals in the water and soil all constitute a risk to human health and environment.

3. Shortage in nutritional value

The gains of the Green Revolution in terms of nutritional stability were limited. Even though all the food grains got benefited from this phase, including wheat, groundnut, rice, and maize, certain crops such as pulses, cereals, and oilseeds were completely ignored and left out. Cotton, tea, jute, and sugarcane were among the large commercial crops that were mostly unaffected by the Green Revolution. Pulses, a significant protein supply is not considered a major crop for food production. It faces a descending mark due to the high yield in wheat and rice cropping patterns, as pulse crops were considered uncompetitive in comparison to the higher-yielding rice and wheat. The per capita production of pulses has decreased from 25 kg in 1960 to 15 kg per year in 2014. At the present, Coarse cereals that are recognised as having a higher nutritious content are originally consigned to marginal regions due to their inability to compete against wheat and rice.

4. Drastic reduction in Food grain prices

Due to the sudden evolution of agricultural production, the prices of the food crops decrease gradually. The farmers have gotten indebted due to the reduced food grain prices, and some have committed suicide as a result of it.

Conclusion

The Green Revolution had a significant positive influence on the state's agricultural industry. In 1978-79, the country's measures and policies to encourage agricultural prosperity through modern agricultural technologies resulted in a peak record gain productivity of several million tonnes. It provides a much-needed relief during the vital years of population

growth by improving agricultural output all over the country. The Indian government was able to settle the debt and enhance its credit rating. Its value lies in the fact that it gave people a chance to think about the problem and devise measures to address it during a critical period of population growth.

According to Bhalla and Chadha, fast technical advancements brought in the 1960s enhanced agricultural revenue for all size groups. In terms of both number and area, the peasants at the middle level emerged as the dominating force. To some extent, the revolution's fruits were shared by small farmers. The daily earnings of agricultural labourers have increased in general. Research on agricultural workers in Ludhiana found that, due to labour scarcity and the increased significance of their employment, their negotiating power has also improved. Similarly, there are some drawbacks also in Green Revolution. As the productivity of food grain production increased steadily no importance was given to other agricultural products. High concentration is given towards high-profit-yielding wheat and rice. In the mid-1970s, rice substituted maize, which had been a major crop during the early stages of the Green Revolution.

Overall, the Green Revolution was indeed a significant accomplishment for many emerging countries, particularly India, and provided them with unparalleled levels of national food production. It symbolised the positive development and transmission of the same agricultural development of science that the industrialised nations had previously claimed for themselves. Furthermore, certain considerations were given to aspects other than guaranteeing food and nutrition security, including the environment, health, farmer situation, and their education on the use of such fertilisers and pesticides.

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