

Agriculture: Status, Challenges, Policies and Strategies for India

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Abstract:- The Indian agriculture witnessed a major technological breakthrough with the Green Revolution during 1970s. The food grain production grew substantially and the country led its way to self-sufficiency. It was a watershed moment for the Indian agricultural sector. However, since then the demand has increased many fold, which has not been met proportionately with the increase in productivity. One of the major roadblocks to the growth of the agriculture in India is the lack of investments on research & development, infrastructure creation and implementation of technology. The aim of the present government to double the farmers' income by 2022 is an ambitious target. If implemented properly, this strategy would address the root causes of agricultural distress in India. This present review aims to provide an overview of the agriculture sector in India and the challenges associated with it, and possible solutions thereof.

Key words: Green Revolution, Watershed, Investment, Productivity, Development

INTRODUCTION

In this world of unimaginable diversity, a species that stands apart from all other living beings is us, i.e., the Human Beings or simply humans. It is not only the advanced physiology that we have as humans, but also our civilization that imparts a peculiar social character to us. Since the time immemorial human civilizations have constantly evolved, and most of their development has remained centered mainly around food collection and consumption and thus, agricultural practices have been an integral part of their foundation. From a society of nomadic food gatherers and hunters, we have travelled a long way to the present form of systematic agriculture.

Before moving ahead, let us have a brief idea as to what Agriculture is actually. 'Agriculture is a science, an art and an occupation that is concerned with cultivating land for raising crops and breeding and raising livestock'. It is the simplification of nature's complex food webs and the re-channeling of energy for human and animal consumption. If we take India into consideration, agriculture has been more a 'way of life' than merely a 'mode of business'. Agriculture has always played a vital role in the Indian economy and it continues to do so even today and it will not be inappropriate to phrase that 'Agriculture is the backbone of the Indian economy'.

With the growth of other sectors, the overall share of agriculture in the Indian economy has decreased over the time from around 51.8% in 1950-51 to around 15.8% in 2018-19 (in terms of Gross Value Added at current prices). However, the agriculture sector still continues to play a

significant role in the overall economic scenario in India and it alone employs more 50% of the total workforce, particularly in rural areas.

Further, agriculture is also critical for the country's food security. India's current population is estimated at over 1.3 billion and this figure has nearly doubled since the 1970s; it is currently growing annually at the rate of 1.08%. This rapidly growing population and climate change put enormous pressure on our present scheme of farming. Forecasting climate change is complex and controversial. There is a global acceptance of the fact that with the continuing erratic behaviour of weather patterns the climates will become less suitable for current agricultural practices and the places that are comparatively warm and humid will be particularly disadvantaged. Studies estimate that higher temperature will likely reduce crop yields by more than 25% and effectively shorten the growing period by extending periods of extensive heat. Agriculture and changes in land use pattern are also responsible for 19-29% of total greenhouse gas emissions globally. Since the nature of these changes is quite unpredictable, therefore it will be of general interest of all to follow mitigation measures religiously.

The fact that India is the world's largest producer of pulses, spices and milk, and has the world's largest cattle herd, makes it a global agricultural powerhouse. It also has the largest area under rice, wheat and cotton cultivation. In terms of rice, wheat, sugarcane, cotton, tea, vegetables, fruits and cultured fish, India ranks second globally. Out of the total area of around 195 million hectares (mha) under cultivation in India, around 63% is rainfed and the remaining 37% is irrigated.

LAND-USE PATTERN

As per the land use statistics of 2014-15, the total geographical area of the country is 328.7 mha, of which reported net sown area is 140.1 mha and the gross cropped area is 198.4 mha with a cropping intensity of 142%. The net area sown is around 43% of the total geographical area and the net irrigated area is 68.4 million hectares.

As per the Phase-I results of the Agriculture Census, 2015-16, the number of operational holdings, i.e., land put to agricultural use, has registered an increase of 5.3% from 2010-11 to 2015-16. The share of marginal holdings (less than 1 ha) in total operational holdings increased from 62.9% in 2000-01 to 68.5% in 2015-16, while the share of small holdings (1 ha to 2 ha) decreased from 18.9% to 17.7% during this period (2018-19). The large holdings (above 4 ha) decreased from 6.5% to 4.3%. The area operated by the marginal and small holdings increased from 38.9% in 2000-

01 to 47.4% in 2015-16, while that of the large holdings decreased from 37.2% to 20% during 2015-16.

The share of operational holdings cultivated by women has increased from 11.7% in 2005-06 to 13.9% in 2015-16. The marginal and small holdings operated by women farmers together constitute 27.9% of total operational holdings cultivated by women.

CURRENT TREND

According to the Situation Assessment Survey 2002-03 of NSSO, 40% farmers showed preference to quit farming if there was a choice. Similarly, micro level studies provide strong evidence of youth not interested in agriculture related work (Himanshu et al. 2016). Agricultural development is important for raising the incomes of people dependent on agriculture. There are significant linkages between farm and non-farm sectors. The

theory of 'unbalanced growth' discusses sectorial linkages and also indicates that agriculture could not become a leading sector due to its weak backward linkages (Hirschman, 1958). The Indian agriculture has transformed significantly over the last few decades. Multiple factors like growth in household income, expansion in food processing sector, and increase in agricultural exports have facilitated growth in this sector.

Rising incomes provide a structural change in the dietary patterns of an average Indian and is diversifying the country's food demand to include high-value foods. According to the National Sample Survey estimates for 2011-12, although cereals account for 26% of the total food consumption expenditure in rural India, high-value foods (like milk, meat, eggs, fish, fruits, and vegetables) account for 42% in rural India (GoI, 2013).

Table 1 - Growth Rates in Agriculture, Industry and Services (%)

| Periods | Growth rate of GDP (%) | | |
|--------------------|------------------------|----------|----------|
| | Agriculture | Industry | Services |
| 1960-61 to 68-69 | 1.04 | 5.05 | 5.03 |
| 1968-69 to 75-76 | 2.24 | 3.92 | 3.37 |
| 1975-76 to 88-89 | 2.47 | 5.53 | 5.40 |
| 1988-89 to 95-96 | 2.76 | 5.90 | 6.15 |
| 1995-96 to 2004-05 | 2.28 | 4.87 | 7.86 |
| 2004-05 to 2014-15 | 3.72 | 8.44 | 8.96 |
| 2014-15 to 2017-18 | 2.55 | 7.15 | 8.71 |

Source: GOI (2017) upto 2014-15; Calculated from National Accounts Statistics for the period 2014-15 to 2017-18.

In order to assist the agriculture sector, the Government of India has introduced several projects. There is Pradhan Mantri Gram Sinchai Yojana - The scheme aims to irrigate the field of every farmer and improving water use efficiency to achieve the motto 'Per Drop More Crop'. Overall the scheme ensures improved access to irrigation. Around 285 new irrigation projects were to be undertaken in

2018 to provide irrigation for 18.8 million hectares of land. As per the Union Budget 2019-20, the scheme has been allocated US\$ 565.16 million. The support price mechanism has been used to sufficiently compensate farmers for this input intensification in the background of slowdown in the growth of land productivity (Dev & Rao, 2010, 2015).

Table 2 - Demand for Agricultural Commodities

| Item | Achieved TE 1997-99 | | | Demand in 2020 (Million tons) | | Yield Target in 2020 |
|---------------|---------------------|---------------------------|---------------|-------------------------------|-------|----------------------|
| | Area (Million ha) | Production (Million tons) | Yield (Kg/ha) | LIG | HIG | LIG |
| Rice | 42.2 | 85.7 | 1903 | 112.4 | 111.9 | 2664 |
| Wheat | 26.2 | 69.1 | 2582 | 82.3 | 79.9 | 3137 |
| Coarse cereal | 30.7 | 30.4 | 1041 | 38.9 | 37.3 | 1268 |
| Cereal | 99.1 | 185.2 | 1814 | 233.6 | 229.0 | 2357 |
| Pulses | 21.7 | 13.8 | 608 | 22.3 | 23.8 | 1029 |
| Food grains | 120.8 | 199.0 | 1595 | 255.9 | 252.8 | 2119 |
| Edible oil | 28.6 | 6.4 | 269 | 10.8 | 11.4 | 379.7 |
| Potato | 1.2 | 21.6 | 17188 | 27.8 | 30.6 | 22279 |
| Vegetables | 5.3 | 74.5 | 14204 | 135.6 | 168.0 | 25673 |
| Fruits | 3.2 | 43.0 | 13437 | 77.0 | 93.6 | 24064 |

Source: R. S. Paroda and Praduman Kumar (2000)

LIG: Low Income Growth 3.5% per capita GDP growth
HIG: High Income Growth 5.5% per capita GDP growth
Demand includes export 4.7 mt rice, 3.6 mt wheat, and vegetables 2.2 mt fruits 1.4 mt and fish 0.49 mt.

MARKET SIZE

As per the Fourth Advance Estimates for 2017-18, production of rice is estimated at a record 112.91 million tonnes. Wheat production, estimated at record 99.70 million tonnes, is higher by 1.19 million tonnes as compared to wheat production of 98.51 million tonnes achieved during 2016-17.

Further, production of nutri / coarse cereals is estimated at record 46.99 million tonnes and total pulses production during 2017-18 is estimated at record 25.23 million tonnes. The total oilseeds production in the country during 2017-18 is estimated at 31.31 million tonnes, which is marginally higher than the production of 31.28 million tonnes during 2016-17. Also, the production of cotton estimated at 34.89 million bales (of 170 kg each) is higher by 2.31 million bales than the production of 32.58 million bales during 2016-17. In addition, production of jute and mesta is estimated at 10.14 million bales (of 180 kg each) during the 2017-18. Also, total production of sugarcane in the country during 2017-18 is estimated at record 376.90 million tonnes.

Total agricultural exports from India grew at a CAGR of 16.45 per cent over FY10-18 to reach US\$ 38.21 billion in FY18. The agriculture exports were US\$ 34.31 billion between Apr 2018-Feb 2019. India being the largest producer, consumer and exporter of spices and spice products, the spice exports from India reached US\$ 3.1 billion in 2017-18. Tea exports from India reached a 36 year high of 240.68 million kgs in CY 2017 while coffee exports reached record 395,000 tonnes in 2017-18. Food and grocery retail market in India was worth US\$ 380 billion in 2017 (IBEF 2019).

CHALLENGES, POLICIES AND STRATEGIES

The major problem now is that agricultural development itself is not central to the concerns of the policymakers, as the changing paradigms of development theory at the international level and certain developments in India relegate agriculture to an issue of secondary importance. The post-second-war literature on development theory emphasized the need for modernization of agriculture as a precondition for industrial growth, which then was regarded as the sole indicator of development of a country (Lewis, 1955; Schultz, 1964). Though the growth in agriculture and farmer profitability improved in the first decade of the new millennium, the predominantly price-incentive-driven nature of this growth raises serious doubts over its sustainability in the absence of breakthrough technologies (Chand, 2014; World Bank, 2014).

The World Bank quotes the following as some of the crucial challenges to the India's agriculture sector:

- Raising agricultural productivity: Raising agricultural productivity per unit of land will need to be the main engine of agricultural growth as virtually all the cultivable land is under farming. Water resources are also limited and the availability of water for irrigation will face difficulty with increasing industrial and urban needs.
- Reducing rural poverty: Rural poverty can be reduced by employing a socially inclusive strategy that comprises agriculture along with non-farm employment, so that the rural development must also benefit the poor, landless, women, scheduled castes and tribes. Moreover, there are strong regional disparities like the majority of India's poor are in rain-fed areas or in the Eastern Indo-Gangetic plains.
- Making agricultural growth to factor in food security: The sharp rise in the production of the food-grain during India's Green Revolution of the 1970s enabled the country to achieve self-sufficiency in food-grains and avoid the threat of famine. The demand for rural labour on account of agricultural intensification in the 1970s to 1980s raised the rural wages and this coupled with declining food prices, reduced the poverty in rural areas. Despite this, the agricultural growth in the 1990s and 2000s slowed down, averaging about 3.5% per annum, and cereal yields registered a meagre increase of only 1.4% per annum in the 2000s.

Notably, the agricultural sector is crucial to the Indian economy, predominantly because the majority (64.2%) of the rural population is dependent on it (Agricultural Census 2010-11). Given the importance of this sector, the Government of India took several steps for its sustainable development. These include:

- o Improvement in soil fertility through the Soil Health Card scheme.
- o Providing improved access to irrigation and enhanced water efficiency through Pradhan Mantri Krishi Sinchayi Yojana (PMKSY).
- o Supporting organic farming through Paramparagat Krishi Vikas Yojana (PKVY).
- o Support for creation of a unified national agriculture market to boost the income of farmers.
- o A new scheme, Pradhan Mantri Fasal Bima Yojana (PMFBY) has been launched for implementation from Kharif 2016 to mitigate the risk of crop loss in agriculture sector.

ENHANCING YIELD OF MAJOR COMMODITIES

Yield of major crops and livestock is much lower in India in comparison to other regions of the world. Since the scope of expanding the area under cultivation is very limited, increasing the yield of food production seems to be the only viable solution to meet the continuing high demand. In order to bridge the wide technological divide there is a need to strengthen research and development framework. To achieve this goal, a robust network of extension services

needs to be created which will lead to a constant flow of information – both top-down and bottom-up between farmers, extension workers, and research institutions to promote the generation, adoption, and evaluation of location specific farm technologies. The genetic yield potential of a large number of vegetables, fruits, fisheries and livestock and products can be increased. In addition to the maintenance of breeding varieties, efforts should also be made towards developing newer hybrid varieties as well as those suitable for export purposes.

INTEGRATED NUTRIENT MANAGEMENT

Balanced use of nutrients should be given prime importance. Phosphorus deficiency is the most widespread soil fertility problem in both irrigated and non-irrigated areas. Price distortions in relative prices of primary fertilizers should be rectified to reduce the imbalances in the use of primary plant nutrients, which include nitrogen, phosphorus, and potash. The use of bio-fertilizers should also be promoted. In order to improve the efficiency of fertilizer use, following need to be taken into consideration:

- Development of physical and institutional infrastructure
- Development of improvised supply of fertilizers and distribution systems
- Improvement in soil testing services
- Enhanced location-specific research on efficient fertilizer practices

ARRESTING DECELERATION IN TOTAL FACTOR PRODUCTIVITY

Investment in infrastructure development, irrigation, research and extension, and efficient use of water and fertilizers are the dominant sources of growth of total factor productivity. The steep decline in the investments, particularly from the public sector, in the agriculture sector is the main cause for the deceleration. This has resulted in the slowdown in the growth of irrigated area and a sharp deceleration in the rate of growth of fertilizer consumption.

The most adverse effect of decline in total investment has been on agricultural research and extension. It is necessary for India to maintain a steady growth rate in total factor productivity to reduce the serious yield gaps.

BRIDGING YIELD GAPS

The States whose current yield levels are below the national average yield must be emphasized upon. Bihar, Orissa, Assam, West Bengal and Uttar Pradesh are the priority States, which account for around 66% of the area under rice cultivation, which need emphasis on bridging yield gaps to attain target demand and yield growth. For wheat, the focus must be mainly on Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan which account for around 68% of the area under wheat cultivation. Major emphasis must be given to Rajasthan, Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh and Uttar Pradesh for coarse

cereals. Madhya Pradesh, Maharashtra, Rajasthan, Gujarat, Andhra Pradesh, Karnataka and Uttar Pradesh account for around three-fourths of the area under pulse cultivation and particular focus is required on them to meet the demand for pulses. In order to avert a situation where the nation experiences a shortage of pulses, the target growth in pulse yield from these states must be 6% annually. Area expansion and irrigation would remain critical to attaining self-sufficiency in pulses production. For sugarcane, research and development efforts must be strengthened in Uttar Pradesh and Bihar to increase the yields per hectare by about 4% annually. Mini sugar mills can be employed to meet the demand for sugar in the market, thereby diverting substantial sugarcane production from Khandasari to sugar production.

INCREASED INVESTMENT IN AGRICULTURE AND INFRASTRUCTURES

The declining productivity and low capital formation in the agricultural sector can be largely attributed to the declining public investment in the sector. This trend is alarming considering the burden on productivity-driven growth in the future. Appropriate policy measures are required to stimulate the slow pace of private investment in agriculture. In light of the fact that, close to 70% of the population in India still lives in the villages, the growth of the agricultural sector will continue to be the main engine of broad-based economic growth and development. This will also compliment the efforts of natural resource conservation, along with food security and poverty alleviation. Community level participation by NGOs, including farmers' groups should be facilitated by the government to improve food security, poverty reduction, and assuring sustainability in the management of natural resources. Recent evidences of resource degradation and declining productivity in some intensively cropped areas is of particular concern.

The tools of modern biotechnology, including genetic engineering, as well as conventional breeding methods are expected to play important roles in the development of higher yielding, pest and stress resistant varieties of crops like wheat, rice, maize, etc. High levels of investments in research and development, and development of highly skilled human resource lie at the centre of the genetic innovations.

There is an urgent need for governments and private donors to increase funding for agricultural research. Along with this, every effort must be made to ensure free flow of technology and information so as to achieve a sustainable scenario.

Emphasis on Empowering Small Farmers

Despite the attached insecurity and vulnerability, the contributions of small land holders in securing food security has increased considerably. The off-farm and non-farm employment opportunities can play an important role in improving their situation. The agricultural productivity can be raised by agricultural research and development, improved information and extension, infrastructure development, better irrigation technologies and investments in human resource development.

CONCLUSION

Among the major sources of agrarian distress are low levels of farmers' incomes and their fluctuations over the years. The problem is acute and is getting severe with the passage of time, affecting large chunks of the population that make living with agriculture. Persistent low levels of income may also adversely affect the future of agriculture sector in India. Adequate attention is required to improve the agricultural incomes and thus the welfare of the farmers to secure future of agriculture in the country. Reaching this end will reduce persistent disparity between farm and non-farm income, alleviate agrarian distress, encourage inclusive growth and infuse dynamism in the farming sector. Decent incomes in farm sector will also attract youth towards the farming profession relieving the non-farm job sector of the continuing burden.

Doubling farmers' income by 2022 is quite challenging, but it is needed and attainable. To double the farmers' income, a three pronged strategy focused on development initiative, technology and policy reforms is required. Research institutes should come with technological breakthrough for shifting production frontiers and raising efficiency in use of input. Evidence is growing about the scope of agronomic practices like precision farming to raising production and income of farmers substantially. Modern machinery like precision seeder and planter, laser land leveller, etc., and practices like direct seeded rice, SRI (system of rice intensification), zero tillage, raised bed plantation and ridge plantation, agroforestry, etc., allow highly efficient farming. Research and development institutes should also include in their packages grassroots level innovations and traditional practices which are resilient, sustainable and income enhancing. The Indian Council of Agricultural Research and State Agriculture Universities should together develop customized farming models for different types of socio-economics and bio-physical settings with a focus on farm income. Better price realization, efficient post-harvest management, improvement in irrigation facilities, competitive value chains and adoption of allied activities can alone contribute to at least a third of increment in farmer's income. The liberalization of the agricultural sector can be looked forward to attract private investment in production and market operations. The ultimate responsibility lies with the political leadership to take bold decisions with a vision of taking the sector forward and address the plaguing issues associated with it.

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