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Seventy-Five Years of Agricultural Development

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Abstract:

The agricultural sector plays a vital role in the Indian economy by generating employment, providing food to the growing population, contributing to capital formation, supplying raw materials to agro-based industries, providing a market for industrial products, and providing trade. The allied sectors like livestock, fisheries, horticulture, forestry, sericulture, dairy, and poultry farming are linked with the agriculture sector. This paper covers the development of the agricultural sector of last seven decades. After independence, the agricultural sector has seen a lot of developments in seeds, technology, fertilizers, micronutrients, pesticides, herbicides, GPS, robotic farming, block chain, the Internet of Things, artificial intelligence, data analytics, etc. But it's not free from crisis as well. During the last seventy-five years agricultural sector has gone through so many crises. Most of the population of the country depends on agriculture, and doing it for so many years, they are still not satisfied with the income and productivity of agriculture. If they are not satisfied, this is the failure of the government of India. So this paper analyses causes of the agrarian distress and farmers' dissatisfaction. Government of India has implemented so many policies for the development of agricultural sector and farmers. This paper also covers the alternatives, which are essential for optimizing the agrarian distress and farmers' dissatisfaction.

Keywords: Agriculture, technology, economy, agrarian distress, productivity, artificial intelligence, internet of things, etc.

Introduction:

India began to develop its economy in a planned manner in 1935 after the Haripura conference of the Indian National Congress. But up to 1947, no work was done. After independence, Nehru started the economy to grow in a planned manner. Even after 75 years of development, the agricultural sector has not yet grown fully. The agrarian distress and agricultural crisis are alarming. The new liberalization policy has further affected the crisis. Both farmers and farming are affected by climate change. There were the problems of growing the agriculture sector during the 1950s. Today the agriculture sector is passing through a number of problems distressing the farm community. This paper covers the critical analysis of agricultural growth since India's growth and also discusses what alternatives are essential for optimizing the agrarian distress and farmers' dissatisfaction.

Objectives:

This paper is intended to highlight the growth process of the agriculture sector for the last seventy-five years. It aims at the following objectives:

- 1) To review the agricultural development initiatives during the last seven decades.
- 2) To analyze the agrarian distress and farmers dissatisfaction.
- 3) What alternatives are essential for optimizing the agrarian distress and farmers' dissatisfaction?

Data and methodology:

We reviewed the data related to the agriculture sector during the last seventy-five years. The diversified data from various organizations and offices is collected and interpreted as per the need of the subsection. The data from government ministries, NSS, various committees and organizations is used in the analysis. The cross-sectional data analysis has been used in the text.

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Since the study is informative and analytical, we referred descriptive method. The interpretation of data in concern to agrarian distress and farmer's dissatisfaction is taken into account.

Results and Discussion:

The development of the agricultural sector depends on various factors. To review agricultural development, we must take into account the initiatives taken during the last seven decades. Following are some agricultural development initiatives:

1) Trickle-down model:

When Nehru came into power, the trickle-down theory of growth was helping underdeveloped countries grow fast. The trickle-down model emphasized to the invest in the capital goods sector which boosts the consumption goods sector and helps it grow in local economies. The Mahalanobis model was adopted during the second five-year plan. Nehru was very interested in big projects. The growth model developed by the economists so far has not taken into account the agricultural sector, which is the backbone of the Indian economy. The controversy over the priority given to the agricultural industry has become contentious. Which sector should be given priority, agriculture or industry? Nehru was under the impression of industry's first model. After Nehru, Dr. C. Subramanyam initiated the Green Revolution movement in the 1960s through the efforts of M. Swaminathan. Since then the agriculture scenario has totally changed.

2) Green Revolution:

M. Swaminathan employed his efforts to bring out high-yielding varieties in the 1960s. After the Green Revolution, various new varieties of cereals and pulses were introduced. To fetch the urge for food, the 'grow more food campaign' was initiated. In 1986, India declared its self-sufficiency in food grain supply. Today, India is a food grain surplus country. By 2030 the demand for food grains will be to the tune of 245 million tons. Today, we have a food grain production of 298-300 million tons. In 2050, India's population will double. Taking into account the individual calorie demand, India has to produce 540-550 million tons of food grains, which will be a challenge to the agricultural sector. Today, more than 14 percent of the population is undernourished, though India is a surplus food grain country. This has created a critical distortion in the economic planning. The food grain producers are not happy with the

Table: 1 Percentage of Agricultural Growth to Total Growth

Years	Total GDP	Agricultural GDP
1951-1967	3.5	1.8
1967-1980	3.9	3.3
1980-2001	5.7	2.8
2001-2011	7.7	3.3
2011-2015	5.3	3.7
2016-2020	7.4	3.8

Source: GOI, Agricultural statistics at a glance, 2023.

The above table gives the details of the gap in the agricultural GDP to total GDP. The agricultural growth during the last seven decades has been very

prices paid for their produce. The demand for milk and milk products, poultry and poultry products, mutton products, fruits and horticulture products, fisheries, value-added crop produce, and nutraceutical products will be growing in the future. The consumer choice is changing by 360 degrees. This is a challenge to the Indian agriculture sector. The demand for crop farming will deteriorate during the next couple of decades. The whole agricultural sector will be divided into 4 sectors: crop farming, fisheries, forestry, and livestock. The demand for chemical farming is deteriorating and the potential for sustainable development of agriculture and crop geography will be changing in the near future.

3) Agricultural technology:

2030 will be the great divide in agricultural technology. The agrarian technology is becoming digital. Precision farming is becoming one of the innovative farming techniques. Artificial intelligence and the Internet of Things will be applied to the agricultural sector. The use of nanotechnology, gene editing, CRISPR-CAS 9 and 12 and genetic modification will be applied to the agricultural technology. As of this date, Internet connections are around 667 million. This number is likely to double due to the digitalization of the agricultural sector. However, the application of all such technology is a challenge to the farmers. Only highly learned farmers will adopt such technology and this will be a challenge to policymakers.

4) Demand-side vs. supply-side policies:

During the last seven decades, the Indian government has followed the supply-side policies. Even the recent policy on food security belongs to the supply-side policy, while we need the secured food system. To frame the demand-side policies is very difficult for the government. Forecasting demand and deciding to supply the agricultural produce would be a challenge to the policymakers. Only professional people can exercise such planning activities.

5) Gap in agricultural GDP to total GDP:

The economic growth rate during the last seven decades is growing very fast. On the contrary, the agricultural GDP growth rate is growing very slowly. Besides, the percentage share of agricultural GDP in total GDP has declined to 20%. On the contrary, the agricultural dependency is still 58 percent.

slow, or is negative sometimes. This is the overall distortion in agricultural growth.

6) Doubling of farmer's income (DFI):

The Ashok Dalwai Committee, constituted by the government of India for 'Doubling of Farmers Income' recommended the following points for Doubling of Farmers' Income: increasing crop and livestock productivity, reducing the cost of production, increasing cropping intensity, diversification to high-value agriculture, shifting surplus manpower from farm to non-farm occupations, etc. Nowadays, committee appreciate the use of digital technologies like the Internet of Things, artificial intelligence, and data analytics in agriculture. For Doubling Farmers' Income, the agricultural

Table: 2 Percentage Share of Gross Capital Formation in Agriculture and Allied Sector at Current Prices

Year	Share of GCF in Agriculture and Allied sector in GCF of economy			Share of GCF in Agriculture and Allied sector in GVA of economy		
	Public	Private	Total	Public	Private	Total
2011-12	5.4	9.3	8.5	0.44	2.94	3.38
2012-13	5.5	8.3	7.7	0.43	2.54	2.97
2013-14	5.1	10.1	9.0	0.39	2.80	3.19
2014-15	5.3	9.0	8.2	0.41	2.47	2.88
2015-16	5.4	7.6	7.1	0.45	1.93	2.37
2016-17	6.1	8.3	7.8	0.48	2.02	2.49
2017-18	5.7	7.6	7.2	0.43	1.91	2.34
2018-19	5.8	7.4	7.0	0.47	1.93	2.40
2019-20	5.4	8.0	7.4	0.41	1.95	2.35
2020-21	6.0	10.9	9.7	0.44	2.48	2.89
2021-22	5.1	9.5	8.5	0.36	2.47	2.60
2022-23	5.5	9.4	8.5	0.42	2.54	2.60

Source: GOI, Agricultural Statistics at a Glance 2023.

The above table:2 shows the public and private sector's share in gross capital formation in agriculture and allied sector at current prices in GCF and GVA of economy from 2011-12 to 2022-23. The total share of GCF in agriculture and allied sectors in the GCF economy is fluctuating. But from the last two years, it has been stable at 8.5 percent. The total share of GCF in gross value added (GVA) shows a declining trend from 3.38 percent in 2011-12 to 2.60 percent in 2022-23. The public sector's share in GCF is relatively stable at around 5-6 percent from 2011-12 to 2022-23 but the private sector's share is fluctuating every year. The share of public and private sector's GCF in GVA of the economy is relatively stable i.e. around 0- 1 percent and 1-2 percent respectively. If we compare the public and private sector's share, it is observed that the private sector's share is more than public sector due to the liberalization policy.

8) Minimum support price:

A minimum support price is introduced to safeguard the farmer's income level. About 23 agricultural commodities and 87 forest products are subsidized under minimum support price. The Shanta Kumar Committee in its report during 2015 indicated that only 6 percent of farmers got benefits, and the

growth rate has to be increased to 10.4 percent, which is not possible. (Source: GOI, Ministry of Agriculture, Ashok Dalwai Committee on Doubling of Farmers' Income, Volume 1 to 14)

7) Capital formation in agriculture:

Capital formation means an addition made to the existing stock of agricultural capital. It includes investment in productive equipment like tractors, harvesters, storage facilities, irrigation, etc., inventory changes, land, infrastructure, and human capital development etc. Capital formation helps to increase output and agricultural productivity.

remaining 94 percent of farmers did not get the benefits of the minimum support price. It means a large portion of farmers is away from the benefits of minimum support price, though the minimum support price has increased in 2024-25 over 2023-24 for Kharif crops, Rabi crops, and commercial crops. This committee recommended that allow private industries to purchase and store food grains, cash be transferred directly to the accounts of farmers, the FCI purchase grains only from the poor states, and provide a subsidy of Rs. 7000 per hectare in cash to farmers. More than 85% of the benefits of MSP have been harnessed by only 3 states (Punjab, Haryana, and Madhya Pradesh)

9) Agricultural per capita income:

The situation assessment survey of agricultural households as per the 77th round of the National Sample Survey (NSS) conducted in 2018-19 observed that the average monthly income of households has increased from Rs. 6,426 to Rs. 10,218 compared to the 70th round conducted in 2012-13. The table: 3 below shows the per capita incomes of agricultural households in four most prominent and four lowest per states during the year 2018-2019.

Table: 3 State-wise Average Monthly Per Capita Income of Agricultural Households

Sr.No	State	Average monthly income per agricultural household (Rs.)
The four most prominent PCI states		
1	Meghalaya	22,841
2	Punjab	26,701
3	Jammu and Kashmir	18,918
4	Kerala	17,915
The four lowest PCI states		
1	Bihar	7,542
2	West Bengal	6,762
3	Odisha	5,112
4	Jharkhand	4,895

Source: NSS Report No. 587: Situation Assessment of Agricultural Households and Land and Livestock Holding of Households in Rural India, 2019

10) Percentage of per capita productivity in agriculture and industrial sector:

The share of farm workers in the total workforce is 46 percent. This indicates the agricultural dependency. The share of agricultural GDP is only 20 percent. The agriculture sector implies lower per capita productivity compared to the industrial sector. The industrial sector contributes a higher proportion to the GDP, indicating higher per capita productivity. Now, the agriculture sector has shown growth due to government initiatives.

11) Size of land holdings:

Due to an increasing population, equal distribution of land among heirs has divided agricultural land into subdivisions. Land in India is small and fragmented. There are more than 90 percent of small and marginal farmers. During 2010-11, the average size of holdings was 1.15 acres which declined to 1.08 hectare during 2015-16 and up to 0.74 hectare in 2023. This limits the availability of credit and prevents the use of modern agricultural technology, limited crop choices, and agricultural efficiency. This leads to high production costs and low agricultural productivity.

Table: 4 Index of terms of trade between agricultural and non-agricultural sectors as well as farmers and non-farmers

Year	ITT between agricultural and non-agricultural sectors	ITT between farmers and non-farmers
2011-12	98.79	97.26
2012-13	100.91	97.34
2013-14	104.60	98.57
2014-15	106.98	97.60
2015-16	106.78	96.97
2016-17	109.62	99.07
2017-18	108.80	97.96
2018-19	106.57	96.20
2019-20	109.57	99.72
2020-21	109.90	99.36
2021-22	104.67	96.65
2022-23	103.50	97.21

Source: GOI, Agricultural Statistics at a Glance, 2023.

12) Terms of trade:

Terms of trade between agricultural and non-agricultural sectors refer to the ratio of agricultural prices to industrial prices, both measured as price index. The index number of ToT between farmers and non-farmers is calculated by dividing the index of prices received by the farmers versus the index of prices paid for final consumption, intermediate consumption, and capital formation. ToT is favourable when the farmers receive higher prices for their products relative to the prices they pay. The index number of ToT between agricultural and non-agricultural sectors is calculated by dividing the index of prices received for farmers and agricultural labourers versus the index of prices paid for farmers, agricultural labourers, final consumption, intermediate consumption, and capital formation. If the ratio is higher, it means greater than 100 indicates favourable terms of trade for the agricultural sector i.e. agricultural sector can buy more industrial goods and if the ratio is less than 100 indicates adverse terms of trade. The index numbers of terms of trade between agricultural and non-agricultural sectors as well as farmers and non-farmers is given in the below table:4.

The index numbers of terms of trade between agricultural and non-agricultural sectors were more than 100 during the last eleven years. It means that there were favourable terms of trade for the agricultural sector except in 2011-12. In the case of ToT between farmers and non-farmers were not favourable for farmers during the last twelve. The fluctuations in international prices of agricultural commodities and market conditions like changes in demand, supply, and competition can affect terms of trade.

13) Agriculture 1.0 to 5.0:

Technological development in the agricultural sector was started during the Kauravas and Pandavas. The wooden plough was associated with Balram, the brother of Sri Krishna. Since then, the use of technological tools has been introduced as per the requirements of the farmers. There have been a lot of developments in the agriculture sector since the early 20th century. The agriculture sector has gone through the different stages (1.0 to 5.0). Each stage represents different eras and developments. The following table shows the different stages, i.e., 1.0 to 5.0, of agriculture, the period of each stage, and how the agriculture sector has developed during each stage.

Table: 5 Different stages (1.0 to 5.0) and developments in agriculture

Sr. No.	Stage	Developments in agriculture
1	Agriculture 1.0 (1784-1870)	Manual labour and animal power
2	Agriculture 2.0 (Early 20 th century)	Machinery and tools like tractors, harvesters, irrigation system
3	Agriculture 3.0 (1940-1960)	Precision agriculture like GPS and green revolution
4	Agriculture 4.0 (Between 20 th and early 21 st century)	Smart farming: Digital technologies like Internet of things, artificial intelligence and data analytics, Block chain.
5	Agriculture 5.0 (Early 21 st century onwards)	Future of Smart farming (Recycle economy), emphasis on sustainability

Conclusion:

The agriculture sector has a greater importance in a developing country like India. The Indian agricultural sector has seen a lot of developments in agricultural technologies. There are different stages of agricultural development, i.e., agriculture 1.0 to 5.0. Now it is the era of smart farming, but due to the lack of farming literacy, India is still lagging behind. There are a lot of challenges faced by farmers in India, like economic, social, and political ones, which lead to low productivity, profitability, per capita income, size of land holdings, soil health, capital formation, and terms of trade. All these are discussed in this paper. The government of India has initiated some policies for the farmers to overcome these challenges. Still, farmers are not satisfied, so it is a failure of the Indian government. The government still has to work on it so that the large population depending on agriculture will become satisfied, and it will lead to more development of the agricultural sector.

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