Journal of Information Systems Engineering and Management
2025, 10(35s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Crucial Achievements of Indian Agriculture: A Critical Assessment

Dr. Swapnali Baruah* and Dr. Ram Krishna Mandal**
**Assistant Professor, College of Administrative and Financial Sciences, Saudi Electronic University, Dammam, Saudi Arabia*
bswapnali3@gmail.com
***Professor, Department of Economics, Cooch Behar Panchanan Barma University, Cooch Behar-736101, West Bengal, India*
rkm_1966@yahoo.co.in, https://orcid.org/0000-0001-9621-7084
Corresponding Author: Dr. Ram Krishna Mandal

ARTICLE INFO

Received: 30 Dec 2024
Revised: 12 Feb 2025
Accepted: 26 Feb 2025

ABSTRACT

India's agricultural sector saw a shift from producing food in short supply to exporting it. Since winning independence, the agricultural sector has been the main driver of India's economy. Thus, without discussing India's agricultural revolution, the tale of its successful transformative history would fall short. The study aims to demonstrate the noteworthy achievements of Indian agriculture considering its unique characteristics, variety, vastness, and past. Methodology: Based on secondary data, this study is mostly descriptive and makes use of both quantitative and qualitative techniques.Findings and Discussion: Thanks to the dedication and hard work of agricultural professionals, India is currently the world's greatest producer of milk, pulses, and jute. It is also the second-largest producer of rice, wheat, cotton, fruits, and vegetables. In addition, it ranks well in the production of poultry, fish, spices, and plantation crops. Rainfed and susceptible to both biotic and abiotic stresses, 49% of the nation's net cultivated area is in this situation. Following independence, foodgrain production surged from 50 million tonnes to 323.55 million tonnes in 2022–2023. Findings: Indian agriculture is rapidly changing due to scientific advancements. India will be a global agricultural powerhouse in very near future. Conclusion: The global social contract should be incorporated into agricultural education in order to meet societal needs, foster leadership, foster greater teamwork, and create novel solutions to problems. As a result, efforts to develop human capacity are required to produce professionals and entrepreneurs in the newly emerging fields of agriculture.

Keywords: Food Scarcity, Agricultural Transition, Scientific Advancements, Powerhouse, Global.

INTRODUCTION

India's history, culture, and legacy are based on agriculture. India's agricultural landscape consists of a complex mosaic of unique agro ecosystems, each distinguished by unique soil, vegetation, climate, and other natural characteristics. Agriculture and related activities provide a livelihood for around 50% of Indians. One of the oldest systems in the world, it is distinguished by its complexity and diversity, disarray, and stress due to human and environmental whims from "seed to market." In the past, overused natural resources brought on by bad weather, the monsoon, and natural disasters caused crop failures and a shortage of food that had a severe effect on society. Following independence, India's agriculture underwent a transformation from one of food scarcity to one of food exportation, largely as a result of scientifically driven innovations that caused agricultural production to increase multiple times, from 135 million tonnes in 1950–1951 to over 1300 million tonnes in 2021–2022, despite growing abiotic and biotic stresses and diminishing and depleting natural resources. On "Azadi Ka Amrit Mahotsav," which commemorates India's 75th anniversary of independence, people celebrate the country's major advancements with joy, pride, and respect. Numerous jubilant democracies across the globe are commemorating India's half-century of sovereignty. Agriculture represents one of the limited sectors within the economy that has demonstrated consistent growth subsequent to independence while effectively meeting domestic requirements. Since the attainment of independence, the agricultural domain has functioned as the primary catalyst for India's economic advancement.

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Consequently, the narrative of India's extraordinary historical transformation would be incomplete without addressing the agricultural evolution from a state of "ship to mouth" to one characterized by "self-sufficiency and export." The accomplishments and significance of Indian agriculture have garnered international recognition. The publication "Indian Agriculture after Independence" chronicles the narrative of India's post-independence journey over the past 75 years. In spite of various adversities, including unpredictable climatic conditions, diminishing soil fertility, rising atmospheric temperatures and an escalation of detrimental pests and diseases, Indian agriculture has achieved notable progress. Through the development and spread of technology, the formation of human capital, and the establishment of rural farm centres to help farmers, the nation may progress from being severely food-scarce to being a food-exporting nation with the coordinated efforts of ICAR as the frontal organisation. We talked about the challenging yet successful history of Indian agriculture. The revolutions in staple foods, livestock, and fisheries demonstrate how Indian agriculture has grown from a food-scarce nation to a food-surplus and exporting nation (Mohapatra, Rout, and Pathak, 2022). India ranks second globally in the production of rice, wheat, oilseeds, fruits, vegetables, cotton, sugarcane, and spices. Furthermore, according to [https://www.investindia.gov.in/team-india-blogs/indian-agriculture-investments-and-achievements], it is the world's leading producer of cotton, milk, pulses, tea, and cashews. In 2020–21, the agriculture sector showed resilience against the COVID-19 pandemic, recording above-average real growth of 3.6 percent, even while the real GVA of the economy as a whole contracted by 6.2 percent. Concerns about resurgent COVID-19 waves have led to many countries stockpiling food grains that they bought at a premium price. However, India is happy with its public cereal stocks, which are 2.8 times higher than buffer norms (Chandrashekhar and Ghosh, 2021), record-high agricultural exports of 17.1% in 2020–21, and significant increases in the procurement of marketed surplus in 2020–21 and 2021–22 [Mukherjee, Atri et al., 2022; Chandrasekhar, & Ghosh, 2021].

OBJECTIVES

The study has made an effort to illustrate the significant accomplishments of Indian agriculture in light of its distinctiveness, diversity, size, and history.

METHODS AND MATERIALS

Design and methodology: With a focus on descriptive research, this study employs both quantitative and qualitative methodologies. Secondary data served as the basis for its design. Secondary sources of Indian knowledge, such as books, essays, websites, and online journals released over time, are where the information is acquired from.

Analysis: To maintain the required presentation and conclusion, the numerous materials obtained among the numerous sources have been carefully reviewed, verified, and organized beneath the relevant headings.

RESULTS AND DISCUSSION

Indian agriculture, which is among the world's oldest, is characterised by diversity, heterogeneity, lack of organisation, and frequent fluctuations throughout the entire process from "seed to market." It is a vital economic sector for the nation's inclusive and sustainable economic growth. The sector produces around 17% of India's GDP and employs 49.6% of the working force, many of whom are seasonal, underpaid, and underemployed. India's agriculture industry has made great strides. Nonetheless, a lack of food has had a major detrimental effect on society on several occasions throughout Indian history. Prior to independence, India's agriculture was always heavily reliant on the weather. Unfavourable monsoons, particularly the southwest monsoon, lead to droughts and crop failure. Occasionally, these droughts led to famines in the years that followed. More came from the famines in India (Mohapatra, Rout, and Pathak, 2022). A great success, the Green Revolution led to a large rise in food output.Indian agriculture grew later, albeit more slowly, and it is now one of the world's leading producers of food grains, milk, fruits, and vegetables. In the 1960s, the government started a number of initiatives, including the Green Revolution, to boost agricultural productivity. This program focused on using chemical pesticides and fertilisers, as well as developing and implementing high-yielding rice and wheat varieties[https://www.linkedin.com/pulse/indian- agriculture-from-1947-present-nurturing-growth-shet].

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Research Article

Major Achievements

Grain Production Records Following the Green Revolution in the 1960s, India's agricultural output saw a noticeable acceleration because of the extensive use of inputs and advancements in technology. Throughout the 1970s and 1980s, this expansion was sustained. Despite a minor downturn in the early 2000s, the average production of food grains has climbed dramatically during the last 10 years. More cropping intensity, higher use of premium seeds and fertilisers, more land under irrigation, increasing governmental and private investment in agriculture, and increased farm financing have all contributed to this surge (Chand & Parappurathu, 2012). In addition to improving access to essential agricultural inputs, the government's price support programme, which is according to the minimum support price, acted as a major factor in increasing the production of pulses and cereals, leading to a record-breaking run of food grain production from 2016 to 2017. Despite unpredictable weather patterns, declining soil fertility, increasing air temperatures, and an increase in pests and illnesses, science-driven agricultural growth enabled India to go from being a severely food-scarce country to one that is food-sufficient, food-surplus, and food-exporting. Thanks to the dedication and hard work of agricultural professionals, India is currently the world's greatest producer of milk, pulses, and jute. It is also the second-largest producer of rice, wheat, cotton, fruits, and vegetables. In addition, it ranks well in the production of poultry, fish, spices, and plantation crops. Rainfed and susceptible to both biotic and abiotic stresses, 49% of the nation's net cultivated area is in this situation. In the years 2021–2022, the total production of food grains grew from 51 Mt in 1950–1951 to over 314 Mt. From 1950 to 1951, there was a noticeable a rise in the nation's food and nutritional security due to the growing production of horticultural crops, food grains, fish, milk, eggs, and fish by a factor of six, fish by an additional factor of 18, and eggs by a factor of 53 (Pathak and Ayyappan 2020). Water stress also affects areas under irrigation system control that are only found in catchments fed by rainfall in the case of a weak monsoon. Flooding, which was once a typical occurrence in the driest sections of the country, is now experienced in the eastern half of the country due to changes in the pattern of rainfall. In addition, the growing frequency of frost in the northwest, heat waves in the middle and northern areas, and cyclones on the eastern coast bring devastation (Mohapatra, Rout, and Pathak, 2022).

SHARE OF AGRICULTURE SECTOR IN GDP

Even though agriculture employed 72% of the labour force, the country was short on food and other raw resources needed for manufacturing. 49% of the nation's income came from the primary sector. The usual shortage of food grains, both in terms of quantity and quality, meant that famines were commonplace throughout the country. Since then, the agriculture sector's share of the national GDP has declined noticeably and structurally. Because the employment share has not kept up with the GDP, there is a sizable income disparity between the non-agricultural and agricultural sectors. The composition of the GDP since independence, stated as a percentage, is now displayed in Table 1 and Figure-1.

Table 1: Sectoral CompositionofGDPsinceindependence (in per cent)

Year	Agriculture and AlliedActivities	Industries	Services
1950-51	51.81	14.16	33.25
1980-81	35.39	24.29	39.92
2000-01	24.51	25.22	50.27
2010-11	17.74	27.76	54.5
2016-17	15.11	31.12	53.77
2019-20	18	27	55
2020-21	20	26	54

Source: Economic Survey, GOI., (various years)

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https://www.jisem-journal.com/

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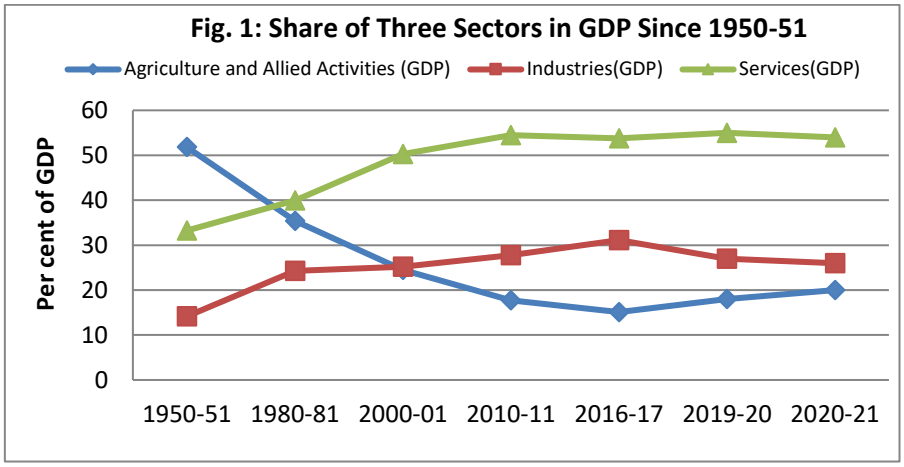


Explanation from Table 1 and Fig. 1: Fig. 2 and Table 2 explain that the industrial and service sectors have replaced the primary sector, which is why the curves for agriculture and related activities are downward sloping and only slightly upward after 2016–17. In contrast, the curves for industries are rising until 2016–17 and then slightly downward, while the service sector's curve is continuously rising. Ultimately, the proportions of the secondary and tertiary sectors are steadily rising. It indicates that the rural economy develops and becomes an industrial economy. The primary sector, or agriculture sector, has contributed less to GDP than it did in 1950–51, 35% in 1980–81, and 15% in 2016–17, as shown by the Table and Fig. It did, however, rise to 18% in 2019–20 and 20% in 2020–21. The agricultural sector's revenue share of the country declined steadily between 1950–1951 and 2016–2017, but its GDP contribution climbed again. The reason for this is the progress made by science in this area. The fact that grains alone contributed nearly half of GDP in 1950–51 indicates how beneficial the agricultural sector is to the Indian economy. Its food production has increased significantly since winning independence, and it currently ranks second in the world and is considered a surplus producer. India's move from "ship-to-mouth" to "self-sufficiency" in food grain production after independence is considered a significant achievement, considering its agrarian economy. Following independence, food grain production surged from 50 million tonnes to 323.55 million tonnes in 2022–2023. A country's economic development greatly influences how much of its GDP and employment come from agriculture. The sector with the most resources in the early stages of development is agriculture, which includes manpower, capital, and revenue. Any economy can be divided into three major categories: primary, secondary, and tertiary sectors. The structure of an economy changes as it advances in development. Economists have labelled these long-term shifts in the economy as "structural transformations of an economy." Even after 70 years of independence, India's economy is still based primarily on agriculture, which employs 42.2% of the working population and contributed 18% of the country's GDP in 2019–20 (National Statistics Office, 2020). India is endowed with large areas of fertile land that are split into 15 agro-climatic zones with a variety of soil types, weather patterns, and crop-growing potential, according to the Indian Council for Agricultural Research (ICAR) [https://www. investindia.gov.in/team-india-blogs/indian-agriculture-investments-and-achievements].

The authority has introduced a number of programmes to boost funding for the agricultural industry and enhance the sector's contribution to the economy as a whole. We produced roughly 135 Mt from agriculture and related sectors in 1950–1951, the year for which the majority of commodity production data is available from authorised sources. The combined production of food and non-food items in 2021–2022 was close to 1300 Mt. It is among of the very few notable turning points in the history of independent India is this accomplishment. All commodities have seen multiplication in production, despite the net sown area staying nearly unchanged at 140 Mha. India is currently among the top 5 countries in the world for agri-producers. These have made it possible to export $50 billion worth of agricultural products, in addition to achieving food self-sufficiency. With only a 1.3-times increase in area, the majority of agricultural commodities have seen a 6–68-times increase in production (Table 2). Consequently, the country that experienced food scarcity until 1950 became self-sufficient in 2000, self-insufficient in 1960, self-sufficient in 2010 and above 2010 (Fig. 2). Even in the midst of the COVID-19 epidemic, food production systems have been able to fulfil demand through innovative interventions at every stage of the value chain. Moreover, there are signals indicating a decrease in the intensity of greenhouse gas (GHG) emissions

Journal of Information Systems Engineering and Management
2025, 10(35s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

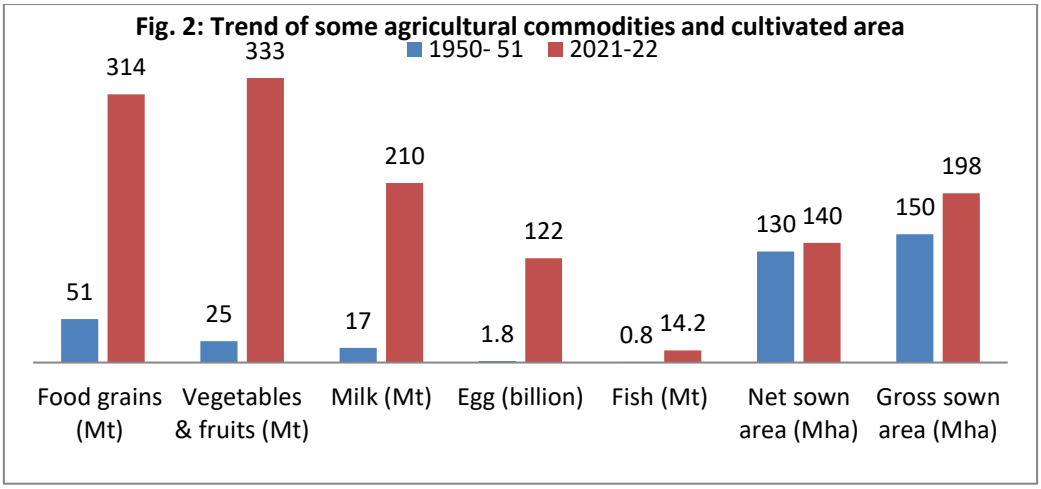
Research Article

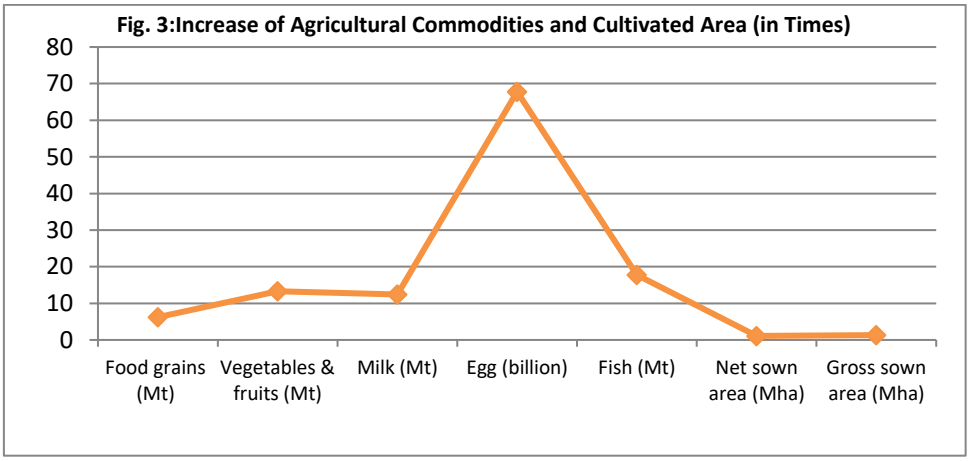
associated with agriculture (Pathak and Ayyappan 2020). Policy, science, technology, and extension have all contributed to the country's shift from a food-scarce to a food-surplus economy.

Table2.ProductionofAgriculturalCommoditiesandCultivatedAreain 1950-51 and 2021-22

Commodity	1950- 51	2021-22	Increase (Times)
Foodgrains(Mt)	51	314	6.2
Vegetables&fruits(Mt)	25	333	13.3
Milk(Mt)	17	210	12.4
Egg (billion)	1.8	122	67.8
Fish(Mt)	0.8	14.2	17.8
Netsownarea(Mha)	130	140	1.1
Grosssownarea(Mha)	150	198	1.3

Source: Mohapatra, T.et.al.(2022): "IndianAgriculture:AchievementsandAspirations" in Pathak, H. et. al (editors), Indian Agriculture after Independence, ICAR, New Delhi, p.8.





Farm machinery and implements were created to increase agricultural mechanisation, save labour and time, lessen drudgery, lower production costs, decrease post-harvest losses, and increase crop yield and farm income. Some of the sectors of Indian agriculture that have experienced considerable success include managing water, energy, and fertiliser, as well as using traditional andunconventional energy sources for processing and production in

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e-ISSN: 2468-4376
https://www.jisem-journal.com/

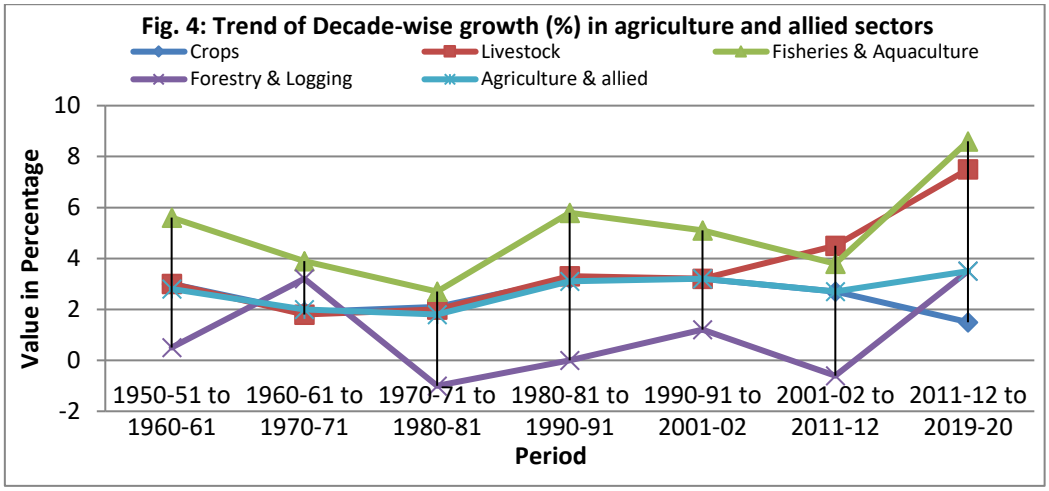
Research Article

agriculture. A range of institutional, technological, and policy interventions affect how well agriculture performs. The trend growth rates are extrapolated to the most recent decade, which spans the years 2010–11–2019–20, from the first decade, 1951–52, to 1960–61. The growth in the agricultural and non-agricultural sectors has also been examined in order to evaluate the relative performance. Agricultural productivity has grown faster since the mid-2000s, particularly in states with low productivity. Subsequently, there has been convergence in agricultural productivity as a result of more inclusive agricultural expansion (Balaji and Pal 2014). Interestingly, the expansion of the non-agricultural sector outpaced the growth of the agriculture sector during the whole time. The agriculture and associated sectors include crops, livestock, fisheries, aquaculture, and the forestry and logging subsectors. The sub-sectors' growth has varied noticeably from one another (Table 3). The last ten years, from 2011–12 to 2019–20, saw the highest level of overall growth ever. The first 50 years after 1950–1951 saw a similar rate of growth in the subsectors of crops and livestock. When compared to the crop sub-sector, the livestock sector has grown at a substantially faster rate since 2001–2002. In recent years, the crop sub-sector's growth has slowed. The output of aquaculture and fishing has also increased significantly. Over many years, the livestock and fisheries industries have contributed to the higher growth in agriculture (Pal, Suresh et al., 2022).

Table3.Decade-wisegrowth(%)inagricultureandalliedsectorsaquaculture Fisheries &aquaculture Fisheries &aquaculture Fisheries &aqua

Period	Crops	Livestock	Fisheries & Aquaculture	Forestry & Logging	Agriculture & allied
1950-51 to 1960-61	3.0	3.0	5.6	0.5	2.8
1960-61 to 1970-71	1.9	1.8	3.9	3.2	2.0
1970-71 to 1980-81	2.1	2.0	2.7	-1.0	1.8
1980-81 to 1990-91	3.2	3.3	5.8	0.0	3.1
1990-91 to 2001-02	3.2	3.2	5.1	1.2	3.2
2001-02to2011-12	2.7	4.5	3.8	-0.6	2.7
2011-12to2019-20	1.5	7.5	8.6	3.5	3.5

Source:EstimatesbasedondatafromMOSPI(2020)



Diversification has been the primary force behind economic acceleration and convergence. Due to the demand generated by the aforementioned quicker expansion in the industrial and service sectors and the consequent increase in per capita income, states have clearly observed a general movement away from crops and towards the livestock and fisheries sectors (Pal et al. 2020). Consequently, markets now drive agriculture and provide farmers higher prices, making it more diverse. The crop sub-sectors decreasing share of agricultural output, from 67% in

Journal of Information Systems Engineering and Management
2025, 10(35s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

1950–1951 to 58% in 2019–20, is indicative of the growing diversification (Fig. 2). However, the proportion of livestock and fishing subsectors is increasing over time. There is plenty of opportunity for diversification into other sub-sectors because the crop sub-sector still generates a substantial quantity of agricultural production.Nowadays, non-food crops with considerable local and international value, including cotton, account for around two thirds of the agricultural sector's total output. On the factor side, signs of increased commercialisation include rising quality seed and fertiliser usage, rising irrigation coverage and energy use, and falling labour due to expanding agricultural mechanisation and other developmental factors. There is a discernible change in the use of pesticides despite regulatory concerns (Subash et al. 2017).

Significance of the Agriculture Sector

The Indian economy places a strong emphasis on the Agriculture Sector, which embodies three key thrust areas: (1) promoting inclusive growth; (2) enhancing rural income; and (3) maintaining food security. It provides over 14% of the country's GDP and exports, and it is the primary source of income for half of its inhabitants. According to the 2011 Census, the overall number of agricultural labourers and farmers increased from 234 million in 2001 to 263 million in 2011. The share of agri-exports in overall exports increased from 13.08% to 14.17% (or Rs 268,000 Cr) during 2012–13 and 2013–14, a record high [https://www.mospi.gov.in/sites/ default/files/Statisticalyear_book_ india _chapters/ch8.pdf].

A Few Amazing Developments and Steps Made in the Field of Agriculture

1. In the crop year 2020–21, 102.36 million tonnes (MT) of rice and 144.52 MT of food grains were produced, according to early estimates from the Ministry of Agriculture and Farmers Welfare.

2. The first commercial cargo of Kashmir's Mishri cherry was shipped to Dubai in July 2021, indicating a shift in the export of horticultural commodities.

3. Groundnut exports from Eastern India surged in June 2021, with 24 metric tonnes going from West Bengal to Nepal.

4. Of the 39 mega food parks permitted in India, twenty-two were active as of November 2021. The Electronic National Agriculture Market (e-NAM) was founded in April 2016 with the goal of uniting the existing Agricultural Produce Market Committees (APMCs) and offering a standardised national market for agricultural commodities. As of February 2021, 157,778 dealers and 16.9 million farmers have enrolled on the service. It is anticipated that 22,000 additional mandis in India would have linked to e-NAM by the end of 2022, adding to the over 1,000 that have already done so.

5. It is estimated that India's agricultural revenue would have quadrupled by 2022. In the next years, it is projected that increased investment in irrigation systems, cold storage, and warehousing would boost the Indian agriculture industry. Furthermore, India's self-sufficiency in genetically modified crops and pulses is expected to help the country's agriculture. Under the PM Matsya Sampada Yojana, the Central Government also intends to invest $9 billion on fisheries. By 2024–2025, the government hopes to increase fish production to 220 lakh tones [https://www.investindia.gov.in/team-india-blogs/indian-agriculture-investments-and-achievements].

Major Achievements in Indian Agriculture

1. Record Production of Food Grains: Higher cropping intensity, more credit for agriculture, investment from the public and commercial sectors, and greater use of premium seeds and fertilisers make this feasible.
2. Diversification Towards Horticultural Crops: Horticultural production has replaced foodgrain production since 2012–2013, and it presently accounts for approximately 35% of the overall value of crop output in the agriculture sector.
3. Growing Significance of Related Activities: Livestock is becoming an increasingly important source of steady income for landless workers and small and marginal farmers as the amount of operational land held continuously declines.

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e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

4. Changing Dynamics of Agriculture Trade: The proportion of goods from the agriculture and associated industries in world trade has doubled, from 1.1% in 2000 to 2.2% in 2018. In 2020–21, 14.2% of India's total exports came from the agricultural and related sectors.

Principal Drivers of Indian Agriculture's Growth

1. **Productivity Growth:** The use of fertilisers, high-yielding seed varieties, public research funding, and rice and wheat production have all contributed to the food grains' notable productivity growth. The productivity growth of oilseeds, horticultural crops, pulses, and nutri-cereals was slow compared to cereals. Additionally, crop yields in India have only reached between 30 and 60 percent of those in developed nations.
2. **Farm Mechanisation:** Farm mechanisation can save input costs by 20% and increase agricultural productivity by 30%. Additionally, mechanised farming shortens the time needed to finish farm tasks and lessens the inherent drudgery of agricultural labour. However, compared to 75% in Brazil, 80% in Russia, and over 90% in developed nations, the level of mechanisation is only about 40%.
3. **Expanding Irrigation Coverage:** There are currently 126.7 million hectares of uncultivated land available. The Pradhan Mantri Krishi Sinchai Yojana (PMKSY) promoted the use of micro irrigation, such as sprinkler and drip systems, to guarantee water use efficiency at the farm level. Still, just 34.4% of India's land is fully irrigated, compared to 38.6% of its entirely unirrigated land [https://edukemy.com/current-affairs/daily-current-affairs/new-rules-to-rank-seiaa-of-all-states/20-01-2022?page=1].

FINDINGS

1. Indian agriculture is rapidly changing due to scientific advancements. The attainment of cereal self-sufficiency is progressively moving in the direction of other commodities, like pulses. Production-side strategies that formerly relied on supply-side strategies are gradually being replaced by income and profits as market- and price-responsive commodities like milk, meat, fish, fruits, vegetables, and different cash crops are produced more and more.
2. From 1947, the state of Indian agriculture illustrates the extraordinary journey of a country dedicated to providing for the needs of its citizens and guaranteeing economic advancement. Indian farmers and policy makers have demonstrated resilience and adaptability through the evolution of agricultural practices, policies, and initiatives.
3. India's ongoing progress towards inclusive, inventive, and sustainable farming methods will continue to fuel prosperity and growth for future generations.
4. Since gaining independence, India's agriculture industry has advanced considerably. Considerable progress has been achieved by the nation to achieve food-grain self-sufficiency and raise agricultural productivity. Among the challenges the sector still faces are advancing new technology, ensuring food security, and increasing farmer earnings. The administration has begun a number of measures to address these problems, but it will be challenging to implement them.
5. India became a global agricultural powerhouse with the first generation Green Revolution.
6. India presently holds the top spot in the world for milk, spices, jute, and pulses. It also has the world's biggest herd of buffaloes. In terms of rice, wheat, cotton, sugarcane, tea, groundnuts, fruits, and vegetables, India comes in second.
7. Although agriculture's share of India's gross value added (GVA) is declining, the sector is nevertheless expanding in absolute terms and employs close to 49% of all families.
8. Despite these advancements, disturbances caused by climate change, dispersed landholdings, low farm productivity, and high volatility in food prices continue to plague Indian agriculture.
9. There are concerns about the environmental sustainability of current agricultural practices in India because of the overproduction of different crops viz. rice, wheat, and sugarcane. It has caused a rapid decline in the ground water table, soil degradation, and severe air pollution [https://edukemy.com/current-affairs/daily-current-affairs/new-rules-to-rank-seiaa-of-all-states/20-01-2022?page=1].

However, the industry faced a number of difficulties, the resolution of which calls for an all-encompassing approach to policy. For example, India's crop productivity is significantly lower than that of other developed and emerging

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Research Article

market economies because of some factors viz., lessened farm mechanisation, fragmented landholdings, and decreased public and private investment in agriculture.

SUGGESTIONS

1. After observing the effects of the availability of skilled labour resources for a technology-driven rise in food grain production during the early stages of the green revolution, the necessity for higher agricultural education in the modern era was felt. The state governments established agricultural universities because of this. Despite ongoing obstacles, human resources have been crucial in achieving self-sufficiency, food security, and excess food grains. Building human capital and skilled labour is essential for anticipating emerging issues and offering correspondingly affordable solutions, which calls for an efficient and well-functioning higher education system.
2. One of the numerous planned improvements to the education system in the NEP-2020 is the higher agriculture education system in India. In September 2020, the Indian Council of Agricultural Research (ICAR) constituted a National Level Committee with the objective of devising a strategy to guarantee that India's agricultural higher education aligns with the diverse NEP-2020 prerequisites. The Sixth Deans Committee was one of the actions recommended by the Committee as part of a plan of action for implementing NEP-2020 in the agriculture education system. The ToR of the 6th Dean's Committee includes, among other things, recommendations for reorganising the current UG programmes in AU's system to meet with the NEP and the 2020 standards for one-year certificates and two-year diplomas.The Sixth Deans' Committee has considered each of these modifications. Under the NEP-2020, ICAR has been assigned the role of Professional Standard Setting Body (PSSB) for Agriculture Education.
3. Beginning with the 2019–20 academic year, the ICAR Post-doctoral Fellowship (ICAR-PDF) Programme was established as part of the organization's ongoing "Strengthening and Development of Higher Agricultural Education in India" scheme. In addition to strengthening national capacity, the programme seeks to identify and assist highly motivated young researchers conducting research in frontier areas of agriculture and related sciences. Under the guidance of a mentor, it offers a platform to develop an autonomous researcher capable of launching a new programme in nationally significant priority areas. For a year, there are 25 PDF positions available at the four ICAR-Deemed Universities. ICAR has granted 14 PDFs to ICAR-DUs thus far.
4. The creation of "Technology Parks" and agribusiness hubs, or agribusiness innovation centres, would act as platforms for innovation and inspire young professionals, graduates, and entrepreneurs from rural areas to launch their own businesses and provide managerial and technological know-how to these areas.
5. Make investments in non-formal education and vocational training in agricultural technologies, as well as institutionalise programmes for experiential learning, entrepreneurship, and skill development.
6. Developing environmentally friendly, disease-resistant, climate-resilient, more nutrient-dense, and diversified crop varieties will require the application of biotechnology and breeding. Expanding the utilisation of digital technology and extension services could facilitate the exchange of information and raise awareness among farmers. The volatility of food prices and farmers' income can be stopped, and the full potential of Indian agriculture can be realised, with improved post-harvest loss management and a revitalised cooperative movement through the establishment of Farmer Producer Organisations (FPOs).

CONCLUSION

Nonetheless, ICAR's assistance and interventions have greatly improved the facilities and promoted faculty skills and capacity building. It is crucial that national curricula and research priorities are taking into consideration the additional challenges that the agricultural industry faces. All requirements—economic viability, worldwide competitiveness, social equity, and environmental sustainability—must be ingrained in curricula. The global social contract should be incorporated into agricultural education in order to meet societal needs, foster leadership, foster greater teamwork, and create novel solutions to problems. As a result, efforts to develop human capacity are required to produce professionals and entrepreneurs in the newly emerging fields of agriculture specialisation. Furthermore, ample land is available at all agricultural universities (AUs) for experimentation, showcasing different trials to farmers, and other purposes. However, it is crucial that all AUs create and adapt strategies for producing enough resources and transform into autonomous organisations, as the New Education Policy also indicates.

Journal of Information Systems Engineering and Management
2025, 10(35s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

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