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A STUDY OF AGRICULTURE SECTOR IN INDIA

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Abstract

Agriculture plays a vital role in India's economy. Over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. Agriculture, along with fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). Today, India ranks second worldwide in farm output. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. The agriculture sector in India is expected to generate better momentum in the next few years due to increased investments in agricultural infrastructure such as irrigation facilities, warehousing and cold storage. Factors such as reduced transaction costs and time, improved port gate management and better fiscal incentives would contribute to the sector's growth.

Key words: Agriculture, GDP, Indian economy and Agricultural productivity.

1. Introduction

Agriculture plays a very important role in India's economy. About 58 per cent of the rural households depend on agriculture as their principal means of livelihood. Agriculture, along with fisheries and forestry, is one of the largest contributors to the Gross Domestic Product (GDP). Today, India ranks second worldwide in farm output. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India.

India exported \$39 billion worth of agricultural products in 2013, making it the seventh largest agricultural exporter worldwide and the sixth largest net exporter. Most of its agriculture exports serve developing and least

developed nations. As per estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) was 16.1 per cent of the Gross Value Added (GVA) during 2014-15 at 2011-12 prices. During Q1 FY2016, agriculture and allied sectors grew 1.9 per cent year-on-year and contributed 14.2 per cent of GVA.

India is the largest producer, consumer and exporter of spices and spice products. It ranks third in farm and agriculture outputs. Agricultural export constitutes 10 per cent of the country's exports and is the fourth-largest exported principal commodity. The agro industry in India is divided into several sub segments such as canned, dairy, processed, frozen food to fisheries, meat, poultry, and food grains. The Department of Agriculture and Cooperation under the Ministry of Agriculture is responsible for the development of the agriculture sector in India. It manages several other bodies, such as the National Dairy Development Board (NDDB), to develop other allied agricultural sectors.

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2. Indian agriculture since 1947

In the years since its independence, India has made immense progress towards food security. Indian population has tripled, and food - grain production more than quadrupled. There has been a substantial increase in available food - grain per capita. Before the mid-1960s India relied on imports and food aid to meet domestic requirements. However, two years of severe drought in 1965 and 1966 convinced India to reform its agricultural policy and that they could not rely on foreign aid and imports for food security. India adopted significant policy reforms focused on the goal of foodgrain self-sufficiency. This ushered in India's Green Revolution It began with the decision to adopt superior yielding, disease resistant wheat varieties in combination with better farming knowledge to improve productivity. The state of Punjab led India's Green Revolution and earned the distinction of being the country's bread basket.

The initial increase in production was centered on the irrigated areas of the states of Punjab, Haryana and western Uttar Pradesh. With the farmers and the government officials focusing on farm productivity and knowledge transfer, India's total foodgrain production soared. A hectare of Indian wheat farm that produced an average of 0.8 tonnes in 1948, produced 4.7 tonnes of wheat in 1975 from the same land. Such rapid growth in farm productivity enabled India to become self-sufficient by the 1970s. It also empowered the smallholder farmers to seek further means to increase food staples produced per hectare

With agricultural policy success in wheat, India's Green Revolution technology spread to rice. However, since irrigation infrastructure was very poor, Indian farmer innovated with tube-wells, to harvest ground water. When gains from the new technology reached their limits in the states of initial adoption, the technology spread in the 1970s and 1980s to the states of eastern India — Bihar, Odisha and west Bengal. The lasting benefits of the improved seeds and new technology extended principally to the irrigated

areas which account for about one-third of the harvested crop area. In the 1980s, Indian agriculture policy shifted to "evolution of a production pattern in line with the demand pattern" leading to a shift in emphasis to other agricultural commodities like oilseed, fruit and vegetables. Farmers began adopting improved methods and technologies in dairying, fisheries and livestock, and meeting the diversified food needs of a growing population. As with rice, the lasting benefits of improved seeds and improved farming technologies now largely depends on whether India develops infrastructure such as irrigation network, flood control systems, reliable electricity production capacity, all-season rural and urban highways, cold storage to prevent spoilage, modern retail, and competitive buyers of produce from Indian farmers. This is increasingly the focus of Indian agriculture policy. India's agricultural economy is undergoing structural changes. Between 1970 and 2011, the GDP share of agriculture has fallen from 43% to 16%. This isn't because of reduced importance of agriculture or a consequence of agricultural policy. This is largely because of the rapid economic growth in services, industrial output, and non-agricultural sectors in India between 2000 to 2010.

3. Irrigation in India

Indian irrigation infrastructure includes a network of major and minor canals from rivers, groundwater well-based systems, tanks, and other rainwater harvesting projects for agricultural activities. Of these, the groundwater system is the largest. Of the 160 million hectares of cultivated land in India, about 39 million hectare can be irrigated by groundwater wells and an additional 22 million hectares by irrigation canals. In 2010, only about 35 % of agricultural land in India was reliably irrigated. About 2/3rd cultivated land in India is dependent on monsoons. The improvements in irrigation infrastructure in last 50 years have helped India improve food security, reduce dependence on monsoons, improve agricultural productivity and create rural job opportunities. Dams used for irrigation projects have helped provide drinking water to a growing



rural population, control flood and prevent drought-related damage to agriculture.

4. Agriculture Output

As of 2011, India had a large and diverse agricultural sector, accounting, on average, for about 16% of GDP and 10% of export earnings. India's arable land area of 159.7 million hectares (394.6 million acres) is the second largest in the world, after the United States. Its gross irrigated crop area of 82.6 million hectares (215.6 million acres) is the largest in the world. India is among the top three global producers of many crops, including wheat, rice, pulses, cotton, peanuts, fruits and vegetables. Worldwide, as of 2011, India had the largest herds of buffalo and cattle, is the largest producer of milk and has one of the largest and fastest growing poultry industries

6. Agriculture in India

5. Major crops and yields in India

The following table presents the 20 most important agricultural products in India, by economic value, in 2009. Included in the table is the average productivity of India's farms for each produce. For context and comparison, included is the average of the most productive farms in the world and name of country where the most productive farms existed in 2010. The table suggests India has large potential for further accomplishments from productivity increases, in increased agricultural output and agricultural incomes.

Rank	Product	Economic value	Unit price	Average yield, India (2010)	World's most productive farms (2010)	
		(2009 prices, US\$)	(US\$/kilogram)	(tonnes per hectare)	(tonnes per hectare)	Country
1	Rice	\$38.42 billion	0.27	3.3	10.8	Australia
2	Buffalo milk	\$24.86 billion	0.4	1.7	1.9	Pakistan
3	Cow milk	\$17.13 billion	0.31	1.2	10.3	Israel
4	Wheat	\$12.14 billion	0.15	2.8	8.9	Netherlands
5	Mangoes	\$9 billion	0.6	6.3	40.6	Cape Verde
6	Sugar cane	\$8.92 billion	0.03	66	125	Peru
7	Bananas	\$8.38 billion	0.28	37.8	59.3	Indonesia
8	Cotton	\$8.13 billion	1.43	1.6	4.6	Israel
9	Fresh Vegetables	\$5.97 billion	0.19	13.4	76.8	USA
10	Potatoes	\$5.67 billion	0.15	19.9	44.3	USA
11	Tomatoes	\$4.59 billion	0.37	19.3	524.9	Belgium
12	Buffalo meat	\$4 billion	2.69	0.138	0.424	Thailand
13	Soyabean	\$3.33 billion	0.26	1.1	3.7	Turkey
14	Onions	\$3.17 billion	0.21	16.6	67.3	Ireland
15	Chicken Meat	\$3.12 billion	0.64	10.6	20.2	Cyprus
16	Chick peas	\$3.11 billion	0.4	0.9	2.8	China
17	Okra	\$3.07 billion	0.35	7.6	23.9	Israel
18	Cattle Meat	\$2.93 billion	0.83	13.8	24.7	Jordan
19	Eggs	\$2.80 billion	2.7	0.1	0.42	Japan
20	Beans	\$2.57 billion	0.42	1.1	5.5	Nicaragua



7. Agriculture productivity in India

Agriculture productivity in India, growth in average yields from 1970 to 2010			
Crop	Average YIELD, 1970-1971	Average YIELD, 1990-1991	Average YIELD, 2010-2011
	kilogram per hectare	kilogram per hectare	kilogram per hectare
Rice	1123	1740	2240
Wheat	1307	2281	2938
Pulses	524	578	689
Oilseeds	579	771	1325
Sugarcane	48322	65395	68596
Tea	1182	1652	1669
Cotton	106	225	510

India and China are competing to establish the world record on rice yields. Yuan Longping of China National Hybrid Rice Research and Development Centre set a world record for rice yield in 2010 at 19 tonnes per hectare in a demonstration plot. In 2011, this record was surpassed by an Indian farmer, Sumant Kumar, with 22.4 tonnes per hectare in Bihar, also in a demonstration plot. These farmers claim to have employed newly developed rice breeds and system of rice intensification (SRI), a recent innovation in farming. The claimed Chinese and Indian yields have yet to be demonstrated on 7 hectare farm lots and that these are reproducible over two consecutive years on the same farm

The total production and economic value of horticultural produce, such as fruits, vegetables and nuts has doubled in India over the 10-year period from 2002 to 2012. In 2012, the production from horticulture exceeded grain output for the first time. The total horticulture produce reached 277.4 million metric tonnes in 2013, making India the second largest producer of horticultural products after China. Of this, India in 2013 produced 81 million tonnes of fruits, 162 million tonnes of vegetables, 5.7 million tonnes of spices, 17 million tonnes of nuts and plantation products (cashew, cacao, coconut, etc.), 1 million tonnes of aromatic horticulture produce and 1.7 million tonnes of flowers (7.6 billion cut flowers).

8. Horticulture in India

Horticultural productivity in India, 2013				
Country	Area under fruits production (million hectares)	Average Fruits Yield (Metric tonnes per hectare)	Area under vegetable production (million hectares)	Average Vegetable Yield (Metric tonnes per hectare)
India	7.0	11.6	9.2	17.6
China	11.8	11.6	24.6	23.4
Spain	1.54	9.1	0.32	39.3
US	1.14	23.3	1.1	32.5
World	57.3	11.3	60.0	19.7



During the 2013 fiscal year, India exported horticulture products worth Rs. 14365 crore (US\$2.1 billion), nearly double the value of its 2010 exports. Along with these farm-level gains, the losses between farm and consumer increased and are estimated to range between 51 to 82 million metric tonnes a year.

9. Agricultural Productivity

Although, India has attained self-sufficiency in food staples, the productivity of its farms is below that of Brazil, the United States, France and other nations. Indian wheat farms, for example, produce about a third of the wheat per hectare per year compared to farms in France. Rice productivity in India was less than half that of China. Other staples productivity in India is

similarly low. Indian total factor productivity growth remains below 2 % per annum; in contrast, China's total factor productivity growth is about 6 % per annum, even though China also has smallholding farmers. Several studies suggest India could eradicate its hunger and malnutrition and be a major source of food for the world by achieving productivity comparable with other countries. By contrast, Indian farms in some regions post the best yields, for sugarcane, cassava and tea crops. Crop yields vary significantly between Indian states. Some states produce two to three times more grain per acre than others. The table compares the statewide average yields for a few major agricultural crops in India, for 2001-2002.

Crop	Average farm yield in Bihar	Average farm yield in Karnataka	Average farm yield in Punjab
	kilogram per hectare	kilogram per hectare	kilogram per hectare
Wheat	2020	Unknown	3880
Rice	1370	2380	3130
Pulses	610	470	820
Oil seeds	620	680	1200
Sugarcane	45510	79560	65300

Crop yields for some farms in India are within 90 % of the best achieved yields by farms in developed countries such as the United States and in European Union. No single state of India is best in every crop. Tamil Nadu achieved highest yields in rice and sugarcane, Haryanain wheat and coarse grains, Karnataka in cotton, Bihar in pulses, while other states do well in horticulture, aquaculture, flower and fruit plantations. These differences in agricultural productivity are a function of local infrastructure, soil quality, micro-climates, local resources, farmer knowledge and innovations.

The Indian food distribution system is highly inefficient. Movement of agricultural produce is heavily regulated, with inter-state and even inter-district restrictions on marketing and

movement of agricultural goods. One study suggests Indian agricultural policy should best focus on improving rural infrastructure primarily in the form of irrigation and flood control infrastructure, knowledge transfer of better yielding and more disease resistant seeds. Additionally, cold storage, hygienic food packaging and efficient modern retail to reduce waste can improve output and rural incomes.

The low productivity in India is a result of the following factors: The average size of land holdings is very small (less than 2 hectares) and is subject to fragmentation due to land ceiling acts, and in some cases, family disputes. Such small holdings are often over-manned, resulting in disguised unemployment and low productivity of labour. Some reports claim smallholder farming



may not because of poor productivity, since the productivity is higher in China and many developing economies even though China smallholder farmers constitute over 97% of its farming population. A Chinese smallholder farmer is able to rent his land to larger farmers, China's organised retail and extensive Chinese highways are able to provide the incentive and infrastructure necessary to its farmers for sharp increases in farm productivity.

Adoption of modern agricultural practices and use of technology is inadequate, hampered by ignorance of such practices, high costs and impracticality in the case of small land holdings. According to the World Bank, Indian branch's Priorities for Agriculture and Rural Development, India's large agricultural subsidies are hampering productivity-enhancing investment. Overregulation of agriculture has increased costs, price risks and uncertainty. Government intervenes in labour, land, and credit markets. India has inadequate infrastructure and services. The World Bank also says that the allocation of water is inefficient, unsustainable and inequitable. The irrigation infrastructure is deteriorating.

The overuse of water is being covered by over-pumping aquifers but, as these are falling by one foot of groundwater each year, this is a limited resource. The Inter-Governmental panel on Climate change released a report that food security may be a big problem in the region post 2030. Illiteracy, general socio-economic backwardness, slow progress in implementing land reforms and inadequate or inefficient finance and marketing services for farm produce. Inconsistent government policy. Agricultural subsidies and taxes often changed without notice for short term political ends.

Irrigation facilities are inadequate, as revealed by the fact that only 52.6 % of the land was irrigated in 2003 – 2004, which result in farmers still being dependent on rainfall, specifically the monsoon season. A good monsoon results in a robust growth for the economy, while a poor monsoon leads to a sluggish growth. Farm

credit is regulated by NABARD, which is the statutory apex agent for rural development in the subcontinent. At the same time, over-pumping made possible by subsidized electric power is leading to an alarming drop in aquifer levels. A third of all food that is produced rots due to inefficient supply chains and the use of the "Walmart Model" to improve efficiency is blocked by laws against foreign investment in the retail sector.

10. Farmers Suicides

In 2012, the National crime Records Bureau of India reported 13,754 farmer suicides. Farmer suicides account for 11.2% of all suicides in India. Activists and scholars have offered a number of conflicting reasons for farmer suicides, such as monsoon failure, high debt burdens, genetically modified crops, government policies, public mental health, personal issues and family problems

11. Diversion of agricultural land for non-agricultural purpose

Indian National Policy for Farmers of 2007 stated that "prime farmland must be conserved for agriculture except under exceptional circumstances, provided that the agencies that are provided with agricultural land for non-agricultural projects should compensate for treatment and full development of equivalent degraded or wastelands elsewhere". The policy suggested that, as far as possible, land with low farming yields or that was not farmable should be earmarked for non-agricultural purposes such as construction, industrial parks and other commercial development.

Amartya Sen offered a counter viewpoint, stating that "prohibiting the use of agricultural land for commercial and industrial development is ultimately self-defeating. He stated that agricultural land may be better suited for non-agriculture purposes if industrial production could generate many times more than the value of the product produced by agriculture. Amartya Sen suggested India needed to bring productive industry everywhere, wherever there are



advantages of production, market needs and the locational preferences of managers, engineers, technical experts as well as unskilled labour because of education, healthcare and other infrastructure. He stated that instead of government controlling land allocation based on soil characteristics, the market economy should determine productive allocation of land.

12. Growth Drivers in Agriculture

Over the recent past, multiple factors have worked together to facilitate growth in the agriculture sector in India. These include growth in household income and consumption, expansion in the food processing sector and increase in agricultural exports. Rising private participation in Indian agriculture, growing organic farming and use of information technology are some of the key trends in the agriculture industry.

As per the 4th Advance Estimates, food grain production is estimated at 252.68 million tonnes (MT) for 2014-15. Production of pulses estimated at 17.20 million tonnes. With an annual output of 138 MT, India is the largest producer of milk. It also has the largest bovine population. India is the largest importer of pulses at 19.0 MT and 3.4 MT, respectively. India, the second-largest producer of sugar, accounts for 14 per cent of the global output. It is the sixth-largest exporter of sugar, accounting for 2.76 per cent of the global exports.

Spice exports from India are expected to reach US\$ 3 billion by 2016 – 2017 due to creative marketing strategies, innovative packaging, strength in quality and strong distribution networks. The spices market in India is valued at Rs 40,000 crore (US\$ 6.16 billion) annually, of which the branded segment accounts for 15 per cent. The procurement target for rice during marketing season (MS) 2015–16 has been finalized as 30 MT.

13. Investments in Agriculture Sector

Several players have invested in the agricultural sector in India, mainly driven by the government's initiatives and schemes. According

to the Department of Industrial Policy and Promotion (DIPP), the Indian agricultural services and agricultural machinery sectors have cumulatively attracted foreign direct investment (FDI) equity inflow of about US\$ 2,182 million from April 2000 to June 2015. Some major investments and developments in agriculture in the recent past are as follows:

- Mahindra & Mahindra (M&M), India's leading tractor and utility vehicle manufacturer, announced its entry into pulses retailing under the brand 'NuPro'. Going forward, the company plans to foray into e-retailing and sale of dairy products.
- Fertilizer cooperative IFFCO launched a joint venture with Japanese firm Mitsubishi Corp for manufacturing agrochemicals in India.
- Acumen, a not-for-profit global venture fund, has invested Rs 11 crore (US\$ 1.7 million) in Sahayog Dairy, an integrated entity in the segment, based at Harda district in Madhya Pradesh.
- Rabo Equity Advisors, the private equity arm of Netherlands-based Rabo Group, raised US\$ 100 million for the first close of its second fund – India Agri Business Fund II. The fund plans to invest US\$ 15–17 million in 10–12 companies.
- Oman India Joint Investment Fund (OIJIF), a joint venture (JV) between the State Bank of India (SBI) and State General Reserve Fund (SGRF), invested Rs 95 crore (US\$ 14.62 million) in GSP Crop Science, a Gujarat-based agrochemicals company.
- The world's seventh-largest agrochemicals firm, Israel-based ADAMA Agrochemicals plans to invest at least US\$ 50 million in India over the next three years.
- Belgium-based Univeg has collaborated with Mahindra & Mahindra to develop a fresh fruit supply chain.
- Companies from the US, Canada, Australia, Israel, the Netherlands and other European countries have shown strong



interest to transfer the best practices, linkages between scientific institutes, agriculture storage, cold-chain management, market access, and productivity enhancement such as the introduction of new technology in seed and plant biotech.

- Canada-based International Food Security Research Fund has major investments in food security research in several Indian universities. These strengthen food-processing and sustainable agricultural techniques.

14. Government Initiatives

Given the importance of the agriculture sector, the Government of India, in its Budget 2015–16, planned several steps for the sustainable development of agriculture. The government has already taken steps to address two major factors (soil and water) critical to improve agriculture production. Steps have been taken to improve soil fertility on a sustainable basis through the soil health card scheme and to support the organic farming scheme 'Paramparagat Krishi Vikas Yojana'. Other steps include improved access to irrigation through 'Pradhanmantri Gram Sinchai Yojana' enhanced water efficiency through 'Per Drop More Crop' continued support to Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the creation of a unified national agriculture market to boost the incomes of farmers.

The Government of India recognizes the importance of micro irrigation, watershed development and 'Pradhan Mantri Krishi Sinchai Yojana' thus, it allocated a sum of Rs 5,300 crore (US\$ 815 million) for it. It urged the states to focus on this key sector. The state governments are compelled to allocate adequate funds to develop the agriculture sector, take measures to achieve the targeted agricultural growth rate and address the problems of farmers. The Department of Agriculture and Cooperation under the Ministry of Agriculture has inked MOUs/agreements with 52 countries including the US. In addition, the Department of Agriculture Research & Education

(DARE) and the Department of Animal Husbandry, Dairying & Fisheries (DAHD&F) under the Ministry of Agriculture have signed MOUs/agreements with other countries, taking the number of partnerships with other countries to 63. These agreements would provide better agricultural facilities in areas such as research and development, capacity building, post-harvest management, value addition/food processing, plant protection, animal husbandry, dairy and fisheries. The agreements could help enhance bilateral trade as well.

Given the correlation between improvement in agriculture and the development of the country, the Government of India adopted several initiatives and programmes to ensure continuous growth. It allocated Rs 25,000 crore (US\$ 3.9 billion) for the Rural Infrastructure Development Fund (RIFD), Rs 1,500 crore (US\$ 231 million) for the long-term rural credit fund, Rs 45,000 crore (US\$ 6.93 billion) for the short-term cooperative rural credit finance fund and Rs 25,000 crore (US\$ 3.85 billion) for the short-term Regional rural bank (RRB) refinance fund. It also marked an ambitious target of Rs 8.5 lakh crore (US\$ 130.9 billion) of agriculture credit during 2015–16.

Some of the recent major government initiatives in the sector are as follows:

- India and Lithuania have agreed to intensify agricultural cooperation, especially in sectors like food and dairy processing.
- Gujarat Government has planned to connect 26 Agricultural Produce Market Committees (APMCs) via electronic market platform, under the National Agriculture Market (NAM) initiative.
- The State Government of Telangana plans to spend Rs 81,000 crore (US\$ 12.1 billion) over the next three years to complete ongoing irrigation projects and also undertake two new projects for lifting water from the Godavari and Krishna river.



- The National Dairy Development Board (NDDB) announced 42 dairy projects with a financial outlay of Rs 221 crore (US\$ 34.02 million) to boost milk output and increase per animal production of milk.
- The government planned to invest Rs 50,000 crore (US\$ 7.7 billion) to revive four fertiliser plants and set up two plants to produce farm nutrients.
- The Ministry of Food Processing Industries took some new initiatives to develop the food-processing sector that would enhance the income of farmers and export of agro and processed foods, among others.
- The Government of Telangana allocated Rs 4,250 crore (US\$ 654 million) for the first phase of the farm loan waiver scheme. The scheme is expected to benefit 3.6 million farmers who took loans of Rs 100,000 (US\$ 1,539) or below before March 31, 2014.

15. Conclusion

The agriculture sector in India is expected to generate better momentum in the next few years due to increased investments in agricultural infrastructure such as irrigation facilities, warehousing and cold storage. Factors such as reduced transaction costs and time, improved port gate management and better fiscal incentives would contribute to the sector's growth. Furthermore, the growing use of genetically modified crops will likely improve the yield for Indian farmers. The 12th Five-Year Plan estimates the foodgrains storage capacity to expand to 35 MT. Also, a 4 per cent growth would help restructure the agriculture sector in India in the next few years.

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