

# Innovating for Sustainability: Social Approaches to Agricultural Development in Punjab

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## ABSTRACT

Agriculture sector of Punjab is a source of employment and livelihood for majority of its population, supplier of raw material to industry and has important potential for economic development. These achievements are outcomes of New Agriculture Strategy adopted in 1960s, which yielded positive outcomes until 1980s, such as increased production, productivity, cropping area etc. Besides this rosy picture, this strategy has disrupted the ecological balance of the state through the monoculture of wheat and rice crops leading to various issues including resilience, poverty, demographic challenges, socioeconomic problems, issues related to technology, storage and transportation, structural problems in agricultural marketing. Social innovation emerges as a promising solution to address these problems, as it emphasizes social responsibility over profit maximization. By integrating social innovations into rural development, agriculture sector's sustainability can be effectively achieved. This study aims to investigate the problems and challenges faced by Punjab's agriculture sector and propose social innovation as a lens through which to find solutions.

**Keywords:** Agriculture, Development, Employment, Social Innovation and Sustainability

Punjab is considered as one of the chief agrestic states of India as its agricultural sector has significantly contributed in the nation's overall economic development, since the advent of new agricultural strategy. Role of state is recognized in ensuring livelihoods for the rural population along with assured food supply to the nation. The contribution of the agricultural and allied sector to the state's GSVA was recorded as 29.45 per cent for the period 2011-12 to 2022-23. This sector provides employment to around one fourth of the labour force (25.54% of workers) in Punjab (GOP, 2023). The agricultural quarter of state became the economic buffer for India, when rest of the economy was facing a recession in 2020 due to the COVID-19 pandemic, share of the

agricultural sector in the state's GSVA consistently increased by one per cent for the year 2020-21. The surprising increase in the agricultural output in the Punjab state was duly recognized fact and it was extensively acknowledged as a result of adopting new farming approach. The Green Revolution has played a pivotal role in transforming Punjab into one of the wealthiest states in the country. Additionally, the 'Punjab model of agricultural development' and the technologies associated with the Green

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Revolution are often regarded as a leading example for promoting agricultural growth in other regions of India (Chand, 1999). The agricultural sector in the state was initially highly productive, with significant growth potential and strong farm incomes for farmers. This trend remained true until the early 1990s. However, following this period, agricultural growth slowed as the available growth potential reached its limits, leading to rising costs, a shrinking resource base, and a decline in productivity and profitability. (Kalkat *et al.* 2006). Furthermore, the persistent wheat-rice cropping pattern in Punjab has not only optimized productivity but has also resulted in the depletion of land quality, water resources, and environmental sustainability (Sidhu and Johl, 2002). From the technological context, signs of fatigue, lower income growth and shrinkage of employment have been noticed (Sidhu and Bhullar, 2004). The agricultural problems in the state are deeply connected to socio-economic concerns, such as the subdivision and fragmentation of land holdings and the rising inclination toward nuclear family structures in rural communities, leading to a shrinking of land sizes for farmers. To address these problems of social nature, there is need of social innovations. In contrary to conventional business innovation, which intends to augment profit, social innovation signifies the new ideas, which work in meeting social goals (Mulgan *et al.* 2007).

The concept of innovation was pioneered by Schumpeter in his work in 1934 (Schumpeter, 1934). He identified five key areas of innovation, which include: the creation of new products or the novel production of existing goods, the introduction of new methods of transportation, the exploration of new markets, the use of new production materials, and the establishment of new market conditions. Shortcoming of this classic concept of innovation is, it is geographically bound and does not provide any proficient solution set to the issues and challenges faced by countryside. Moreover, Schumpeter innovation pays attention specifically on the technical innovations and improvements, with the objective of profit maximisation. Thus, need of the time was to evolve such a panacea, which will address the problems and challenges faced by the society as a whole. Social innovation gained importance in 1980s. The concept initially appeared in the study of Drucker (1985). Many economists

have defined the term social innovation as, all the new and innovative ideas to solve the prevailing social problems (Kocziszky *et al.* 2015 and Varga, 2017). It is perceived that technical innovations give solution to the issues related to quality of life in central or core areas (Varga, 2017). On the other hand peripheral areas are lagging behind and face the development related issues like migration, demographic change, dismantling infrastructure, degradation of environment, farming issues etc. (Schermer & Kroismayr, 2020). So, it becomes imperative to look into such new innovation as social innovations. Bock (2016) has also regarded social innovations as a novel tool for rural development. Social innovation includes social responsibility and excludes the profit maximization objective (Liptak, 2019).

Four major elements of social innovation are society or people, challenge or problem, process dealing with the challenge and objective (solving the problem in order to have maximum of well being) (Dawson & Daniel, 2010). It is also accepted that social innovation targets at sustainable development. Sustainable development means “the development that meets the needs of the present without jeopardizing the capability of upcoming generations to meet up their own needs” (WCED, 1987). Over time several dimensions of sustainability has been evolved, specifically, social, economic, cultural and environmental (Lankoski, 2016). Now, the question arises is whether social innovation furnishes a way for acquiring the balance among social, economic and environmental sustainability or not? So, in the present study attention will be paid to this query related to sustainability.

Agriculture Sustainability is the capability to make farm products to gratify unlimited needs of human as well as having sustainable effects on environment. It requires reducing irrecoverable damage to the ecosystem, which has great impact on the environment. The present paper is organised as firstly, to inspect the aspects of agriculture development in the state of Punjab such as land use pattern, production and productivity of various crops, fertilizer or pesticides consumption, sources of irrigation and their impact on groundwater depletion; secondly, explore the sustainability of agricultural development in Punjab and finally,

find the solutions of issues and challenges faced by agriculture sector through the social innovation lens.

## MATERIALS AND METHODS

For analysis purpose secondary data has been employed. Several published data sources like - Economic Survey of Punjab, Statistical Abstract of Punjab, Agriculture at a Glance, published reports of various public and private institutions, etc. have been utilised. The reference period of the present study is 1960-61 to 2020-21. Descriptive statistical tools such as averages, percentages, etc. have been used for enumeration of statistics.

## RESULTS AND DISCUSSION

**Agricultural Structure of Punjab:** Punjab has long been recognized as an agriculturally dominant state. Subsequent to its restructuring in 1966, Punjab, accounting for approximately 1.5% of India's total land area, has been a cornerstone of national food security, significantly contributing to agricultural production. Till 2014-15 the share of state in central pool in terms of wheat and rice was 41.5 per cent and 24.2 per cent respectively (GOP, 2015). Latest estimates for the year 2022-23 shown that contribution of Punjab in national foodgrains pool in terms of wheat and rice was noticed as 17.14 per cent and 12.18 per cent respectively (Punjab Economic Survey, 2022-23). Before moving towards the area

under major crops in the state, let's have a look at the pattern of land resource use in Punjab.

**Land use pattern in Punjab:** Table 1 presents data on the land use pattern, indicating that the total net sown area in Punjab was recorded at 4,127 thousand hectares out of the state's total geographical area of 5,033 thousand hectares in 2020-21. This signifies that approximately 82% of the reported land in Punjab is currently being utilized for cultivation, the largest proportion among all states in the country.

In Punjab, the area under current fallow and uncultivated land is minimal. The state's cropping intensity increased significantly from 140% in 1970-71 to 186% in 2000-01, leading to an expansion of the total cropped area from 5,678 thousand hectares in 1970-71 to a peak of 7,941 thousand hectares in 2000-01. However, this growth has since stabilized, with the total cropped area declining to 7,818 thousand hectares in 2020-21, as further increases in cropping intensity have become constrained. Additionally, the rising demand for land for non-agricultural purposes poses a potential threat to the net sown area, which may, in turn, negatively impact the total cropped area.

**Area under Major Crops in Punjab:** The cropping pattern of Punjab, as illustrated in Table 2, indicates that in 2020-21, approximately 98% of the total cropped area was dedicated to five major crops: wheat, rice, maize, sugarcane and cotton. Among

**Table 1:** Land use pattern in Punjab ('000 hectares)

| Item                                    | 1970-71 | 1980-81 | 1990-91 | 2000-01 | 2010-11 | 2020-21 |
|-----------------------------------------|---------|---------|---------|---------|---------|---------|
| Geographical Area                       | 5036    | 5036    | 5036    | 5036    | 5036    | 5033    |
| Reporting Area                          | 5031    | 5033    | 5033    | 5033    | 5033    | 5033    |
| Area under Forest                       | 123     | 216     | 222     | 280     | 295     | 245     |
| Barren & Uncultivated Land              | 208     | 96      | 83      | 28      | 25      | 36      |
| Land put to Non Agri. Uses              | 416     | 436     | 343     | 410     | 503     | 511     |
| Culturable Waste Land                   | 83      | 41      | 35      | 15      | 2       | 8       |
| Permanent pastures & Other Grazing Land | 5       | 4       | 10      | 4       | 4       | 4       |
| Land under Misc Tree Crops              | 4       | 4       | 12      | 3       | 4       | 10      |
| Fallow Land                             | 139     | 45      | 110     | 40      | 33      | 84      |
| Net Area Sown                           | 4053    | 4191    | 4218    | 4250    | 4158    | 4127    |
| Area sown more than once                | 1625    | 2572    | 3284    | 3691    | 3724    | 3691    |
| Total Cropped Area                      | 5678    | 6763    | 7502    | 7941    | 7882    | 7818    |
| Cropping Intensity (%)                  | 140     | 161     | 178     | 186     | 190     | 190     |

**Source:** Statistical Abstract of Punjab.

**Table 2:** Area under Major Crops in Punjab ('000 hectares)

| Year    | Wheat        | Rice         | W+R          | Maize       | Cotton      | Sugar Cane | Other       | Total         |
|---------|--------------|--------------|--------------|-------------|-------------|------------|-------------|---------------|
| 1970-71 | 2299 (48.25) | 390 (8.18)   | 2689 (56.43) | 555 (11.65) | 397 (8.33)  | 128 (2.69) | 996 (20.90) | 4765 (100.00) |
| 1980-81 | 2812 (48.05) | 1183 (20.22) | 3995 (68.27) | 382 (6.53)  | 649 (11.09) | 71 (1.21)  | 755 (12.90) | 5852 (100.00) |
| 1990-91 | 3273 (49.61) | 2015 (30.54) | 5288 (80.16) | 188 (2.85)  | 701 (10.63) | 101 (1.53) | 319 (4.84)  | 6597 (100.00) |
| 2000-01 | 3408 (48.56) | 2612 (37.22) | 6020 (85.78) | 165 (2.35)  | 474 (6.75)  | 121 (1.72) | 238 (3.39)  | 7018 (100.00) |
| 2010-11 | 3510 (48.91) | 2826 (39.38) | 6336 (88.28) | 133 (1.85)  | 483 (6.73)  | 70 (0.98)  | 155 (2.16)  | 7177 (100.00) |
| 2015-16 | 3506 (48.68) | 2970 (41.24) | 6476 (89.92) | 127 (1.76)  | 335 (4.65)  | 92 (1.28)  | 172 (2.39)  | 7202 (100.00) |
| 2020-21 | 3530 (48.28) | 3149 (43.01) | 6679 (91.35) | 108 (1.48)  | 252 (3.45)  | 89 (1.22)  | 184 (2.52)  | 7312 (100.00) |

**Source:** Statistical Abstract of Punjab Various Issues.

**Note:** values in parentheses represent the percentages of the total.

these, wheat was the predominant crop, accounting for 48.28% of the cropped area, followed by rice at 43.01%. In absolute terms, the area under wheat cultivation expanded significantly from 2,229 thousand hectares in 1970-71 to 3,530 thousand hectares in 2020-21. Similarly, rice cultivation, which covered only 390 thousand hectares in 1970-71, increased to 3,149 thousand hectares by 2020-21. Collectively, wheat and rice occupied 6,679 thousand hectares, constituting 91.35% of the total cropped area, while the area under all other crops declined sharply to 633 thousand hectares (approximately 9%). The primary factors contributing to the expansion of wheat and rice cultivation include their relatively high and stable yields compared to other crops, along with the assurance of a minimum support price.

These findings highlight the dominance of wheat and rice in Punjab's cropping pattern. However, this shift has introduced additional challenges to the agricultural sector. Traditionally, crops such as pulses and oilseeds played a crucial role in replenishing soil fertility naturally. The decline in their cultivation has reduced the availability of natural soil nutrients, increasing reliance on chemical fertilizers. Furthermore, the continuous expansion of wheat and rice cultivation has led to significant environmental concerns, including Groundwater exhaustion and soil deterioration.

### Production and yield of major crops in Punjab

The production and yield of key crops in Punjab are presented in Tables 3 and 4. In 2020-21, wheat and rice collectively accounted for 72.26% of the state's total agricultural output, compared to approximately

69% in 1970-71. The total production of major crops experienced a significant increase from 8,437.91 thousand tonnes in 1970-71 to 43,143 thousand tonnes in 2020-21, marking more than a threefold rise. Regarding yield, Punjab saw substantial growth in wheat and rice production between 1970-71 and 2000-01. The wheat yield nearly doubled from 2,238 to 4,563 thousand kilograms per hectare between 1970-71 and 2000-01, while rice yield increased from 1,765 to 3,506 thousand kilograms per hectare during the same period. Similarly, maize yield increased from 1,555 thousand kilograms per hectare in 1970-71 to 2,793 thousand kilograms per hectare in 2000-01. Although the total production and productivity of major crops showed a consistent upward trend until 2000-01, this growth plateaued in subsequent years and, in some cases, declined.

### Irrigated Area in Punjab

Irrigation is one of the most important components in agriculture development. Table 5 and 6 depicts the information regarding the irrigated area in Punjab by the different sources and the number of tubewells installed during the period 1960-61 to 2020-21. During 1960-61, canal water irrigated about 58 per cent of the total irrigated area, which has reduced to 28 per cent in 2020-21, whereas the share of well and tube well irrigation has increased from 41 to 72 per cent during the same period. Data in Table 6 illustrates the rising trend in the area irrigated by tube wells in the state over time. The total number of tube wells has shown significant growth, increasing from 1.90 lakh in 1970-71 to 14.76 lakh in 2020-21.

**Table 3:** Production of major crops in Punjab ('000 Metric Tons)

| Year    | Wheat         | Rice          | W+R           | Maize       | Cotton        | Sugar Cane   | Other          | Total Production  |
|---------|---------------|---------------|---------------|-------------|---------------|--------------|----------------|-------------------|
| 1970-71 | 5145 (60.97)  | 688 (8.15)    | 5833 (69.13)  | 861 (10.20) | 147.31 (1.75) | 527 (6.25)   | 1069.6 (12.68) | 8437.91 (100.00)  |
| 1980-81 | 7677 (56.97)  | 3233 (23.99)  | 10910 (80.96) | 612 (4.54)  | 200.26 (1.49) | 392 (2.91)   | 1361.8 (10.11) | 13476.06 (100.00) |
| 1990-91 | 12159 (44.60) | 6506 (23.86)  | 18665 (68.46) | 333 (1.22)  | 1909 (7.00)   | 5592 (20.51) | 766 (2.81)     | 27265 (100)       |
| 2000-01 | 15551 (56.42) | 9157 (33.22)  | 24708 (89.65) | 461 (1.67)  | 1199 (4.35)   | 7230 (26.23) | 1407 (5.11)    | 27561 (100)       |
| 2010-11 | 16472 (54.42) | 10833 (35.79) | 27305 (90.21) | 497 (1.64)  | 1822 (6.02)   | 4904 (16.20) | 1746 (5.77)    | 30267 (100)       |
| 2020-21 | 17185 (39.83) | 13992 (32.43) | 31177 (72.26) | 395 (0.92)  | 1023 (2.37)   | 7487 (17.35) | 3061 (7.09)    | 43143 (100.00)    |

**Source:** Statistical Abstract of Punjab, Various Issues.

**Note:** values in parentheses represent the percentages of the total.

**Table 4:** Yield of major crops in Punjab (kg/hectare)

| Year    | Wheat | Rice | Maize | Cotton American | Cotton Deshi |
|---------|-------|------|-------|-----------------|--------------|
| 1970-71 | 2238  | 1765 | 1555  | 399             | 338          |
| 1980-81 | 2730  | 2733 | 1602  | 329             | 241          |
| 1990-91 | 3715  | 3229 | 1786  | 481             | 285          |
| 2000-01 | 4563  | 3506 | 2793  | 437             | 408          |
| 2010-11 | 4693  | 3828 | 3707  | 646             | 472          |
| 2020-21 | 4868  | 4443 | 3665  | 436             | 596          |

**Source:** Statistical Abstract of Punjab Various Issues.

**Table 5:** Irrigated Area in Punjab (000 Hectare)

| Year/Source | Canal        | Well and Tubewell | Other     | Total      |
|-------------|--------------|-------------------|-----------|------------|
| 1960-61     | 1180 (58.42) | 829 (41.04)       | 11 (0.54) | 2020 (100) |
| 1970-71     | 1246 (43.84) | 1591 (55.98)      | 5 (0.18)  | 2842 (100) |
| 1980-81     | 1430 (42.28) | 1939 (57.33)      | 13 (0.38) | 3382 (100) |
| 1990-91     | 1660 (42.56) | 2233 (57.26)      | 7 (0.18)  | 3900 (100) |
| 2000-01     | 962 (23.82)  | 3074 (76.13)      | 2 (0.05)  | 4038 (100) |
| 2010-11     | 1113 (27.37) | 2954 (72.63)      | —         | 4067 (100) |
| 2020-21     | 1114 (27.74) | 2902 (72.26)      | —         | 4016 (100) |

**Source:** Statistical Abstract of Punjab, Various Issues.

**Note:** values in parentheses represent the percentages of the total.

**Table 6:** Tubewells in Punjab(in lakh)

| Year     | 1960-61 | 1970-71 | 1980-81 | 1990-91 | 2000-01 | 2010-11 | 2020-21 |
|----------|---------|---------|---------|---------|---------|---------|---------|
| Tubewell | 0.007   | 1.90    | 6       | 8       | 10.73   | 13.82   | 14.76   |

**Source:** Statistical Abstract of Punjab, Various Issues.



## Use of chemical fertilizers

The data in Table 7 indicates a substantial rise in fertilizer consumption in the state during the post-Green Revolution period. The total use of fertilizers in the state has increased from 5 thousand nutrients tons in 1960-61 to 1938 thousand nutrients tons in 2020-21.

All these statistics on production and yield of major crops, irrigated area, number of Tubewells and use of chemical fertilisers have shown a rosy picture of Punjab state till 2001. After this period the agricultural growth of the state became stagnant and even faced the decline in the growth rate. Thus, demanding the sustainability of agricultural development in the country in general and in Punjab in particular. Next section deals with the issues of sustainability of farming sector in terms of social, economic and environment; particularly from the angles of social innovation.

## Sustainable Agricultural Development in Punjab

As we knew that new agricultural strategy was adopted in mid 1960s in India and Punjab was one among the states where this strategy was experimented. This has resulted in the replacement of old ways and methods of cultivation in Punjab (Singh, 2011). New agricultural strategy has positively affected the food grains production in the state. It has been recorded that food grains production has surged to 31.69 million tonnes in 2017-18 from 3.2 million tonnes in 1960-61. This expansion in production and productivity of food grains in general and that of wheat and rice in particular was considered as historic. On the other hand cropping intensity too has rose to 190 per cent in 2022-21 from 126 per cent in 1960-61 (GOP, 2023). Various factors have facilitated this rise in agricultural production like use of HYVs, consolidations of land holdings, improved and expanded irrigation facilities, fertilizers, pesticides, mechanisation of the farming,

advancement of product markets, development of basic infrastructure, provision of finance at easy terms, R&D activities in agriculture etc.

The above discussed accomplishments show a sunny side of agriculture sector of Punjab state. During 1980s new agricultural strategy loses its momentum and become unsustainable for the state. The reason being firstly, the yield of major crops has shown signs of stagnancy and secondly, cost of cultivation has also escalated (Singh, 2000). Moreover, after achieving of the potentials of two major crops i.e. wheat and rice, the state is suffering from the serious issue of Groundwater exhaustion and soil deterioration (Sidhu and Johl, 2002). Further, the technological development in farming sector has depicted the signs of exhaustion, sluggish income growth and contraction of employment opportunities (Sidhu *et al.* 2004). So, the pressing demand of the time is to encourage the sustainability of farming activities. The agricultural system in Punjab has been evaluated through the lens of three key dimensions of sustainability: economic, environmental, and social aspects.

## Economic Sustainability

The economic viability of the agricultural sector is determined by cultivation costs, crop yields, and market prices of the various crops. In Punjab, wheat, rice, and cotton are the primary crops contributing to the state's agricultural economy (Tables 3 & 4). Per hectare yield of rice was the highest (6.8 tonn per hectare), followed by wheat (4.0 tonn per hectare), basmati (4.8 tonn per hectare) and cotton (2.4 tonn per hectare). However, cotton recorded the highest cultivation expense, amounting to ₹ 68.6 thousand per hectare, whereas wheat had the lowest at Rs 39.1 thousand per hectare. The cost of production for rice and basmati was ₹ 53.3 thousand and Rs 62.1 thousand per hectare, respectively (Singh, 2020). In crop wise comparison, it was found that basmati fetched much higher returns than other

**Table 7:** Use of chemical fertilizers(in 000 nutrients tons)

| Year                     | 1960-61 | 1970-71 | 1980-81 | 1990-91 | 2000-01 | 2010-11 | 2020-21 |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|
| Use of Fertilizers (NPK) | 5       | 213     | 762     | 1220    | 1313    | 1911    | 1938    |

**Source:** Statistical Abstract of Punjab, Various Issues.

crops, whereas, cotton generated the lowest net profit (Singh, 2020, Singh *et al.* 2017; Raju *et al.* 2015). However, basmati is not covered under the Minimum Support Price (MSP) given by the government.

Singh (2020) reported that a farm household cultivating 4.8 hectares of land had an annual income of ₹ 50,201 only. When earnings from allied agricultural activities are included, the total annual income increases to ₹ 83,668, which means that an average farm household (with five members) in Punjab, has approximately ₹ 46 per day for daily expenditures. According to IFAD (2011) estimations, those who live on \$1.25 a day, are considered as poor. In this way, Contrary to its image as an agriculturally advanced state, Punjab's average farm household remains entrenched in poverty. Therefore, it can be stated that Punjab's current agriculture structure is economically unsustainable.

### Environmental Sustainability

Punjab's agricultural sustainability can be measured by analyzing the health of its natural resources, with a particular emphasis on soil and water. The indiscriminate use of chemical fertilizers has raised concerns regarding soil health in the region. Since the post-Green Revolution era, fertilizer usage in Punjab has surged from 37.5 kilograms per hectare in 1970-71 to 256 kilograms per hectare in 2020-21, nearly double the national average (GOP, 2023). Over use of the chemical fertilizers had brought organic component in the soil to very low level, as a result soil fertility declined. On the other hand, the adoption of High Yielding Varieties (HYVs) in wheat and rice has led to increased nutrient removal, contributing to soil nutrient depletion (Benbi *et al.* 2006).

Punjab's agricultural sustainability is increasingly at risk due to severe groundwater depletion (Singh and Park, 2018). The failure to implement effective crop diversification policies has led to a persistent rise in the area under rice cultivation (from 2299 thousand hectare in 1970-71 to 3530 thousand hectare in 2020-21). As a result demand for water also increases. Groundwater extracted through tube wells serves as the primary source of irrigation in Punjab, covering approximately 72% of the total sown area. The state has witnessed a sharp increase in tube wells, growing from 1.90 lakh in 1970-71 to 14.76 lakh in 2020-21. The decline in diesel-operated

tube wells benefits the environment; however, the over extraction of groundwater remains a challenge to sustainable agriculture (GOP, 2023). As per the Punjab Guidelines of Punjab Water Regulation and Development Authority (PWRDA, 2020), out of the 153 blocks in Punjab, 109 comes under the over-exploited category in case of ground water. The problem of rice crop residual burning is the other threat to environment. The continuation of existing policies, including free electricity for agriculture and the MSP support for rice cultivation, could lead to severe groundwater depletion in Punjab. (Singh, 2020a).

### Social Sustainability

While the mechanization of key farming operations in Punjab has significantly contributed to increasing crop production and productivity, thereby enhancing national food security, it has also had adverse effects. It has displaced agricultural labor, marginalized rural artisans, and rendered small farms economically unsustainable, forcing many smallholders out of business (Sidhu *et al.* 2011). Despite comprising one-third of Punjab's landholders, small farmers continue to struggle with unequal access to key farming resources such as modern machinery and irrigation, which are essential for profitability (Singh, 2014). For instance, only about 50 per cent of the small farmers owned a tractor as compare to 72 per cent of the medium farmers. Moreover, over 10 percent of smallholders relied on renting irrigation facilities from large landowners (Singh, 2014). Less than half of small farmers could obtain credit from the Primary Agriculture Credit Societies, forcing the remaining ones to rely on non-institutional lenders like commission agents. These informal lenders often charge exorbitant interest rates, leading to severe financial distress. As a result, many are left with no choice but to sell their land to settle debts, while some face severe economic distress, leading to tragic consequences. The highly mechanized agriculture system after green revolution pushed farm labour, rural artisans and women out of farming in state.

From the above discussion it is clear that agriculture sector of Punjab is not following the path of sustainability. Thus, the dire need of time is to find the solution of these problems from the social perspective.

## Policy Suggestions from the Lens of Social Innovations

**Crop Diversification:** The current cropping pattern (monoculture of wheat-paddy) is having a detrimental impact on soil health, and, being highly water intensive, they are one major cause of the depletion of ground water in the state. Alternative cropping pattern is essential for improving the agricultural sustainability. The cultivation of millets can be a better option for maintaining the water economy of the Punjab, as they are more drought tolerant and require less irrigation than rice. Moreover, these crops will also improve soil health by enhancing soil nutrients. Public procurement and minimum support price (MSP) on such crops should be a part of diversification policy. Local institutions like Gram Panchayats, NGOs and cooperative societies can play a crucial role in promotion of these crops.

**Organic Farming:** Organic farming is an example of social innovations, where farming is carried out by group of persons, who may further generate employment for 25-30 persons, depending on the needs. Besides providing employment opportunities at native place, organic farming will also assist in augmenting the market value of the produced raw material. In this case, social innovation does not mean production of vegetables or fruits rather the process, which takes place through the involvement of civil society characters. This public employment program has been adopted in the village Hernádszentandrás of North Hungarian region.

**Social Land Program:** This program has been implemented in the village Belecska, Hungary. 365 individuals have participated in it and taken the benefits. This program was introduced with the purpose of eliminating the symptoms of crisis in rural areas. Local government has played an important role in this program of social innovation. The primary objective of such programs is to support individuals who lack the necessary resources for agricultural production (such as landless individuals), those who face challenges in managing land efficiently (such as marginal and small farmers), and those who are socially disadvantaged (such as SCs and OBCs in India). These programs aim to provide opportunities for small-scale housing and livestock farming, leveraging both individual and community resources (Liptak, 2019). With social land programs

the problems of unemployment and migration can be easily addressed. This instance makes it clear that social innovations hold intrinsic value while also serving as exemplary frameworks for adaptation.

## REFERENCES

- Benbi, D.K., Nayyar, V.K. and Brar, J.S. 2006. Green revolution in Punjab: The impact on soil health. *Indian Journal of Fertility*, **2**: 57–66.
- Bock, B.B. 2016. Rural marginalisation and the role of social innovation: A turn towards nexogenous development and rural reconnection. *Sociologia Ruralis*, **56**(4): 552–573.
- Chand, R. 1999. Emerging crisis in Punjab agriculture: Severity and options for future. *Economic and Political Weekly*, **34**(13): A2–A10.
- Dawson, P. and Daniel, L. 2010. Understanding social innovation: A provisional framework. *International Journal of Technology Management*, **51**(1): 9–21.
- Drucker, P. 1985. *Innovation and entrepreneurship*. New York: Harper & Row.
- Government of Punjab (GoP). 2015. *Punjab economic survey 2013–14*. Economic and Statistical Organisation, Department of Planning, Government of Punjab.
- Government of Punjab (GoP). 2023. *Punjab economic survey 2021–22*. Economic and Statistical Organisation, Department of Planning, Government of Punjab. Retrieved from <https://www.esopb.gov>
- Government of Punjab (GoP). 2023. *Statistical abstract of Punjab*. Chandigarh: Economic Adviser to Government of Punjab.
- International Fund for Agricultural Development (IFAD). 2011. *Rural poverty report 2011*.
- Kalkat, G.S., Pannu, K.S., Singh, K. and Rangi, P.S. 2006. *Agricultural and rural development of Punjab: Transforming from crisis to growth*. Mohali: Punjab State Farmers Commission, Government of Punjab.
- Kocziszky, G., Benedek, J., Veresné Somosi, M. and Balaton, K. 2015. Regionális társadalmi innováció generálása szakértői rendszer segítségével. *Észak-magyarországi Stratégiai Füzetek*, **12**(2): 4–22.
- Lankoski, L. 2016. Alternative conceptions of sustainability in a business context. *Journal of Cleaner Production*, **139**: 847–857.
- Liptak, K. 2019. The importance of social innovations in rural areas. *DETUROPE – The Central European Journal of Tourism and Regional Development*, **11**(3).
- Mulgan, G., Tucker, S., Ali, R. and Sanders, B. 2007. *Social innovation: What it is, why it matters and how it can be accelerated*. London: University of Oxford, Young Foundation. Retrieved December 8, 2023, from <https://youngfoundation.org/wp-content/uploads/2012/10/Social-Innovation-what-it-is-why-it-matters-how-it-can-be-accelerated-March-2007.pdf>



- Punjab Water Regulation and Development Authority (PWRDA). 2020. *Punjab guidelines for groundwater extraction and conservation*.
- Raju, S.S., Chand, R., Srivastava, S.K., Kaur, A.P., Singh, J., Jain, R., Immanuelraj, K. and Kaur, P. 2015. Comparing performance of various crops in Punjab based on market and economic prices and natural resource accounting. *Agricultural Economics Research Review*, **28**: 189–198.
- Schermer, M. and Kroismayr, S. 2020. Social innovation in rural areas. *Österreichische Zeitschrift für Soziologie*, **45**: 1–6.
- Schumpeter, J.A. 1934. *The theory of economic development: An inquiry into profits, capital, credit, interest and the business cycle*. (Harvard Economic Studies, 46).
- Sidhu, R.S. and Bhullar, A.S. 2004. Changing structure of the farm economy in Punjab: Impact of livestock on income and employment. *Indian Journal of Agricultural Economics*, **59**(3): 579–587.
- Sidhu, R.S. and Johal, S.S. 2002. Three decades of intensive agriculture with special reference to Punjab. In S.S. Johal & S.K. Ray (Eds.), *Future of Punjab agriculture* (pp. 16–39). Chandigarh: Centre for Research in Rural and Industrial Development (CRRID).
- Sidhu, R.S., Singh, S. and Bhullar, A.S. 2011. Farmers' suicides in Punjab: A census survey of the two most affected districts. *Economic and Political Weekly*, **46**(26/27): 131–137.
- Singh, P. 2011. Economic benefits and ecological cost of green revolution: A case study of Punjab. *Journal of Economic and Social Development*, **8**(1): 64–74.
- Singh, S. 2000. Crisis in Punjab agriculture. *Economic and Political Weekly*, **35**(23): 1889–1892.
- Singh, S. 2014. *Determinants of agricultural sustainability in the Indian Punjab with a special reference to extension systems* (Doctoral dissertation). University of Reading, UK.
- Singh, S. 2020. Economic sustainability of farm enterprises in the Indian Punjab: A case study. *Journal of Agricultural and Crop Research*, **8**(8): 147–158.
- Singh, S. 2020a. Agricultural sustainability in Punjab: A way forward. *CDIES Policy Brief Series on Punjab Economy*. Centre for Development Economics and Innovation Studies (CDEIS), Punjabi University Patiala. Retrieved from <http://punjabiversity.ac.in/pages/Images/cdeis/1%20Sukhwinder%20Singh.pdf>
- Singh, S. and Benbi, D.K. 2016. Punjab-soil health and green revolution: A quantitative analysis of major soil parameters. *Journal of Crop Improvement*, **30**: 323–340.
- Singh, S. and Park, J. 2018. Drivers of change in groundwater resources: A case study of the Indian Punjab. *Food Security*, **10**(4): 965–979.
- Singh, S., Kaur, P., Sachdeva, J. and Bhardwaj, S. 2017. Profitability analysis of major crops in Punjab: Some evidence from cost of cultivation survey data. *Indian Journal of Economics and Development*, **13**(1): 71.
- Varga, K. 2017. Issues of regional social innovation. *International Journal of Engineering and Management Sciences*, **2**(4): 602–616.
- World Commission on Environment and Development (WCED). 1987. *Our common future*. Oxford: Oxford University Press.

