Structural transformation in Bihar with a focus on sectoral shifts and development outcomes

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Abstract

This study examines Bihar's growth trajectory through the lens of structural transformation, reallocation of output and labour across agriculture, industry construction, and services. And to evaluate how far observed sectoral shifts have translated into improvements in development outcomes. Using the latest publicly available official statistics for GSDP, sector shares, per-capita income and state-finance aggregates, complemented with employment structure and human-development indicators, we document three stylized facts. First, Bihar's growth record is phase-specific: a long period of weak convergence in the 1990s early 2000s is followed by acceleration in the late-2000s, and a post-pandemic rebound leading up to 2023-24. Second, the recent structure of output is service-led with construction as a major co-driver, while agriculture remains the dominant employer, implying persistent productivity gaps. Third, development outcomes show improvement but remain constrained by the slow pace of high-productivity job creation and by deficits in human capital and nutrition. The study proposes a measurement framework, CAGR decompositions, a structural change index, and output-share to employment-share productivity proxies to make Bihar's transformation empirically trackable over time and to connect sectoral shifts to welfare outcomes.

Keywords: Structural transformation, Sectoral shares, Employment reallocation, GSDP, Poverty, NFHS

1. Introduction

Structural transformation is the core mechanism through which low-income economies raise average productivity: as labour moves from low-productivity agriculture to higher-productivity industry and modern services, aggregate output per worker rises even when within-sector productivity growth is modest. Standard development models and modern empirical syntheses treat this reallocation, across sectors and within sectors (traditional to modern), as central to long-run convergence. The contemporary literature also emphasizes that "good" structural change is not just a rising services share, but the creation of productive, scalable employment in sectors with learning, tradability, and strong backward—forward linkages. These ideas motivate the present study's focus on Bihar since 1991 [1, 2].

The Bihar economy is an analytically important case because it combines three features that often co-exist in late-developing regions: (i) historically weak industrialization, (ii) Very high dependence on agriculture for employment, and (iii) large-scale labour migration as an adjustment mechanism. The post-liberalization period (after 1991) did not automatically trigger rapid convergence for Bihar; instead, the growth response was delayed and uneven, reflecting governance capacity, infrastructure, human capital, and fiscal constraints. Early diagnostic work emphasized foundational constraints like public investment deficits, weak connectivity, limited private investment climate, and low urbanization, suggesting that "policy regimes" and state capacity would strongly condition any transformation path [3].

This study asks three linked questions. First, what do growth patterns look like across phases of the post-1991 period, and how do they relate to major shocks and policy regimes? Second, how has the output structure shifted, particularly across agriculture, industry/construction, and services and what does this imply about the nature of transformation? Third, do development outcomes (poverty reduction, nutrition/health indicators, and income levels) move consistently with the growth transformation narrative, or do gaps persist? While the title horizon is 1991-2025, the empirical core is anchored on the latest official years where consistent state accounts and audited fiscal numbers are publicly available; the study is explicit about series limitations and treats 2024-25 as the frontier where only advance provisional estimates may exist in some channels.

2. Data, variables, and measurement strategy

State-level long-run analysis is complicated by periodic base-year revisions (and classification changes) in national accounts. Therefore, for hard comparisons of levels and growth we prioritize the most recent official state-finance and GSDP/GSVA series available in a single consistent reporting framework, and then use older literature for contextual phase characterization (1990s/ear1y 2000s). The quantitative backbone for 2019-20 to 2023-24 comes from the State Finances Audit Report (SFAR) for Bihar, which reports GSDP at current prices, sector shares, and per-capita income at constant prices, along with audited fiscal aggregates [6].

For employment structure and labour allocation, we use the Macro and Fiscal Landscape report for Bihar, which compiles sectoral distribution of workers for 2022-23 (agriculture, services, construction, and manufacturing) and related labour-market features. [7].

For development outcomes, poverty ratios are taken from the Planning Commission's official 2011-12 poverty estimates (Tendulkar methodology), which remain the last official state poverty ratios released under that framework. [8]. Health and nutrition indicators are drawn from NFHS-5 Phase-I state fact sheets for Bihar (2019—20), including stunting, underweight, and anemia measures [9].

For mid-2000s phase characterization, we cite World Bank project documentation noting Bihar's high average growth in 2005—06 to 2009-10 (often interpreted as a mix of catch-up, governance improvements, and public investment) [4].

Let Y_t be GSDP (current prices) in year t. Let $s_{i,t}$ be sector i 's share in GSDP (percent). Let $e_{i,t}$ be sector iii's share in employment (percent). We analyze:

1. Nominal growth and nominal CAGR of GSDP;
2. Sectoral composition of GSDP;
3. A labour productivity proxy $\pi_i = \frac{s_i}{e_i}$, interpreted as *relative output per worker*
4. (normalized to economy-average = 1);
5. Development outcomes: poverty headcount (2011—12) and NFHS-5 nutrition/anaemia indicators (2019-20).

Compound Annual Growth Rate (CAGR): for any variable X from t_0 to t_1 with n years,

$$\text{CAGR} = \left(\frac{X_{t_1}}{X_{t_0}}\right)^{1/n} - 1$$

Labour productivity proxy (sector relative):

$$\pi_i = \frac{s_i}{e_i}$$

When $\pi_i < 1$, the sector employs more workers than its output share suggests (below-average output per worker); when $\pi_i > 1$, it is above-average.

Structural Change Index (SCI) (time series): if sector shares are available for two dates,

$$\text{SCI} = \frac{1}{2}\sum_i |s_{i,t_1} - s_{i,t_0}|$$

This is included as a *replicable template;* full SCI computation for 1991—2023 requires a consistent sector-share time series, which should be constructed from the official state accounts tables for each base-year series and then linked with care.

3. Growth patterns since 1991: phase narrative anchored in official evidence

The post-1991 trajectory for Bihar is better understood as a set of phases rather than a single trend. The 1990s and early 2000s are widely characterized in official diagnostics as a period of weak infrastructure, limited private investment, and state-capacity constraints under which liberalization effects were muted and labour out-migration served as a key household risk-management strategy [3].

A second phase, beginning mid-2000s, is associated with a marked acceleration. World Bank project documentation reports that Bihar's economic growth averaged about 13 percent during 2005-06 to 2009-10, substantially higher than national growth in that period often interpreted as catch-up from a low base coupled with improved public investment and governance outcomes [4]. Academic analysis connecting Bihar's growth to public finance highlights the role of rising plan expenditure, improved resource flows, and investment in infrastructure as plausible channels for the acceleration [5].

The third phase includes the 2010s and the post-pandemic rebound. Here, the structural pattern matters: growth driven by construction and services can raise GSDP rapidly, but if manufacturing remains thin, the capacity to generate stable, high-productivity jobs at scale is limited, especially when agriculture continues to absorb a large share of workers. Recent official compilations show exactly this tension: even by 2022-23, nearly half of Bihar's workers remain in agriculture, while services and construction absorb much of the remainder. [7].

The latest audited years show strong nominal expansion after the pandemic. Bihar's GSDP at current prices rises from T5, 81,855 crore (2019-20) to T8, 54, 429 crore (2023-24), implying a nominal CAGR of 10.08% over four years [6]. This top-line growth, however, must be interpreted with the inflation component and with distributional and employment lenses; that is why the sector composition and labour allocation are central to assessing "quality" of transformation.

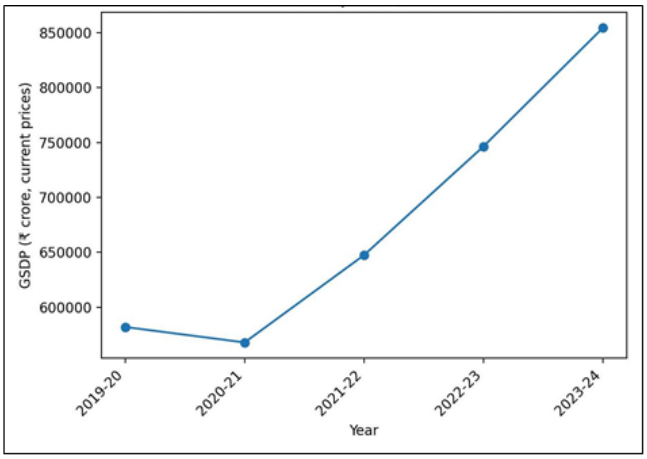

Fig 1: Bihar GSDP at current prices, 2019-20 to 2023-24

4. Sectoral shifts in output: what kind of transformation is Bihar experiencing?

The most recent audited composition reported for 2023-24 (current prices) indicates the following structure: agriculture, forestry and fishing at 21.5%, industry at 19.9%, construction at 19.5%, and services at 39.2% of GSDP [6]. This is already a "non-agricultural output" economy in composition: roughly four-fifths of output is outside agriculture. Yet the transformation question hinges on *which* non-agricultural sectors dominate: construction and services together approach 59% a pattern consistent with many late-developing regions where urbanization, public works, and service expansion outpace factory-led industrialization.

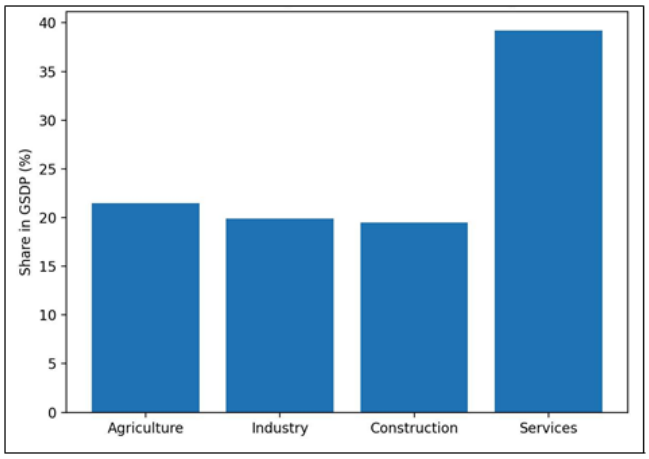

Fig 2: Sectoral composition of GSDP, 2023-24

The same official reporting shows that the rebound period is not uniform across sectors; sectoral GSVA growth rates (current prices) exhibit sharp pandemic-era movements and subsequent recovery, with agriculture showing volatility and non-agriculture showing stronger momentum in the rebound years [6]. For structural transformation assessment, the key issue is persistence: if services and construction continue to outgrow agriculture while industry does not deepen, output shares will keep shifting, but job quality and productivity catch-up may lag.

Construction-led output expansion is ambiguous in welfare terms. It can be pro-poor in the short run if it absorbs low-skill labour and raises rural non-farm wages; it can also be fiscally and cyclically sensitive, with limited productivity growth compared to manufacturing. Therefore, a serious transformation diagnosis must jointly observe (i) construction share trends, (ii) capital formation proxies, (iii) manufacturing employment share, and (iv) fiscal sustainability of public capex. This study provides the measurement scaffolding, and it locates the most credible public series for each component, but a full 1991—2025 linked time-series build remains a separate replication task due to base-year breaks.

5. Labour reallocation and productivity gaps: output shares v/s employment shares

A core empirical signature of incomplete transformation is the persistence of agriculture as the main employer even after its output share has fallen. Official compilation for Bihar reports that in 2022-23, workers are predominantly concentrated in agriculture, forestry and fishing (49.6%), followed by services (28.9%) and construction (18.4%), while manufacturing accounts for only 5.7% of workers [7].

Using the latest output shares (2023-24) and employment shares (2022-23), we compute a simple relative productivity proxy $\pi_i = s_i/e_i$ for the three comparable aggregates (agriculture, construction, services). The results are stark and policy-relevant:

- Agriculture: $\pi \approx 0.43$ (output share far below employment share)
- Construction: $\pi \approx 1.06$ (near economy-average)
- Services: $\pi \approx 1.36$ (above-average)

These are not "true productivity" estimates (they use different years and broad aggregates), but they are directionally informative: Bihar's labour is still heavily concentrated in a sector whose output share is much smaller, which mechanically constrains average incomes unless either (a) labour exits agriculture faster, or (b) agricultural productivity rises sharply, or (c) remittances and transfers offset the gap.

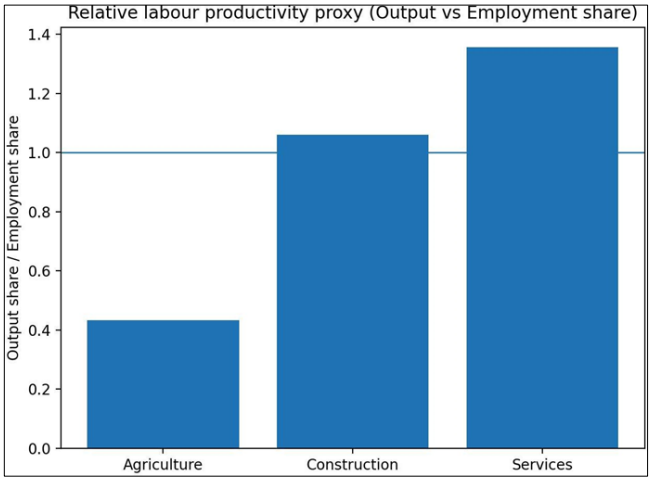

Fig 3: Relative labour productivity proxy

This pattern aligns with the structural change literature's warning that growth can coexist with weak transformation if labour does not move into high-productivity activities at scale. In such contexts, services growth may be "dual": a modern segment with high productivity and a large informal segment with low productivity. This is why manufacturing's small employment share is consequential: factory expansion historically provided one of the most scalable pathways for mass productivity gains, especially for low- and semi-skilled workers [1, 2].

6. Development outcomes: poverty, human capital, and the growth welfare link

The Planning Commission's 2011-12 poverty estimates place Bihar's poverty headcount ratio at 33.74% overall, with 34.06% rural and 31.23% urban (Tendulkar methodology) [8]. Even acknowledging that these are dated, they remain a critical structural baseline: a transformation path starting from such high poverty must be judged by how effectively it converts growth into broad-based improvements in nutrition, schooling, and health outcomes that shape the next generation's productivity.

NFHS-5 (2019-20) documents improvement in some child nutrition indicators compared to NFHS-4, but levels remain high. For Bihar, children under 5 who are stunted are 42.9% (down from 48.3%), wasted 22.9% (vs 20.8%), and underweight 41.0% (vs 43.9%). Anaemia remains extremely high: children 6-59 months anaemic 69.4% (vs 63.5%), and all women 15W9 anaemic 63.5% (vs 60.3%) [9].

These indicators matter for structural transformation for two reasons. First, they directly depress effective labour productivity via physical and cognitive impacts. Second, they interact with sectoral structure: low-productivity agriculture

and informal services typically provide weaker platforms for sustained human capital investment unless complemented by strong public health and nutrition systems. In that sense, the growth story and the development outcomes story are inseparable: incomplete transformation can slow improvements in human development, and weak human development can slow transformation.

Per-capita income at constant prices reported in the state finance audit framework rises from Y47, 249 (2019-20) to Y66,828 (2023-24), implying a real CAGR of 9.05% over four years. [6]. This is a strong rebound-period signal; however, sustained convergence depends on whether productive employment expands, not only on output growth.

7. Fiscal capacity and the political economy of transformation

Structural transformation is not sectoral arithmetic alone; it is also a state capacity and public-finance problem. Bihar's ability to build infrastructure, support urban systems, and invest in human development depends on fiscal space and on the quality of public spending. The SFAR provides audited indicators such as revenue deficit, fiscal deficit trends, debt dynamics, and expenditure composition alongside GSDP [6]. Public-finance research on Bihar argues that improvements in resource flows and expenditure management were plausibly linked to the mid-2000s acceleration [5].

From a transformation perspective, three fiscal channels matter most: (i) capital expenditure that reduces logistics and connectivity costs (crowding in private investment), (ii) recurrent spending that raises human capital (health, nutrition, schooling quality), and (iii) institutional spending that strengthens compliance, land markets, and urban governance conditions under which manufacturing and modern services can scale. The empirical implication is straightforward: even if sector shares shift mechanically toward services, the quality of transformation hinges on whether the state can build the complementary assets that convert services growth into high-productivity tradable and skill-intensive activities.

8. Discussion: interpreting Bihar's transformation pattern

The evidence assembled here supports a nuanced diagnosis. Bihar's output structure is no longer agriculture-dominant; by 2023-24, services and construction together constitute the majority of GSDP [6]. Yet employment remains heavily agricultural even as late as 2022-23 [7]. This mismatch is the signature of incomplete structural transformation and explains why development outcomes remain stressed despite growth phases.

The development-outcomes data reinforce this interpretation. High poverty at the last official benchmark year (2011-12) and persistently high stunting and anemia in 2019-20 suggest that the growth-to-welfare transmission is constrained by human capital deficits and by the limited availability of stable high-productivity jobs for the bottom half of the distribution [8, 9]. Finally, the phase narrative matters. The mid-2000s acceleration shows that Bihar can grow rapidly under favorable governance and investment conditions [4]. The policy task is to convert such growth episodes into durable structural change specially by deepening manufacturing and modem tradable services and by raising agricultural productivity so that labour can exit agriculture without rural distress.

Table 1: Bihar GSDP (current prices) and growth

Year	GSDP (In crore, current prices)	GSDP growth (current prices, %)
2019-20	5,81,855	11 05
2020-21	5,67,814	7.40
2021-22	6,47,394	14.01
2022-23	7,46,417	15.29
2023-24	8,54,429	14.47

Values are T crore; growth rates are as reported in the audited state finance framework [6].

Table 2: Sectoral composition of GSDP (2023-24)

Sector	Share in GSDP (%)
Agriculture, forestry & fishing Industry	21.5
Construction	19.9
Services	19.5
Share in GSDP (%) 21.5	39.2

Table 3: Employment structure (2022-23) and productivity proxy

Sector	Employment share (2022-23, %)	Output share (2023-24, %)	$\pi = s/e$
Agriculture	49.6	21.5	0.43
Construction	18.4	19.5	1.06
Services	28.9	39.2	1.36

Employment shares from Bihar macro-fiscal compilation; productivity proxy uses 2023-24 output shares for comparable sectors [6, 7].

Table 4: Poverty baseline (2011-12, Tendulkar)

Geography	Poverty headcount ratio (%)
Rural Bihar	34.06
Urban Bihar	31.23
Total Bihar	33.74

Official poverty ratios [8].

Table 5: Key NFHS-5 outcomes for Bihar (2019-20)

Indicator	NFHS-5 (2019-20)	NFHS-4 (2015-16)
Children under 5 stunted (%)	42.9	48.3
Children under 5 wasted (%)	22.9	20.8
Children under 5 underweight (%)	41.0	43.9
Children 6-59 month's anaemic (%)	69.4	63.5
Women 15W9 anaemic (%)	63.5	60.3

Selected indicators with NFHS-4 comparison [9].

9. Conclusion

Bihar's post-1991 experience illustrates both the possibilities and the limits of growth without deep employment transformation. The latest audited evidence shows rapid

nominal expansion and a service-led output structure with construction as a major co-driver. Yet labour remains heavily concentrated in agriculture, implying persistent productivity gaps. Development outcomes, poverty baseline and NFHS indicators show progress but highlight binding constraints in nutrition and human capital that can slow transformation itself. The policy implication is not "services versus agriculture" as a slogan, but an integrated strategy: raise agricultural productivity, expand manufacturing and modern tradable services, and strengthen human development so that labour reallocation becomes both feasible and welfare-improving. The measurement framework used here is designed to make future updates to 2024-25 straightforward once final official tables are released.

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