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Sectoral Transformation of Punjab's Economy Before and After COVID-19: Evidence from GSVA Estimates

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Abstract

The present study examined the sectoral growth, structural transformation, and post-pandemic recovery patterns in Punjab's economy before and after COVID-19. The results of the study revealed that the tertiary sector was the fastest-growing sector in Punjab, both before and after COVID-19, recording a CAGR of 7.05 and 8.05 per cent, respectively, followed by the secondary sector. In contrast, the primary sector showed comparatively slower growth, with its CAGR declining from 2.27 per cent during the pre-COVID period to 1.45 per cent during the post-COVID period. The share of the primary sector in GSVA declined from 27.17 per cent during the pre-COVID period to 22.22 per cent during the post-COVID period, while the shares of the secondary and tertiary sectors increased to 27.02 and 50.76 per cent, respectively. The sectoral growth performance during the pandemic year varied considerably, with the tertiary sector recording the sharpest contraction in 2020-21. The recovery analysis showed that all sectors surpassed their pre-pandemic levels by 2024-25, although the pace of recovery was substantially higher in the secondary and tertiary sectors. The tertiary sector contributed 61.28 per cent of the total increase in GSVA during the study period, highlighting its dominant role in Punjab's economic growth. The study emphasized the need for policies that promote industrial diversification, service sector expansion, and agricultural modernization to ensure balanced and sustainable economic development in the state.

Keywords: GSVA, Structural transformation, COVID-19, Sectoral composition, Economic growth

JEL Classification: O11, O47, O53, R11, E01.

Introduction

Punjab has played a pivotal role in India's economic development, particularly since the Green Revolution. The state has played a crucial role in ensuring national food security. The state recorded the highest per capita income among Indian states while maintaining an annual growth rate of over 5 per cent for nearly twenty-five years after the mid-1960s (Ghuman and Khurana, 2025). However, since the economic reforms of the early 1990s, the state's growth trajectory has slowed relative to many other Indian states. While many Indian states diversified their economies through industrialization and expansion of the service sector, Punjab continued to rely heavily on agriculture, resulting in concerns regarding the sustainability of its long-term growth performance. At the same time, the industrial and service sectors have become increasingly important contributors to economic development. Consequently, concerns have emerged regarding the pace of structural transformation and the changing sectoral composition of the state's economy (Ghuman and Khurana, 2025 and Singh *et al*., 2025).

Structural transformation is often associated with higher productivity, increased incomes, and improved living standards (Panth, 2021 and Gollin and Kaboski 2023). However, the outbreak of the COVID-19 pandemic in 2020 introduced an unprecedented shock to the economies across the world. The pandemic and the associated lockdown measures disrupted production, trade, transportation, employment, and consumption activities, resulting in significant economic losses. In India, the pandemic adversely affected manufacturing, trade, MSMEs, labour markets, and supply chains, thereby intensifying the existing economic slowdown (Sahoo and Ashwani, 2020). Punjab was no exception. The state's economy experienced considerable disruptions in agricultural operations, industrial production, trade, transportation, and employment. The pandemic adversely affected government finances, employment opportunities, industrial output, and agricultural activities, thereby aggravating existing structural challenges within the state economy (Singh *et al*., 2021).

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The economic consequences of COVID-19 were not uniform across sectors. While agriculture displayed relatively greater resilience owing to its essential nature, several industrial and service activities experienced substantial disruptions. Sanyal *et al.,* (2024) revealed significant declines in household incomes in Punjab during the lockdown period, with daily wage labourers among the most severely affected groups. Rural households also experienced more persistent income losses than urban households. Similarly, manufacturing and construction activities witnessed disruptions in production and employment, resulting in changes in the composition of industrial output (Aggarwal and Singh, 2022). Consequently, the pandemic not only affected overall economic growth but also had the potential to alter the sectoral composition of the economy by affecting sectors differently (Kandpal, 2024). Although economic activity gradually recovered following the easing of restrictions, expansion of vaccination coverage, and implementation of policy support measures, the pace of recovery varied considerably across sectors and subsectors. These differences in recovery patterns may have accelerated, slowed, or altered the process of structural transformation within the state economy. Therefore, an assessment of post-pandemic recovery is essential to understand the resilience of different sectors and the evolving economic structure of Punjab. Although several studies have examined the economic consequences of COVID-19 in Punjab, but most have focused on employment, household income, agriculture, or industrial disruptions. Limited evidence is available on how the pandemic period coincided with changes in the sectoral composition of Punjab's economy using recent GSVA estimates extending to 2024-25. An assessment of sectoral growth, structural transformation, and recovery patterns is therefore important for understanding the evolving structure of Punjab's economy.

Data Sources and Methodology

The present study was based entirely on secondary data related to Gross State Value Added (GSVA) of Punjab at constant (2011-12) prices. The data were obtained from the State Income Estimates released by the Ministry of Statistics and Programme Implementation (MoSPI), Government of India. Sector-wise GSVA estimates for the period 2011-12 to 2024-25 were used to examine the growth performance, structural transformation, and post-pandemic recovery patterns before and after COVID-19. Further, for analytical purposes, the study period was divided into three phases, i.e., pre-COVID period (2011-12 to 2019-20), COVID year (2020-21), and post-COVID period (2021-22 to 2024-25). The analysis focused on three broad sectors of the economy, namely primary, secondary, and tertiary sectors, along with their major sub-sectors. The following analytical tools were used to analyze the data:

Estimation of compound annual growth rate (CAGR)

The growth performance of major sectors was examined using the exponential growth model as given below:

$$Y_t = ab^t$$

Where, Y_t = GSVA of a particular sector in year (t); a = intercept; b = growth parameter, and t = time period. By taking natural logarithms on both sides, we have:

$$\ln(Y_t) = \alpha + \beta t + u_t$$

Where, $\alpha = \ln(a)$; $\beta = \ln(b)$, and u_t = error term

Thereafter, the Compound Annual Growth Rate (CAGR) was estimated as:

$$CAGR = [\exp(\beta) - 1] \times 100$$

The statistical significance of the growth rates was assessed using the t-statistic associated with the estimated coefficient.

Sectoral composition analysis

The structural composition of Punjab's economy was examined by estimating the percentage contribution of each sector to total GSVA. The shares of primary, secondary, and tertiary sectors were calculated for each year and compared across periods to identify structural transformation. The sectoral share was computed as:

$$\text{Sector Share}_i = \frac{\text{GSVA}_i}{\text{Total GSVA}} \times 100$$

Where, GSVA_i denotes the GSVA of the i^{th} sector, and Total GSVA represents the aggregate gross state value added.

Further, to identify shifts in the internal composition of the primary, secondary, and tertiary sectors, average sub-sectoral shares were computed separately for the pre-COVID and post-COVID periods by using the following formula:

$$\text{Subsector Share}_i = \frac{\text{Subsector GSVA}_i}{\text{Sector GSVA}} \times 100$$

Assessment of sectoral performance during COVID-19

To examine the sectoral performance of Punjab's economy during the COVID-19 year, annual growth rates were estimated for 2020-21 relative to the pre-pandemic year 2019-20. The analysis facilitated a comparison of the growth performance of different sectors during the pandemic period and helped to identify sectors that experienced relatively greater contractions or resilience.

$$\text{Growth Rate} = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100$$

Where, Y_t represents GSVA in 2020-21, and Y_{t-1} represents GSVA in 2019-20.

Recovery Index

To evaluate the post-pandemic recovery across sectors, a recovery index was constructed using 2019-20 as the base year.

$$\text{Recovery Index} = \frac{GSVA_t}{GSVA_{2019\text{-}20}} \times 100$$

Where, $GSVA_t$ is sectoral GSVA in year t; and $GSVA_{2019\text{-}20}$ is sectoral GSVA during the pre-pandemic year. An index value greater than 100 indicated recovery beyond the pre-pandemic level.

Contribution of Major Sectors to Economic Growth

The relative contribution of each sector to the overall expansion of Punjab's economy was estimated using cumulative changes during the study period as follows:

$$\text{Contribution}_i = \frac{GSVA_i}{\Delta \text{Total GSVA}} \times 100$$

Where, $\Delta GSVA_i$ = GSVA(2024-25) - GSVA(2011-12); and

ΔTotal GSVA = Total GSVA(2024-25) - Total GSVA(2011-12)

Results and Discussion

Changing sectoral composition of Punjab's economy

Figure 1 illustrates the changing sectoral composition of Punjab's economy during the period 2011–12 to 2024–25. The figure indicated a clear structural transformation characterized by a declining share of the primary sector and a rising contribution of the secondary and tertiary sectors in Punjab's Gross State Value Added (GSVA). The share of the primary sector declined continuously from 30.82 per cent in 2011–12 to 20.89 per cent in 2024–25, reflecting the diminishing relative importance of agriculture and allied activities in the state's economy. In contrast, the secondary sector exhibited a gradual upward trend, with its share increasing from 25.39 per cent in 2011–12 to 27.15 per cent in 2024–25. Although the increase was moderate, it indicated the growing role of industrial activities in the state's economic structure. The tertiary sector remained the dominant contributor throughout the study period and recorded a substantial increase from 43.79 per cent in 2011–12 to 51.96 per cent in 2024–25. The share of the services sector crossed the 50 per cent mark after 2019–20, highlighting its increasing importance in driving economic growth. A noticeable shift in sectoral shares was observed during the post-COVID period. While the primary sector experienced a sharp decline from 25.13 per cent in 2020–21 to 20.89 per cent in 2024–25, the secondary and tertiary sectors expanded further, suggesting an acceleration of structural transformation following the pandemic. Overall, the figure demonstrated a gradual shift away from an agriculture-dominated economic structure towards industry- and service-led growth. These findings are consistent with the broader pattern of structural transformation observed in developing economies, wherein economic development is accompanied by a declining share of agriculture and a rising contribution of industry and services (Kuznets 1973).

Growth performance of major sectors in Punjab

The growth performance of Punjab's economy during the study period has been presented in Table 1. The results indicated that all major sectors showed positive and statistically significant growth during the pre-COVID (2011-12 to 2019-20) and post-COVID (2021-22 to 2024-25) period, although considerable differences existed across sectors. During the pre-COVID period, the tertiary sector

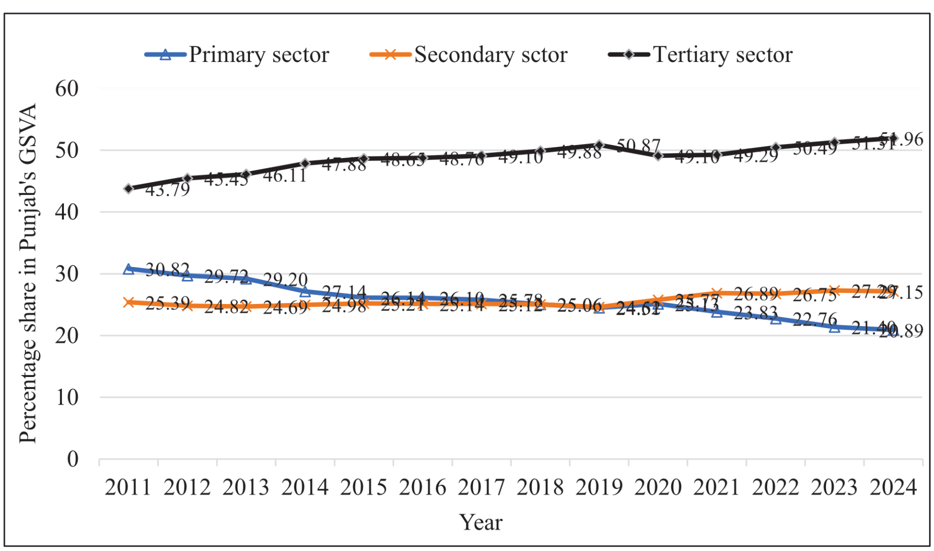


Figure 1. Changing sectoral composition of Punjab's economy, 2011-12 to 2024-25

emerged as the fastest-growing sector with a CAGR of 7.05 per cent per annum, followed by the secondary sector (5.14%) and primary sector (2.27%). The significantly lower growth rate of the primary sector reflects the mature and relatively stagnant nature of Punjab's agricultural economy, which has long been characterized by limited diversification and slowing productivity gains (Kaur and Chauhan 2024). However, after the pandemic, the growth performance showed noticeable changes. The tertiary sector maintained its position as the leading growth driver, recording a CAGR of 8.05 per cent during the post-COVID period, while the secondary sector exhibited an even stronger acceleration with a CAGR of 6.71 per cent. In contrast, the growth rate of the primary sector declined to 1.45 per cent and was only marginally significant at the 10 per cent level. This suggested that although agriculture provided resilience during the pandemic, its long-term growth potential remained constrained relative to industry and services in Punjab. The growth rate of overall GSVA was 4.82 per cent, increasingly driven by non-agricultural activities.

Table 1: Compound annual growth rate (CAGR) of major sectors in Punjab (%)

Sector	Pre-COVID (2011-12 to 2019-20)	Post-COVID (2021-22 to 2024-25)	Overall (2011-12 to 2024-25)
Primary	2.27***	1.45*	2.04***
Secondary	5.14***	6.71***	5.56***
Tertiary	7.05***	8.05***	5.92***
Total GSVA	5.24***	6.18***	4.82***

*Note: ***, **, and * indicate significance at 1, 5, and 10 per cent levels.*

Dynamics of structural transformation in Punjab's economy

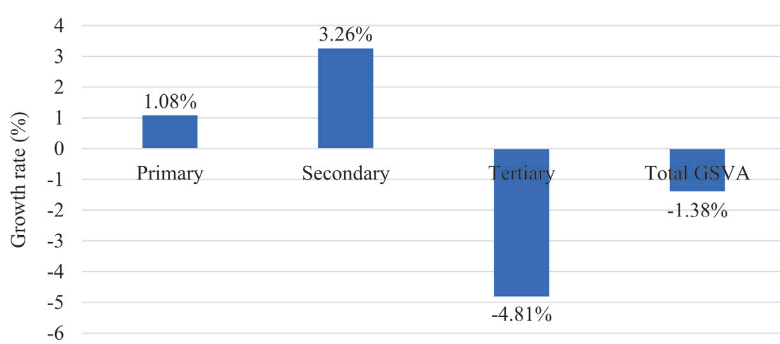
The dynamics of sectoral composition in Punjab's economy before and after COVID-19 are presented in Table 2. The results indicated a noticeable shift in the relative contribution of major sectors to Gross State Value Added (GSVA). It was found that the average share of the primary sector declined significantly from 27.17 per cent to 22.22 per cent, indicating a substantial reduction in the relative importance of agriculture and allied activities. Similarly, the average share of the secondary sector increased significantly from 25.00 per cent to 27.02 per cent, while the tertiary sector's share increased from 47.83 per cent to 50.76 per cent. These findings provided strong evidence that the pandemic period coincided with an acceleration of Punjab's structural transformation process. The expansion of the secondary and tertiary sectors in the post-pandemic period highlighted their growing importance in the state's economy and suggested a continued movement of economic activity away from the primary sector.

Table 2: Dynamics of Structural Transformation (Before and After COVID-19)

Sector	Pre-COVID Mean (%)	Post-COVID Mean (%)
Primary Share	27.17	22.22
Secondary Share	25.00	27.02
Tertiary Share	47.83	50.76

Sectoral growth patterns during the COVID-19 period

The sectoral growth performance of Punjab's economy during the COVID-19 year (2020-21) is presented in Figure 2. The results showed substantial sectoral differences in vulnerability to the pandemic-induced disruptions. The tertiary sector experienced the most severe contraction, reflecting the adverse effects of lockdowns, mobility restrictions, and reduced economic activity on trade, transport, hospitality, and other service activities. On the other hand, the primary sector displayed resilience and continued to record positive growth during the pandemic year. The relatively stable performance of agriculture may be attributed to its essential nature and uninterrupted production activities despite movement restrictions (Jaacks *et al*., 2021). Similarly, the secondary sector also maintained positive growth, although its performance varied across constituent industries. These findings suggested that while COVID-19



Note: Annual growth rates computed from 2019-20 and 2020-21 GSVA.

Figure 2. Growth performance of major sectors in Punjab's economy during 2020–21

Table 3: Post-COVID recovery index of major sectors (2019-20 = 100)

Sector	2020-21	2021-22	2022-23	2023-24	2024-25
Primary	101.08	102.32	103.89	103.77	107.39
Secondary	103.26	114.99	121.56	131.79	138.98
Tertiary	95.19	101.99	111.04	119.89	128.69

Note: Recovery index calculated using 2019-20 as base (=100).

generated a significant shock to Punjab's economy, its effect was highly uneven across sectors, with service activities bearing the largest burden of adjustments (Singh *et al*., 2021).

Post-COVID recovery of major sectors

The recovery index values for post-pandemic performance of Punjab's major sectors (Table 3) indicated notable differences in sectoral responses to the COVID-19 shock. It was found that the primary sector remained above its pre-pandemic level throughout the period, with the index increasing from 101.08 in 2020-21 to 107.39 in 2024-25. This suggested that agriculture and allied activities were relatively resilient to the disruptions caused by the pandemic and continued to expand during the period. Similarly, the secondary sector also remained above its 2019-20 level during 2020-21, recording an index value of 103.26. Thereafter, the sector showed strong growth, with the index rising steadily to 138.98 by 2024-25, which indicated the rapid expansion of manufacturing, and construction activities during the post-pandemic period. In contrast, the tertiary sector was the only major sector to experience a decline below its pre-pandemic level, with the index falling to 95.19 in 2020-21. However, the sector recovered quickly following the easing of restrictions and surpassed its pre-pandemic level in 2021-22. The index continued to rise thereafter, reaching 128.69 by 2024-25. Overall, the findings revealed that Punjab's economy exhibited considerable resilience, with all major sectors performing above their pre-pandemic levels by 2024-25. The stronger recovery of the secondary and tertiary sectors highlighted the growing importance of industries and services in Punjab's economy and their increasing role in driving economic growth of the state (Sanyal and Singh 2021).

Contribution of major sectors to GSVA growth

Table 4 presents the contribution of major sectors to the overall increase in GSVA between 2011-12 and 2024-25. The results indicated that the tertiary sector accounted for the largest share of economic expansion, contributing 61.28 per cent of the total increase in GSVA. This highlighted the central role of services in Punjab's economic growth over the study period. The secondary sector contributed 29.16 per cent of total GSVA growth, reflecting the growing importance of manufacturing, construction, and utility services. In contrast, the primary sector accounted for only 9.56 per cent of the total increase in GSVA despite its continued importance in employment and rural livelihoods. These findings suggested that Punjab's economic growth during the last decade was overwhelmingly driven by the expansion of service and industrial activities rather than agriculture (Sanyal and Singh 2021).

Table 4: Contribution of Major Sectors to Growth in GSVA During 2011-12 to 2024-25

Sector	Increase in GSVA (Rs. lakh)	Contribution to Total GSVA Growth (%)
Primary	2,125,203	9.56
Secondary	6,481,133	29.16
Tertiary	13,620,667	61.28
Total GSVA Increase	22,227,002	100.00

Source: Calculated using cumulative increase between 2011-12 and 2024-25.

Changes in sub-sectoral composition

The changes in the internal composition of major sectors presented in Table 5 revealed that within the primary sector, the share of crops declined from 60.82 per cent during the pre-COVID period to 55.34 per cent during the post-COVID period, representing a decline of 5.48 percentage points. In contrast, livestock increased substantially by 5.06 percentage points. This shift indicated increasing diversification within agriculture and highlights the growing importance of livestock as a source of agricultural value addition (Das *et al*., 2023 and Kumar *et al*., 2024). Forestry remained largely stable, while fisheries recorded the 0.36 percentage points increase among primary sub-sectors. Similarly, within the secondary sector, manufacturing remained the dominant subsector, accounting for nearly 60 per cent of sectoral GSVA in both periods. The shares of construction and utilities exhibited only marginal changes, indicating a relatively stable industrial structure. The tertiary sector experienced more noticeable internal adjustments. The share of trade and hotels declined by 2.15 percentage points, reflecting the adverse effect of the pandemic on commercial and hospitality activities. Financial services also recorded a modest decline of 0.64 percentage points. In contrast, the public administration increased by 1.48 percentage points, while the share of other services increased by 1.53 percentage points during the post-COVID period. Real estate and professional services remained largely stable over the two periods. Overall, the results indicated that the

Table 5: Average sub-sectoral composition before and after COVID-19 (%)

Sector	Sub-sector	Pre-COVID (2011-12 to 2019-20)	Post-COVID (2021-22 to 2024-25)	Change (Percentage point)
Primary	Crops	60.82	55.34	-5.48
	Livestock	29.58	34.64	5.06
	Forestry	8.68	8.73	0.05
	Fisheries	0.87	1.23	0.36
Secondary	Manufacturing	59.29	59.78	0.49
	Construction	27.67	27.28	-0.39
	Utilities	13.04	12.94	-0.10
Tertiary	Trade and hotels	23.17	21.02	-2.15
	Transport	11.75	11.45	-0.30
	Financial services	11.84	11.20	-0.64
	Real Estate and Professional services	20.16	20.24	0.08
	Public administration	11.29	12.77	1.48
	Other Services	21.79	23.32	1.53

Note: The year 2020-21 was excluded as the pandemic shock year.

structural transformation of Punjab's economy occurred not only across sectors but also within sectors, with increasing importance of livestock, public administration and other service activities and a declining relative role of crops and trade-related services.

Conclusions and Policy Implications

The present study examined the sectoral growth, structural transformation, and recovery patterns in Punjab's economy using GSVA estimates for the period 2011–12 to 2024–25. The findings revealed significant structural changes in the state's economy. It was found that the tertiary sector emerged as the fastest-growing sector both before and after the pandemic, followed by the secondary sector, while the primary sector showed comparatively slower growth. The COVID-19 pandemic affected sectors unevenly, with the service sector experiencing the sharpest contraction during 2020-21, whereas agriculture remained relatively resilient. The post-pandemic recovery was stronger in the secondary and tertiary sectors, which surpassed their pre-pandemic levels by a considerable margin. Furthermore, the tertiary sector accounted for more than 61 per cent of the total increase in GSVA during the study period, highlighting its dominant role in Punjab's economic growth. These findings suggested the need for policies aimed at promoting industrial diversification, strengthening high-value service activities, accelerating agricultural diversification towards livestock and allied enterprises, and enhancing investments in infrastructure, innovation, and skill development. Furthermore, strengthening economic resilience through sector-specific support mechanisms and promoting balanced growth across agriculture, industry, and services will be crucial for achieving sustainable, inclusive, and resilient economic development in Punjab.

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