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INDIAN CHAMBER OF FOOD AND AGRICULTURE

UNLOCKING PUNJAB'S FARMING POTENTIAL

Understanding the Problems and Planning for a Better Agricultural Future

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Punjab, known as the granary of India, has a rich history of agricultural success. During the Green Revolution, its agricultural GDP grew at an impressive rate of 5.7% per annum from 1971–72 to 1985–86, more than double the growth rate of 2.31% achieved at the all-India level during the same period. Punjab's remarkable agricultural success, especially in wheat and rice production, played a crucial role in helping India achieve food security and reduce its dependence on food aid.

However, after 1985–86, the green revolution began to lose momentum, and Punjab's agricultural growth slowed to around 3% per annum, similar to the national average. In subsequent years, from 2005–06 to 2016–17, Punjab's agricultural growth further declined to just 1.6% per annum, less than half of the all-India agricultural GDP growth of 3.6% over the same period. This decline in agricultural growth has had significant implications for Punjab, once known for its high per capita income and low poverty rates.

Several key factors contributed to Punjab's earlier agricultural success. These include (i) the provision of irrigation facilities, (ii) the development of all-weather rural roads, and (iii) the establishment of an assured market for agricultural produce. These policies significantly boosted agricultural GDP and farmers' income. The availability of free power and guaranteed markets led to an overemphasis on rice cultivation, which isn't well-suited to Punjab's agro-climatic conditions. This resulted in the rapid depletion of the water table, with 80% of the state's blocks now considered overexploited.

This report by the Indian Chamber of Food and Agriculture (ICFA) unravels Punjab's historical challenges while devising a path forward that leads to a reinvigorated agricultural sector, aiming for more than 5% annual growth and overall GSDP growth rates surpassing the national average of 7-8% for the next 10-15 years.

OVERVIEW OF PUNJAB AGRICULTURE

Punjab, located in the northern part of India, shares its borders with Jammu and Kashmir to the north, Himachal Pradesh to the east, Haryana to the south, and Rajasthan to the southwest. The state covers an area of 50,362 square kilometers, which constitutes approximately 1.5% of India's total geographical area. Punjab's climate is influenced by the Himalayan mountains to the north and the Thar Desert to the south and southwest. The state receives an average annual rainfall of only 61.9 centimeters, with 75% of this precipitation occurring during the monsoon months. Agriculture is the dominant sector in Punjab, accounting for 85% of the state's water consumption.

However, due to increasing water demands and a decrease in canal capacity, there has been a growing reliance on tube wells for irrigation. Consequently, groundwater resources are being overexploited for agricultural purposes. Currently, the state has achieved a ground water development rate of 172%, and groundwater is overexploited in 80% of its administrative blocks.

❖ Agricultural Growth in Punjab

Following the reorganization of Punjab in 1966, the state implemented a series of policies that transformed it into a dominant agro-based economy. At that time, India faced food scarcity, and the primary objective was to achieve self-sufficiency in food grain production. To accomplish this, the green revolution strategy was adopted, with an initial focus on Punjab, Haryana, and Western Uttar Pradesh.

This strategy involved the adoption of new agricultural technologies, including high-yielding varieties of seeds for crops like wheat, the use of chemical fertilizers, and the development of irrigation facilities. These advancements played a pivotal role in propelling Punjab's economy into a high-growth trajectory. Between 1971-72 and 1985-86, the agricultural sector in Punjab experienced an impressive annual growth rate of 5.70%.

However, this growth rate gradually declined, dropping to 3% during the period from 1986-87 to 2004-05 and further diminishing to a relatively low 1.9% in the more recent period from 2005-06 to 2018-19. This decrease represents a significant slowdown in agricultural growth compared to the earlier decades and is nearly half the national average agricultural growth rate of 3.7%.

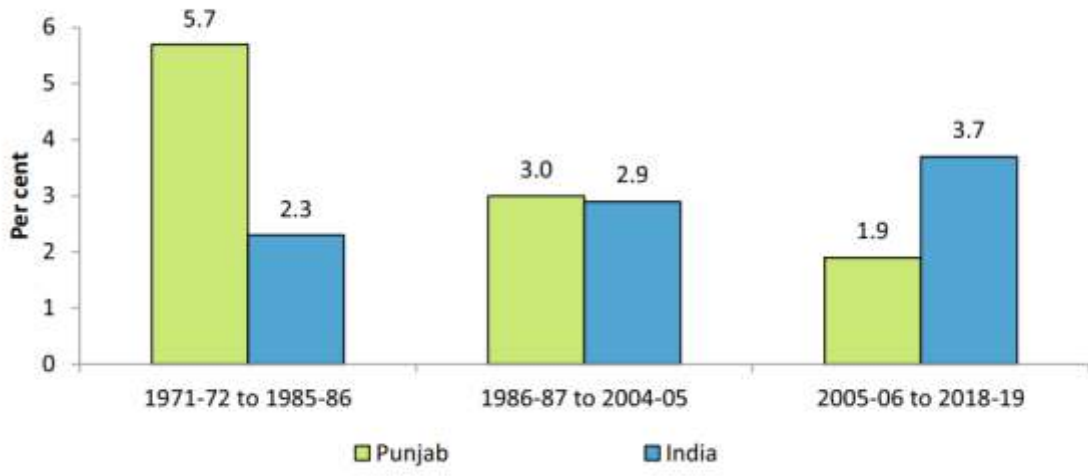

Fig 1. Agriculture growth in Punjab and India.

Source: Government of India, central statistical organization and government of Punjab

❖ Agricultural Livelihood in Punjab

Punjab, with a population of 29.9 million in 2018, represents 2.2% of India's total population. While 39% of the workforce was engaged in agriculture in 2001, this number decreased to 35.6% in 2011 (or 34% according to the Labour Bureau in 2015–16). The agricultural sector's contribution to the state's GDP dropped from 48% in the early 1980s to 26% in 2016–17.

In contrast to most Indian states, Punjab is dominated by semi-medium and medium-sized farmers, with small and marginal farmers accounting for a smaller portion. In 2015–16, these larger farmers operated the majority of agricultural land. The average landholding size has slightly decreased from 3.79 hectares in 1995–96 to 3.62 hectares in 2015–16.

Agricultural households in Punjab reported the highest average monthly income in India at Rs.

23,133 in 2015–16. Income grew at a rate of 4.3% annually from 2002–03 to 2015–16, surpassing the all-India growth rate of 3.7% during the same period. Income sources shifted, with a rising share from cultivation and animal farming and a decrease from non-farm businesses and wages and salaries during this period, although this trend reversed between 2012–13 and 2015–16.

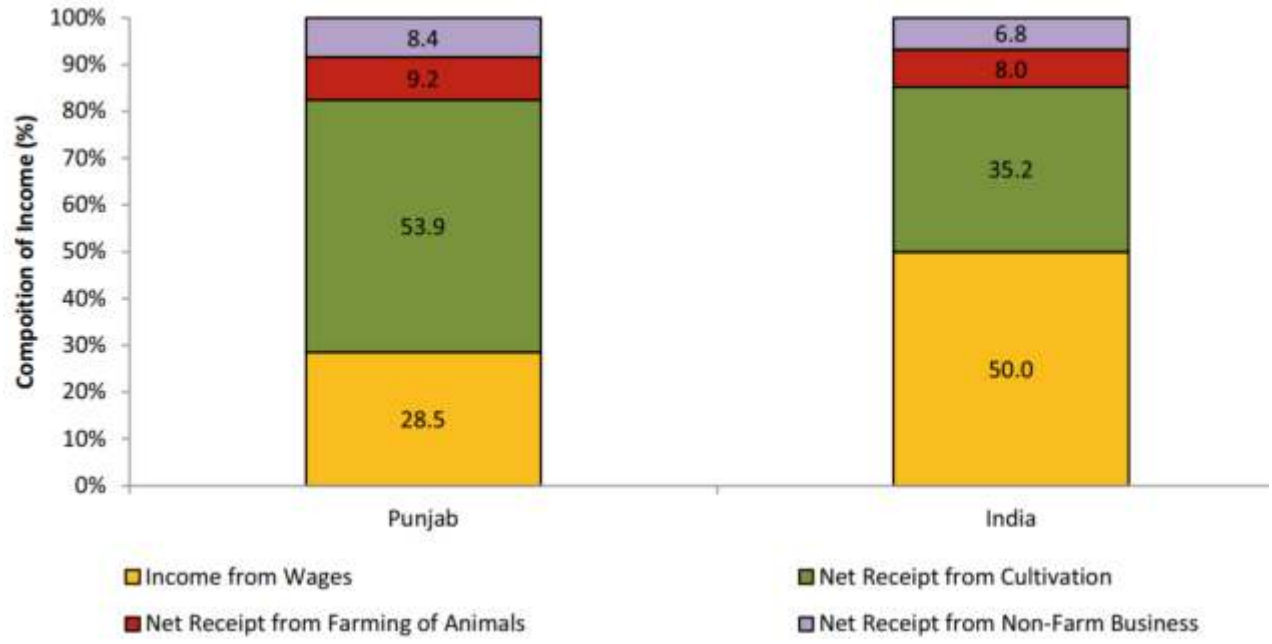

Fig 2. Composition of agricultural household income from different sources in Punjab and India in 2015–16
Source: NSSO

❖ Cropping Pattern in Punjab

Punjab's land use pattern has seen limited changes, with the net sown area decreasing slightly from 83% to 82% between 1986–87 and 2014–15, while forest area increased marginally from 4.4% to 5.1% during the same period. In 2014–15, the state had a net sown area of 4.1 million hectares and a net irrigated area of 4.0 million hectares. Punjab boasts a gross cropped area and gross irrigated area per 100 persons significantly higher than the national average.

Unlike the nationwide trend of decreasing land holdings, Punjab has seen an increase in average landholding size over the years, going from 2.89 hectares in 1970–71 to 3.77 hectares in 2010–11. However, this increase has been attributed to declining water tables, which have driven up production costs, forcing some small and marginal farmers to sell their land.

Punjab primarily focuses on food grain production, with the share of food grains in the gross cropped area rising from 76.5% in 1986–87 to 82.9% in 2015–16. The cultivation of cotton, sugarcane, and oilseeds has decreased significantly during this period. Within food grains, rice and wheat are the dominant crops, with rice steadily increasing to around 37% of the cropped area in 2015–16, while wheat remained stable at around 44%.

The area dedicated to fruits and vegetables has remained relatively consistent over the years, constituting 1.1% (90,000 hectares) and 3% (244,000 hectares) of the total gross cropped area in 2017–18, respectively.

SOURCES AND COMPOSITION OF AGRICULTURE GROWTH

In the fiscal year 2022-23, the agriculture and allied sectors are anticipated to make up 28.94% of Punjab's Gross State Value Added (GSVA), a slight dip from the 29.39% recorded in 2021-22. The previous year saw these sectors grow modestly at 0.80%, but a more optimistic outlook projects a growth rate of 3.70% for 2022-23. This anticipated increase is primarily attributed to a 3.51% growth in the agriculture sector, driven by a higher production of wheat.

Within these sectors, crop husbandry takes the lion's share, contributing 15.46% to Punjab's GSVA in 2022-23 and accounting for more than half of the agricultural GSVA. This substantial share implies that changes in crop sector growth closely parallel shifts in the overall growth of the agriculture and allied sector. Projections for 2022-23 indicate that crop GSVA in Punjab is set to rise by 3.51%, a notable improvement from the -2.68% recorded in 2021-22. However, this sector's susceptibility to environmental factors can result in fluctuations in its growth rates.

In contrast, growth in allied activities has been relatively stable, as these sectors are less reliant on environmental conditions and, consequently, experience more consistent growth. Livestock rearing, in particular, has been a standout performer, averaging a strong 5.0% growth between 2012-13 and 2021-22. It is anticipated to grow at 4.2% in 2022-23.

Interestingly, the contribution of allied activities to the agriculture and allied sectors' GSVA has been on the rise, primarily driven by the livestock sector. Starting with a 26.03% share in 2011-12, the livestock sector is poised to account for 38.44% of Punjab's agriculture and allied sectors' GSVA in 2022-23. This underscores the growing significance of activities associated with agriculture in augmenting farm income and generating employment opportunities.

Fig. 3 Share of subsectors of agriculture | Source : Directorate of Statistics, Punjab

❖ Food Grains and Non-food Crops

In Punjab, the key crops produced include rice, wheat, maize, bajra, sugarcane, oilseeds, and cotton. However, rice and wheat dominate, making up 80% of the total cropped area. Over time, the cultivation of rice and wheat has expanded significantly. Wheat production has risen from 4.8 million MT in 1970-71 to 15.9 million MT in 2016-17, while rice production increased from 0.57 million MT to 11.5 million MT during the same period. Punjab's contribution to national rice production grew from 1.40% in 1970-71 to 10.8% in 2016-17, whereas wheat's share declined from 23.2% to 17.2%. Cotton production also dropped from 16.1% to 3.5%. Currently, 36% of the total cropped area in Punjab is dedicated to rice cultivation.

Punjab has already achieved high crop productivity levels, leaving limited room for yield improvement. Therefore, it is crucial to diversify from the wheat-rice cropping pattern to other crops. This shift is not only essential for increasing farm incomes but also for preserving soil and water resources.

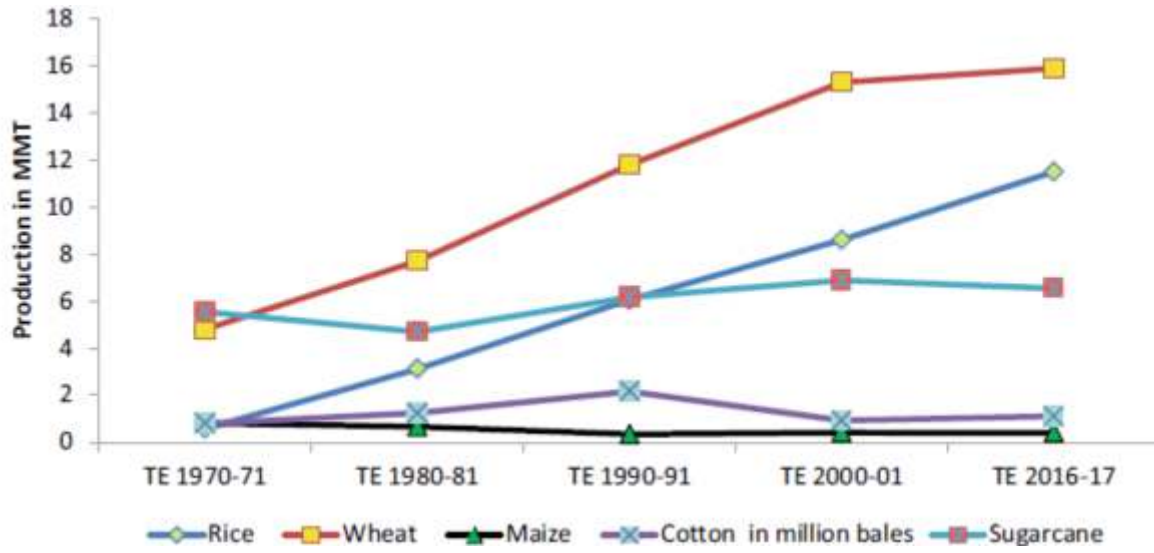

Fig. 4 Production of important crops in Punjab | Source : DES

❖ Horticulture

In Punjab, the horticulture sector, comprising fruits and vegetables, occupies only 4.23% of the total cropped area. Surprisingly, this sector has significantly contributed to the overall growth in agriculture and related activities, accounting for 11.3% of the growth between 2000-01 and 2015-16. The gross value of output from fruits and vegetables has shown growth, although it has been somewhat inconsistent year-on-year.

Punjab's share in the national production of fruits and vegetables is relatively small, with 2% of fruits and 2.7% of vegetables. Nonetheless, there has been a notable increase in production over time. Fruit production went from 0.75 million MT in 2005-06 to 2.0 million MT in 2018-19, while vegetable production increased from 2.43 million MT to 5.0 million MT during the same period. This increase can be attributed to improved yield per hectare, as the cultivation area for these crops remained relatively stable.

In 2016-17, significant vegetable crops produced in Punjab included radish (2nd largest producer), carrot (2nd largest producer), peas (3rd largest producer), potato (6th largest producer), bottle gourd (7th largest producer), and cauliflower (10th largest producer). Key fruits grown in Punjab include Kinnow, orange, malta, lemon, and guava. Punjab is the second-largest producer of mandarin (25% of the country's production), the sixth-largest producer of oranges, and also contributes significantly to guava production.

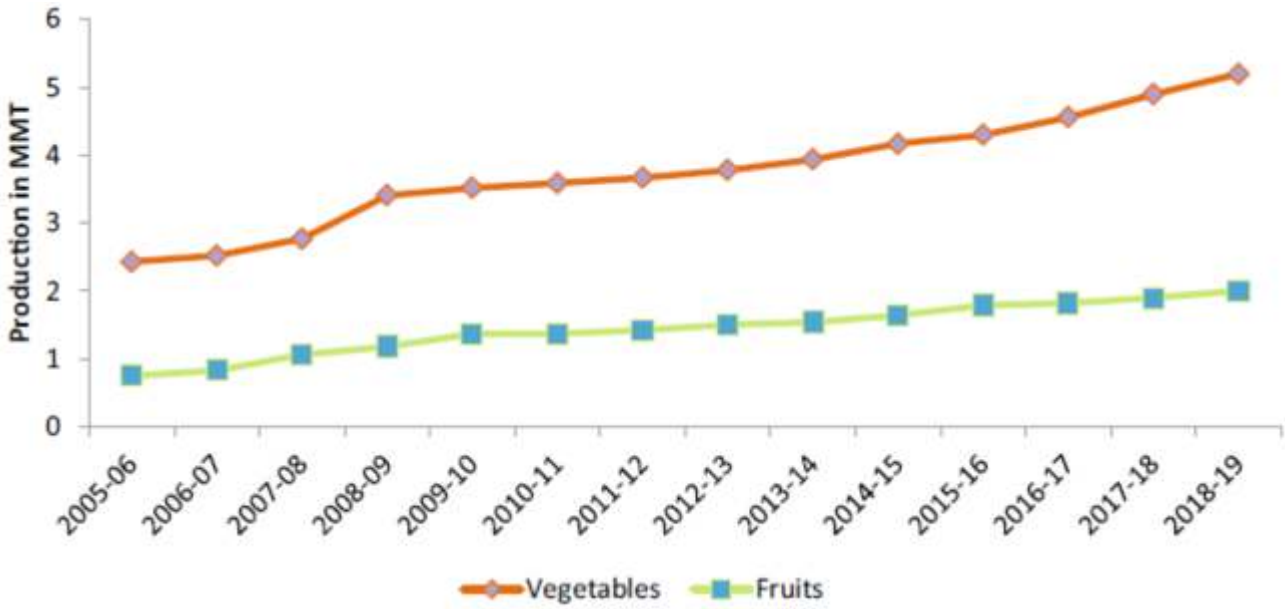

Fig. 5 Production of fruits and vegetables in Punjab (million MT).

Source: Different reports of national horticulture board

❖ Livestock

The livestock sector is a significant part of Punjab's economy, accounting for 31.3% of the total value of output in 2015–16. Milk production is a major contributor, making up 82% of the livestock segment's value. Punjab is India's sixth-largest milk producer, with an impressive growth rate. It boasts the highest per capita milk availability in the country, with strong demand for dairy products. The Punjab State Co-operative Milk Producers' Federation Limited (Milkfed) plays a crucial role in milk marketing and technical support to producers. However, dairy co-operatives procure only about 5% of total production, with the majority being sold through the unorganized sector, which involves multiple intermediaries.

In the meat and egg sector, Punjab's share in the gross value of output has remained around 3.7%. The state is the third-largest producer of buffalo meat in India, with export potential. The poultry sector has also performed well.

Fisheries contribute 1% to the total value of output in agriculture and allied activities. Inland fish farming has seen growth, but there's room for improvement in seed production, infrastructure, and marketing to reduce wastage and increase marketable surplus.

In summary, while Punjab excels in milk production and has potential in meat, egg, and fisheries sectors, there are opportunities for improving marketing, infrastructure, and value addition to enhance the contribution of the livestock sector to the state's economy.

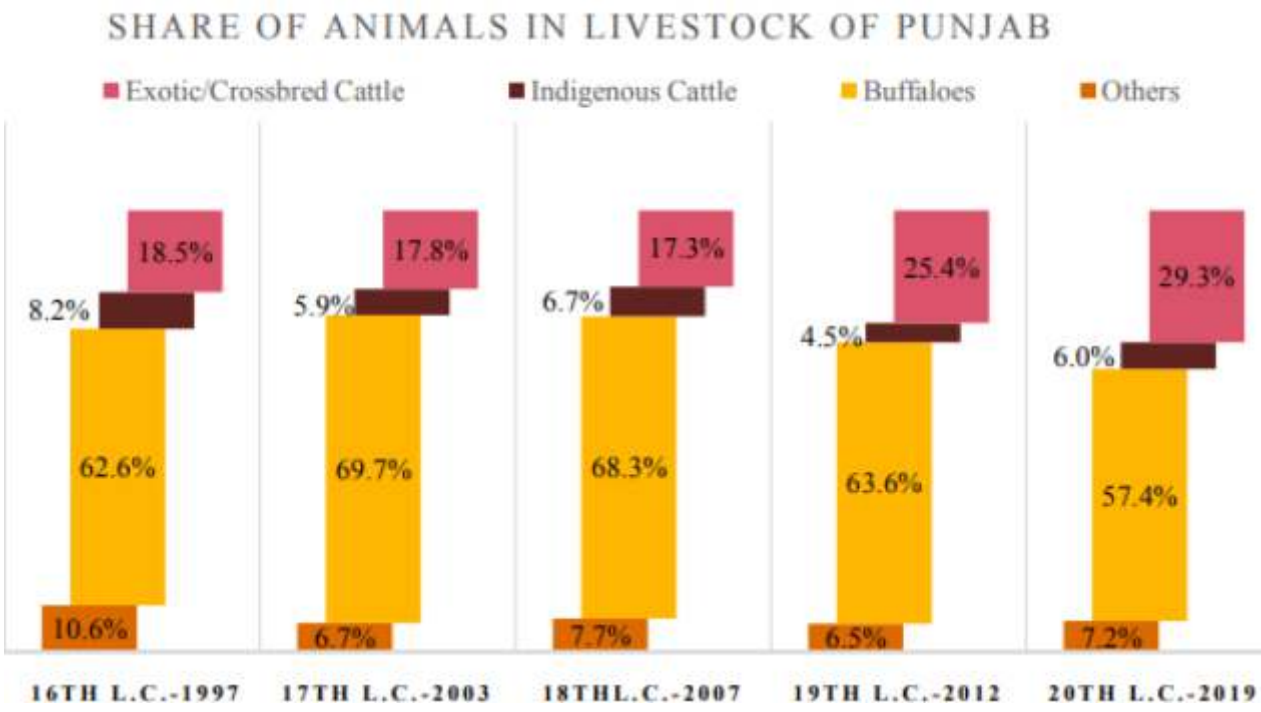

Fig. 6 Share of animals in livestock of Punjab.
Source: Livestock Census, various years

UNDERLYING CHALLENGES IN THE AGRICULTURE GROWTH

Farmer Producer Organisations (FPOs) in Punjab are making a significant impact on the income and employment of local farmers, particularly benefiting small, marginal, and semi-medium farmers, according to a study conducted by the Punjab Agricultural University (PAU) in Ludhiana during the 2019-20 period. This study, titled "Economic Impact of Farmer Producer Organisations on Punjab Peasantry," highlights that joining FPOs led to increased incomes among farmers, with a notable 15.71% rise attributed to changes in cropping practices and better utilization of agricultural inputs.

The FPOs in Punjab, numbering 194, consist of member farmers who collectively manage and operate them, often with support from various organizations and agencies. The study reveals that several factors, including farm size, family size, and FPO membership, significantly influence farmers' income levels. FPOs have played a pivotal role in enhancing the financial well-being of their members by imparting knowledge about efficient agricultural practices, optimizing the use of resources such as seeds, fertilizers, and pesticides, and promoting timely application of inputs. Notably, small and marginal farmers have experienced the most substantial income growth, as they diversified into allied activities alongside traditional farming, guided by the awareness and guidance provided by FPOs.

However, the study also points out certain challenges in the FPO landscape in Punjab. Many FPOs are found to be non-functional or inefficient in their operations. Common issues include inadequate storage facilities, limited access to credit, and the absence of effective links with national and international markets. To harness the full potential of FPOs in Punjab, there is an urgent need for financial and technical support to establish modern storage facilities, enhance fund utilization, and facilitate credit access for members. Moreover, strengthening the connectivity of FPOs to broader markets, both domestic and global, should be a priority to ensure sustainable growth for the state's agriculture sector.

Underlying Challenges in Punjab's Agriculture Sector

- **Diminished Crop Diversity :** Punjab, renowned for its diverse crop cultivation, has increasingly focused on high-yield wheat and rice varieties since the Green Revolution. This approach has led to a decline in crop diversity, contributing to soil exhaustion and heightened pest and disease issues. The intensive cultivation of wheat and rice has also compromised soil fertility, hampering the growth of other crops. Despite initial benefits, the Minimum Support Price (MSP) has not adequately compensated farmers due to rising costs and inflation.
- **Soil Erosion :** Soil degradation poses a severe threat to Punjab's agriculture. The narrow crop variety has depleted soil nutrients over time. To compensate, farmers resort to excessive use of chemical fertilizers and pesticides, further depleting soil quality and productivity. Additionally, over-irrigation has caused waterlogging and soil salinity, exacerbating the degradation issue. The reliance on chemicals and limited income diversification has contributed to this predicament.
- **Water Scarcity :** Punjab grapples with a critical water scarcity crisis due to excessive groundwater utilization for irrigation. Farmers heavily depend on groundwater, leading to a rapid decline in water tables. Concurrently, industries and urban areas also contribute to this crisis through indiscriminate water consumption.
- **Burden of Farm Debt :** High input costs, including seeds, fertilizers, and pesticides, have placed significant financial burdens on Punjab's farmers. Insufficient access to credit and exorbitant moneylender interest rates compound the problem, resulting in mounting farm debt. This predicament often forces farmers to sell land or accumulate more debt, driven partly by societal pressures to maintain a certain standard of living.
- **Dwindling Farming Income :** Despite its productivity, Punjab struggles with declining farming income. Exorbitant input costs, coupled with low prices for non-MSP crops, have eroded profitability. Inadequate government support and price stabilization measures further hinder fair returns for farmers. The MSP system has failed to keep pace with rising input expenses.
- **Dependence on Arthiyas and FCI :** Farmers in Punjab have deep-rooted ties with Arthiyas (middlemen) in agricultural mandis. The produce is primarily channeled through Arthiyas, and the Food Corporation of India (FCI) purchases Wheat and Rice at MSP. This restricted selling option was a focal point of the contentious agricultural laws. Farmers seek the best possible prices for their crops and often choose the Mandis and Arthiyas for a secure, albeit lower-risk, income source.
- **Climate Change Impacts :** Punjab's agriculture grapples with the repercussions of climate change, including erratic rainfall, rising temperatures, and extreme weather events like floods and droughts. These climatic shifts have adversely affected crop yields and quality, posing additional challenges to the farming community.
- **Inadequate Storage Infrastructure :** Punjab's limited storage facilities result in difficulties storing agricultural produce. Aging and poorly maintained storage structures lead to substantial losses from spoilage, pests, and rodents. Consequently, farmers are compelled to sell their crops prematurely and at suboptimal prices.

Conclusion and Policy Recommendations

The preceding econometric analysis underscores the three key drivers of agricultural growth in Punjab: (i) the expansion of irrigation through tube wells, (ii) the assurance of remunerative prices for wheat and rice, and (iii) the development of all-weather road infrastructure. These factors have been instrumental in propelling agricultural growth in the state. Notably, Punjab has achieved a remarkable feat by bringing 98.5% of its gross cropped area under irrigation, boasting one of the most advanced road networks in India, and leading in wheat and rice procurement.

However, it is evident that the potential for further growth through investments in roads, irrigation, and markets has been largely realized and exhausted. Therefore, in order to reinvigorate agricultural growth in Punjab, which has been stagnant at around 5% per annum, we must pivot towards high-value agricultural sub-sectors.

Some policy recommendations are given below :

1. **Diversification from Common Rice**

   Promoting Maize Cultivation : Presently, only 1.65% of Punjab's gross cropped area is dedicated to maize cultivation. Expanding maize cultivation and linking it with food and poultry processing industries can create a robust market for various maize products.

   Promotion of the Livestock Sector : Fostering milk processing and encouraging private investment can significantly enhance milk production and dairy sector profitability. Developing meat processing, particularly for buffaloes, can open doors for export-oriented opportunities.

   Promotion of Horticulture : Boosting fruit and vegetable production through protected cultivation, drip and sprinkler irrigation, and developing processing, grading, and packaging infrastructure can stimulate growth in high-value horticulture products.

   Fisheries : Expanding fisheries in waterlogged areas like Muktsar, Fazilka, Bathinda, and Faridkot, and supporting the establishment of fish seed mills and carp seed farms can create alternative employment avenues.

2. **Encouraging Food Processing Industries**

   Value Addition : Focusing on food processing units, particularly those using wheat and milk as raw materials, can help in employment generation and connecting farmers directly with processors. The state should work to improve the entire value chain infrastructure for perishable products.

   Contract Farming : Promoting contract farming through the operationalization of the Contract Farming Act, 2013, can incentivize corporate participation and boost the food processing industry.

3. **Promote Sustainable Agriculture with Emphasis on Water Use Efficiency**

Shift to Direct Benefit Transfer (DBT) for Power Subsidy : Addressing groundwater depletion by metering and charging electricity beyond a set threshold can encourage efficient power and water use. Transferring subsidies directly to farmers' bank accounts based on land holdings can motivate resource conservation.

Shift to DBT for Fertilizer Subsidy : Correcting the imbalanced use of fertilizers through direct cash transfers to farmers, tied to soil testing and soil health cards, can enhance soil fertility and promote efficient fertilizer use. Reducing import duties on urea and letting market forces determine prices can further optimize fertilizer use.

Promoting Micro-irrigation Techniques : Encouraging the adoption of drip irrigation, particularly in sugarcane cultivation, can significantly improve water use efficiency.

Sustainable Futuristic Agricultural Development : Exploring solar power for irrigation and cold storage, especially in potato storage, can mitigate power shortages and reduce water table depletion. Overall, Punjab should shift its agricultural strategy from a focus on food security to income enhancement for farmers, driven by high-value crops and food processing industry development.

By diligently implementing these policy recommendations, Punjab can reinvigorate its agricultural sector, providing farmers with diverse income opportunities and promoting sustainable resource management. As the state shifts toward high-value crops, food processing, and efficient resource utilization, it not only enhances farmer incomes but also contributes to the responsible stewardship of its crucial water resources. In doing so, Punjab sets a compelling example for balanced agricultural growth and environmental sustainability, securing a brighter future for its farming communities and the state as a whole.

ABOUT ICFA

The Indian Chamber of Food and Agriculture is the apex body in India, working on business, policy, and development agendas and serving as a global platform for trade facilitation, partnerships, technology, and agribusiness services. A proactive approach helps ICFA discern critical challenges emerging in Indian agriculture and create opportunities for development, value addition, and international trade to accelerate growth in the food and agriculture sectors globally. ICFA, with more than 25 industry Working Groups and sector-specific Business Councils, represents the interests of key stakeholders at the national level and, through its international platforms and partnerships, facilitates India's global engagement in the food and agriculture sectors.

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