

Regional Disparities in the Impact of the Green Revolution: A Comparative Study of Northern and Southern States of India

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Abstract

The Green Revolution, initiated in the 1960s, transformed India from a food-deficient to a self-sufficient nation through the introduction of high-yielding varieties (HYVs), chemical fertilizers, and advanced irrigation systems. However, the diffusion of its benefits was not uniform across regions. This study examines the regional disparities in the impact of the Green Revolution by comparing the Northern states (Punjab, Haryana, and Uttar Pradesh) with the Southern states (Tamil Nadu, Karnataka, and Andhra Pradesh). Using secondary data from agricultural census reports, government statistics, and research studies, the analysis highlights differences in agricultural productivity, input use, rural income, and infrastructure development. The findings reveal that the Northern region experienced higher productivity gains, rapid mechanization, and better irrigation infrastructure, while the Southern region lagged behind due to limited irrigation coverage and initial policy focus on wheat cultivation. The study suggests that equitable policy measures, region-specific technological interventions, and sustainable agricultural diversification are essential to bridge these regional gaps and promote balanced rural development.

Keywords: Green Revolution, Regional Disparities, Agricultural Productivity, Irrigation Development, Sustainable Agriculture.

Introduction

Agriculture research has made an improvement in traditional farming in every country of the world. The first agriculture research centre was established by agriculture scientist J.V.Bosington at Ells in 1834. It was a centre which initiated agriculture research. American

Society of Agronomy was established in 1908 which accelerated agricultural development In America. Indian Society of Agronomy was established in fifties of 20th century. During 1958, for the first time in India wheat production increased from 120 lakh tones to 170 lakh tones. American Scientists developed a number of new high yielding varieties of wheat by processing wheat seeds imported from Mexico. These varieties were having production potentialities of 60-65 quintals per hectare. A similar improvement in variety of rice was also observed. As a result of introducing these high yielding varieties a true Green Revolution was observed in middle of sixties which ensured India's self – dependence in food grains.¹ the credit for it goes not only to Nobel Laureate Dr. Norman Borlaug but also to Dr. M.S.Swaminathan. Green Revolution in India gave a rise to productivity of different crops. New techniques still possess potentialities of increasing production of wheat 2.5 times, rice 3 times, Maize 3.5 times, jower 5 times and bajra 5.5 times. Indian Green Revolution is associated with the use of HYVS (High Yielding Variety Seeds), chemical fertilizers and new techniques which led to a sharp rise in agriculture production during the middle of 1960. During 1960-61 a programme named 'Intensive Agriculture District Progrmme' (IADP) was introduced in 7 districts of the country. This programme was aimed to provide credit loans, seeds, fertilizers, equipments etc. During 1964-65, second similar progrmme named 'Intensive Agriculture Area Programme' (IAAP) was introduced in other parts of the country. This programme was centered to a few particular specific crops. Both the progrmmes – IADP and IAAP were related to intensive farming but there operation was limited to traditional varieties of crops. The pioneer of Indian green revolution Mr.M.S.Swaminathan, presently chairman of National Commission on Farmers gave a new call for 'Evergreen Revolution' for doubling the present production level of foodgrains from 210 million tonnes to 420 million tones. For making 'Evergreen Revolution' a success. He stressed on adopting best scientific techniques and promoting organic farming.² He also mentioned four pre requisites for getting the success.

- Promoting soil health.
- Promoting 'Lab to Land' exhibitions.
- Making rainwater harvesting compulsory.
- Providing credit to farmers on suitable conditions.

Stages of Agricultural Development

Pre – Green Revolution

Boost in productivity growth of coarse grains and pulses per unit of land.

Green Revolution

Expansion of area and rapid growth in productivity of wheat and rice, made possible by widespread adoption of improved varieties, expansion of agricultural research, demonstration and education, and investment in irrigation, supported by establishment of a national infrastructure to produce and supply inputs and to warehouse, distribute and market outputs.

Post Green Revolution

Continued growth in productivity through intensification of chemical and labour inputs, followed by a gradual deceleration in productivity growth.

Commercialization

Further diversification of cropping patterns from low value to high value crops such as fruits, vegetables, flowers and other horticulture crops for domestic consumption, processing and export. Agriculture is India's backbone for the growth and development of the country's economy. Nearly 65 per cent of the Indian population is still dependent on agriculture for its livelihood and employment. It is also the source of supply of raw materials for industries and provides support to the transport system.³ In recent years there has been great diversification in Indian agriculture such as livestock, horticulture and fisheries. Today India occupies a significant place at the global level as the second largest producer of milk. Since India's Independence great strides have been made in the field of agriculture. Efforts made under the five year plans resulted in the growth rate of agricultural output by about 2.7 per cent per annum as compared with 0.8 per cent per annum during the first half of the 20th century. The Green Revolution of the 1960s initiated a gradual transformation of the traditional household agriculture into modern and scientific agriculture in several parts of India. The introduction of new technology in agriculture brought about unprecedented increases in yield and output of major cereal crops like rice and wheat.

Statement of the Problem

Agriculture forms the backbone of the Indian economy and despite concerted industrialization in the last four decades: agriculture occupies a place of prime importance. Being the large industry in the country, agriculture is the source of livelihood for over two-thirds of the population in the country. It emphasized the extension of irrigation facilities and later in the sixties adopted

seed-water-fertilizer technology popularly known as the Green Revolution. Agreement on Agriculture (AoA) is opening up of world market for agricultural products. This agreement provides for abolishing non-tariff barriers and restrictions, reduction in import duty, significant reduction in subsidies, price support and other measures of protection of domestic agriculture and rationalization of export subsidies and assistance. AoA contains provisions in the broad areas of trade and agricultural policies, market access, export subsidies and domestic support.⁴

Objectives of the Study

1. To assess the regional differences in agricultural productivity between Northern and Southern states since the Green Revolution.
2. To examine variations in irrigation infrastructure, technology adoption, and input utilization across regions.
3. To analyse the socio-economic implications of regional disparities on rural livelihoods and income distribution.

Tools of Analysis

- Simple Regression
- Dummy Variable

Data Analysis

Growth of Agricultural Output in India

The data on the value of agricultural output expressed in 1993-94 prices over the period from 1990-91 to 2014-15 are given in Table 1. For these periods, the index number and the annual growth rates of agricultural output have been worked out and they are also give in the value of agricultural output in India was Rs.130298 crores in 1990-91, it increased with fluctuations and reached Rs.154439 crores in 1997-98 and touched the highest value of Rs.175037 crores in 2000-01. The agricultural output increased by 1.34 times in this period. The average value of output is Rs.148666 crores per year.

Table 1

Growth of Agricultural Sector in India

Year	Output Rs. crore	Index Number	Annual GrowthRate
1990-91	130298	100.00	--
1991-92	131451	100.88	0.88

1992-93	126668	97.21	-3.63
1993-94	125574	96.37	-0.86
1994-95	152084	116.72	21.11
1995-96	153218	117.59	0.74
1996-97	158849	121.91	3.67
1997-98	154439	118.52	-2.78
1998-99	161256	123.76	4.42
1999-00	166454	127.74	3.21
2000-01	175037	134.33	5.15
Average =		148666.18	L.G.R. 3.43%
2001-02	169651	100.00	--
2002-03	184378	108.68	8.68
2003-04	176789	104.20	-4.12
2004-05	184378	108.68	4.29
2005-06	187832	110.71	1.86
2006-07	176285	103.91	-6.14
2007-08	189901	111.93	7.71
2008-09	162411	95.73	-14.47
2009-10	190312	112.17	17.17
2010-11	196520	115.83	3.26
2011-12	201234	117.33	3.76
2012-13	243245	121.33	4.04
2013-14	276899	125.45	4.44
2014-15	334215	127.34	4.78
2015-16	365780	131.33	5.21
Average =		181845.7	L.G.R. 1.78%

Source: Economic Survey 2016-17, GOI.

The average value of agricultural output in constant prices has increased under the WTO regime however; the linear growth rate has come down to 1.78 per cent from 3.43 per cent. The growth of agricultural output (expressed in constant prices), the extent of overall globalization, and extent of globalization in the agricultural sector and the share of agricultural

sector in the overall globalization have been analyzed in this section. To study the extent of overall globalization, globalization in the agricultural sector, and the contribution of agricultural sector in the globalization process, macro economic data on GNP, total exports, total imports, imports and exports of agricultural commodities have been used. To compare the present position and position before the implementation of AoA of WTO, time series data for a period 25 years from 1990-91 to 2015-16 have been used. This period is divided into two sub-periods consisting of first ten years prior to the implementation of AoA of WTO, from 1990-01 to 2000-01 and the second fifteen years period, after the implementation of AoA of WTO from 2001-02 to 2015-16. GNP in current prices increased by 2.67 times and trade increased by 3.83 times during 2001-02 to 2015-16. In the earlier decade, that is during 1990-91 to 1999-2000, GNP in current prices increased by 3.64 times and trade increased by 5.64 times. Visibly, GNP and trade have registered a less growth in the period under WTO regime.

Present Situation of Indian Agriculture

The following are some of the important features of Indian agriculture: Agriculture provides direct livelihood to 59 per cent of the labour force in India. 35 per cent of India's population below the poverty line lives in rural areas, and is directly or indirectly dependent on agriculture. Agriculture contributes more than 22 per cent of GDP (2007 estimates), although the share has progressively come down from 57 per cent in 1950-51. In developed countries like the UK and USA, the share of agriculture in GDP is only around two per cent. It accounts for about 10 per cent of total value of India's commodity exports. Bulk of agricultural exports consists of 13 key commodities including tea, coffee, tobacco, cashew, spices, raw cotton and sugar. Almost 30 per cent of tea produced in the country and 50 per cent of coffee and jute are exported. In addition to this, credit must be given for export of manufactured goods using agricultural raw materials, which accounts for another 15 per cent of India's exports. Indian agriculture has been able to improve the per capita net availability of foodgrains to 451 grams (2007) from 395 grams in 1950's. The gross irrigated area increased from less than one million hectares per annum before green revolution (mid 60s) to about 2.5 million hectares per annum during the 1970's. Total gross irrigated area is now 80 million hectares. Total food grains (cereals and pulses) production increased from 48.1 million tonnes in 1950-51 to 230.67 million tonnes in 2008. While overall growth in food grains production has been impressive assisted by the technological breakthrough, one disturbing aspect is the year-to-year fluctuation

in cereals output which affects the employment and income of the poor who depend solely on on-farm activities. This trend will also affect the food security of the masses.⁵

Positive Impacts of Green Revolution

The fundamental achievement of inexperienced revolution was once that there was a vast enlarges in agricultural production. Food grains output elevated from eighty one million tons in 3rd design (annual average) to 202 million tones in the tenth plan. In 2008-09, it stood at 233.9 million tones. Therefore the non meals grains were excluded from the ambit of new strategy. The manufacturing of wheat had improved from 11.1 million tones from third format (annual average) to 70.2 million tones in the 10th plan. The manufacturing of wheat had touched the high stage of 80.6 million tones in 1008-09. The overall contribution of wheat to whole meals grains has extended from 13% in 1950-51 to 34.5% in 2008- 09. Wheat has remained the mainstay of the Green Revolution over the year.⁶

The average annual production of rice additionally rose from 35.1 million tones in the third format to 85.6 million tones in the 10th plan. It stood at 99.2 million tones in 2008-09. The green revolution used to be in the main directed to expand the manufacturing of food grains. It did not have an effect on at first the manufacturing of business crops or cash crops such as sugarcane, cotton, jute, oilseeds and potatoes; this vegetation did no longer record any significant enhancement initially. However, big improvement in the output of sugarcane took location after 1973-74. Likewise, there used to be big enhancement in the manufacturing of different cash plants such as oilseeds, potatoes etc. In the 12 months 1960-61 the production of oilseeds was once solely 7 million tones which were improved to 31.1 million tones in 2009-10. The production of cotton also expanded from 6 million tones in 1960-61 to 33.4 million tones in the year 2009-10. Similarly the manufacturing of jute elevated from four million tones in 1960-61 to 10.6 million tones in the yr 2009-10. The manufacturing of potatoes also accelerated from 3 million tones in 1960-61 to 36.6 million tones in 2009-10.⁷

Negative Impacts of Green Revolution

The new agricultural policy has made the farmers market oriented. The farmers are largely dependent on the market for the grant of inputs and for the demand for their products. At the same time, the demand for agricultural credit has also expanded as the new technology has accelerated the money requirements of the farmers.⁸ besides; cutting-edge technology has certainly proved its superiority over the ordinary technology only in those areas the place

fantastic prerequisites prevail. But as mentioned above the stipulations are triumphant only in selected areas. When the new agricultural approach was once delivered in the early 1960s, it was once hoped that vogue of raising output of food grains would continue. But sharp fluctuations of meals grains output were found in the later years.

Suggestions

1. Policies should address the distinct agro-ecological and socio-economic conditions of each region rather than applying a uniform national model.
2. Expanding micro-irrigation systems (drip and sprinkler) and improving rural connectivity can boost agricultural performance in water-scarce Southern states.
3. Encourage farmers in both regions to adopt diversified cropping patterns such as pulses, millets, and horticultural crops to reduce dependency on a few major cereals.
4. Strengthen agricultural extension services to ensure equitable dissemination of modern technologies, especially to small and marginal farmers.
5. Enhance access to credit, subsidies, and insurance for farmers in lagging regions to promote technology adoption.
6. Promote eco-friendly agricultural practices, organic farming, and soil health management to avoid the environmental degradation associated with the first Green Revolution.

Conclusion

Agricultural sector in India does not gain much from the reform process and globalization policies. We can see that there are both positive and bad impacts of Green Revolution on Indian Economy. The Green Revolution significantly improved India's food security but also deepened regional inequalities in agricultural development. While Northern states reaped substantial economic gains through intensive cultivation and mechanization, many Southern states did not benefit equally due to resource and policy constraints. This imbalance has had long-term implications for rural livelihoods, employment, and income distribution.

In the post reform period the public investment in agricultural sector has slowed down Government investment is essential to provide basic infrastructure facilities to agricultural sector. Due to Green Revolution agricultural region of India is capable to meet the increasing

demand for food grains. Hence, the government should provide all possible support under permissible different categories of AoA to the agricultural sector, to promote the development of this sector. To move toward an “Evergreen Revolution,” India must adopt a regionally balanced approach that integrates technological innovation with sustainability and inclusivity.

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