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AN ANALYSIS OF OCCUPATIONAL SHORTAGE IN INDIA IN POST COVID PANDEMIC PERIOD

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ABSTRACT

The dynamics of occupational shortages in India present a complex and multidimensional challenge that permeates various industrial sectors and economic domains. Despite India's robust economic growth trajectory and demographic advantage of a substantial youth population, the nation faces significant challenges in skilled Labour availability, creating critical gaps in various occupational sectors. This empirical investigation endeavours to analyse these occupational shortages in the post-COVID-19 landscape, utilizing comprehensive data from the Occupational Shortage Index published by the Ministry of Labour and Employment, with particular emphasis on state-wise and regional variations. The longitudinal analysis reveals a noteworthy pattern characterized by an initial decline in occupational shortages followed by a recent upward trajectory, suggesting evolving Labour market dynamics. The research identifies significant sectoral heterogeneity in Labour market conditions. Notable findings indicate substantial disguised employment in specific sectors, including personal care services, educational professions, and agricultural-fishery domains. Conversely, acute shortages are observed in professional categories, particularly among Chief Executives, Senior Officials, Legislators, and healthcare practitioners, indicating structural imbalances in high-skill sectors. The spatial analysis demonstrates pronounced regional disparities in Labour market conditions across India. The central region exhibits the most severe occupational shortages, while the northern region demonstrates excess Labour availability. At the state level, Madhya Pradesh, Uttar Pradesh, and Maharashtra emerge as epicentres of occupational shortages, whereas Telangana, Rajasthan, and Kerala manifest surplus Labour conditions. These geographical variations suggest underlying structural differences in regional Labour markets and economic development patterns. To address these structural imbalances, the research advocates for a comprehensive policy framework encompassing multiple interventions. These include the enhancement of skill development initiatives, systematic educational reforms, promotion of regionally balanced employment generation, and strengthening of public-private partnerships. These strategic interventions are deemed crucial for optimizing the alignment between Labour market supply and demand dynamics. The findings contribute significantly to understanding India's post-pandemic Labour market structure, offering evidence-based insights for policy formulation aimed at addressing occupational shortages while leveraging the nation's demographic dividend within its rapidly evolving economic landscape.

KEYWORDS: *Occupational Shortage, Occupational Shortage Index, Regional Disparity*

INTRODUCTION

India faces a significant occupational shortage due to a mismatch between the skills of job seekers and industry requirements, exacerbated by an education system that focuses more on theoretical knowledge than practical skills (Chand & Singh, 2022). This gap is especially pronounced in sectors like technology, healthcare, and advanced manufacturing. The lack of emphasis on vocational training, rural-urban disparities, and an aging workforce in certain sectors further contribute to the issue. Despite government initiatives like the Skill India Mission, the shortage remains a barrier to economic growth. A Labour market indicator that measures supply and demand for certain occupations is the Occupational Shortage Index (OSI). It usually shows which professions are lacking employees in comparison to the demand for those positions (Ministry of Labour and Employment, 2023). The OSI essentially assists in identifying occupations or industries where there may be a large number of open positions but a lack of suitable applicants to fill them, potentially signaling a skilled Labour shortage. Although the methodology used to calculate the index may vary significantly among nations and organizations, it frequently examines elements like unemployment rates in particular industries. The term labour shortage has no universally agreed upon definition. It sometimes refers to a shortfall in the total number of individuals in the labour force, and sometimes denotes the possible mismatch between workers and jobs in the economy. (Barnow , Trutko, & Piatak, 2013) The previous studies on occupational shortages have explored various facets of this phenomenon, including its identification, measurement, and impact and makes an important contribution to understanding labor dynamics in modern supply chains. (Tang, Mao, Wang, & Chen, 2022) provides valuable insight into American supply chain labor shortages by distinguishing between skilled and unskilled workers - an angle previous studies have not fully explored. Using a mixed-methods approach, the study reveals that these two worker categories face different causes of labor shortages and create distinct impacts on supply chains. The research convincingly argues that addressing supply chain labor issues requires separate strategies for skilled and unskilled workers, rather than a unified approach. (Horbach & Rammer, 2020) make a significant contribution to understanding how firms adapt their hiring

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strategies when facing labor shortages. Building upon (Barron, Berger & Black's, 1997) model, the research examines how companies adjust their recruitment approaches between extensive search (reaching more candidates) and intensive search (evaluating candidates more thoroughly). The study yields three key insights: firms using extensive search should reduce investment during shortages, while those using intensive search should increase investment if the shortage is severe enough; intensive search becomes more valuable when resources are limited; and labor shortages generally push firms toward extensive search strategies. The paper's novel finding that changes in recruitment investment patterns could serve as an indicator of labor shortages provides a practical tool for identifying market conditions. While the research is primarily theoretical, it offers valuable practical implications for both business strategy and labor market analysis.

(Cassang & Carvalho, 2020) focused on an empirical investigation into labor market search strategies amid workforce shortages offers significant theoretical contributions by extending the Barron, Berger & Black (1997) framework. The research delineates the dichotomy between extensive and intensive search approaches, yielding three principal findings: (1) firms should reduce extensive search investments regardless of shortage intensity, while intensive search investments become optimal under severe shortages; (2) resource-constrained firms derive greater utility from intensive search strategies; and (3) labor shortages fundamentally alter the relative importance of extensive search methodologies. The study's theoretical implications suggest that variations in employers' search strategy investments could serve as potential indicators of labor market shortages.

(Dawson, Rizoiu, Johnston, & Williams, 2020) presents an innovative Machine Learning approach to predict occupational labor shortages using Australian data from 2012-2018. The research combines an extensive dataset of 1.3 million job advertisements with official labor force metrics to predict labor shortages across 132 occupations. Using XGBoost classification, the model achieves impressive accuracy with macro-F1 scores up to 86%. Perhaps the most significant finding is that job advertisement data proved to be the strongest predictor of year-over-year changes in labor shortages, validating the use of job ads as a proxy for labor demand. The study's predictive framework offers practical value for policymakers and businesses in workforce planning, though it would be interesting to see if these findings hold true in other countries or time periods.

(Sumption, 2022) critically examines the UK's approach of using "shortage occupations" to determine work visa eligibility post-Brexit. While this policy gives preferential treatment to middle and high-skilled jobs deemed to have shortages by allowing lower wage thresholds, the paper argues this approach is fundamentally flawed. The core issue is that labor shortages are inherently difficult to measure accurately, with different methodological approaches yielding conflicting results. This makes it risky to base immigration policy heavily on shortage lists, as they may not truly reflect labor market realities. The paper suggests that while targeting shortage occupations is politically attractive, the practical implementation challenges make it an unreliable foundation for immigration policy. (Klein & Smith, 2024) analysis of Denmark's labor market dynamics reveals structural inefficiencies despite robust macroeconomic indicators. The post-pandemic economic recovery has exposed persistent structural challenges, including delayed workforce entry among youth demographics, evolving skill requirements, and suboptimal migrant integration mechanisms. The research proposes multifaceted policy interventions: labor income tax rate adjustments, age-appropriate workplace modifications, educational system reforms, and enhanced migration integration frameworks. The study emphasizes the imperative of developing adaptive educational infrastructure to address contemporary transitions in demographics, digitalization, and environmental sustainability, with particular emphasis on strengthening vocational education pathways.

(Satishkumar & Umesh, 2018) empirically examined agricultural labor shortage mitigation strategies in selected Indian districts (Sindhanur and Mandya) utilized a randomized sampling methodology (n=240) to identify primary adaptation mechanisms. The research findings indicate four predominant strategic responses: agricultural mechanization implementation, transition to labor-efficient crop selection, extra-village labor recruitment, and intensified familial labor utilization. The study's findings emphasize the efficacy of mechanization interventions and recommend policy initiatives to enhance awareness and accessibility of custom hiring centers through subsidized self-help group frameworks. This research contributes to the broader understanding of agricultural labor market adaptations in developing economies.

(Mehrotra, 2018) identifies several critical issues in India's labor market. It first debunks the common myth that 12 million people enter India's workforce annually. It then highlights two major crises: 1) agricultural workers wanting but unable to transition to non-agricultural work since 2011-12, and 2) increasingly educated youth struggling to find non-agricultural employment despite their aspirations. A particular concern is the growing number of educated young women who have achieved gender parity in secondary education but face limited non-agricultural job prospects. The paper provides a detailed analysis of these issues across five sections, examining the demographic dividend myth, rural distress, youth unemployment, challenges facing educated women, and concluding with six recommended steps for job creation in both private and public sectors, including a proposal for social insurance programs for unorganized sector workers.

The current study aims to contribute by bridging the gap to the existing literature by analyzing the occupational shortages in the post-COVID-19 landscape, utilizing comprehensive data from the Occupational Shortage Index published by the Ministry of Labour and Employment, with particular emphasis on state-wise and regional variations.

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DATA AND METHODOLOGY

Data Source

The OSI is developed by using Periodic Labour Force Survey data. The PLFS collects data on Employment and Unemployment in India and is conducted by the Ministry of Statistics & Programme Implementation (MoSPI) since 2017-18. The survey period is July to June every year. The latest available PLFS Report is for the period July 2022 to June 2023. The objective of PLFS is primarily twofold: To estimate the key employment and unemployment indicators (viz. Worker Population Ratio, Labour Force Participation Rate, Unemployment Rate) in the short time interval of three months for the urban areas only in the 'Current Weekly Status' (CWS). To estimate employment and unemployment indicators in both 'Usual Status' (ps+ss) and CWS in both rural and urban areas annually.

Variable Selection

Instead of direct measurement of skill characteristics, skill proxies (occupation) are used for calculation of OSI. The OSI comprise of following 4 sub-indicators:

- Hourly Wage Growth
- Employment Growth
- Growth in Hours Worked
- Share of Under-qualified Workers

$$Occupational\ Shortage\ Index\ (OSI) = (Weight_wage * Wage_Growth) + (Weight_employment * Employment_Growth) + (Weight_hours * Hours_(worked_growth\ )) + (Weight_underqualified * Proportion_Underqualified)$$

These Sub-Indicators are linearly combined based on the predefined weights to compute the Occupational Shortage Index.

Assigning Weight to Indicators

Assignment of weights and aggregation of the weighted index values were two vital and conceptually complex issues that were addressed before integrating the indicators into the Occupational shortage index. Weights indicate the relative contribution of indicators in influencing the overall performance of a dimension and the possible trade-off among the factors towards the ultimate policy objective. The selection and assignment of weights makes a significant difference to the final ranking of entities. The following technique was used to calculate the weight of each indicator.

$$W_i = \frac{k}{\sqrt{Var(Y_{ij})}}$$

Where, $K = \frac{1}{\left\{\sum_{i=1}^{I} \frac{1}{\sqrt{Var(Y_{ij})}}\right\}}$

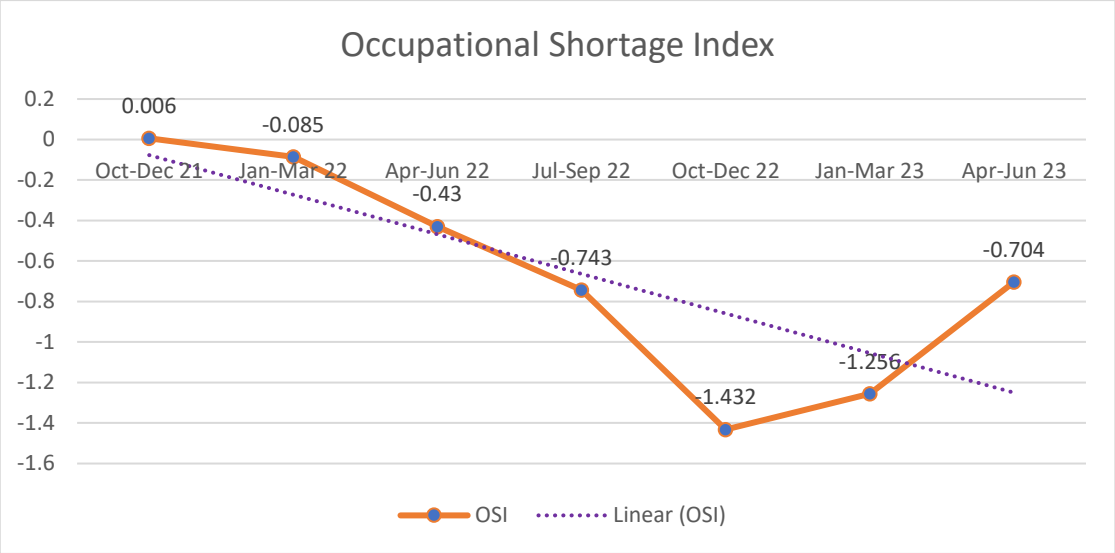
Where weight (Wi) is (0<W > 1 and ∑mi=1Wi = 1) that is assigned to the ith variable. Var (Yij) has statistical variation across the standardized indices for all variables.

High OSI indicates Shortage/higher demand of workers within a particular occupation, which may result in higher wages, more job opportunities. Low OSI indicates Surplus/less demand of workers, which may lead to lower wages, fewer job opportunities, and increased competition for available positions.

The occupation shortage index would be a valuable tool for policymakers, businesses, and educational institutions to make informed decisions about workforce planning, education, and training programs. It would serve as a foundation for informed decision-making and action in the Labour market ecosystem. By identifying areas with labour shortages, stakeholders can work towards developing targeted solutions to address these gaps and ensure a well-balanced and skilled workforce. The regular updation of the index reflects changes in the labour market and economic conditions.

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An Analysis of Occupational Shortage Index Dynamics: 2021-2023



Source: Ministry of Labour and Employment

The temporal analysis of the Occupational Shortage Index (OSI) reveals significant fluctuations and structural shifts in Labour market conditions from the fourth quarter of 2021 through the second quarter of 2023. The index exhibits a complex trajectory, initiating from a marginally positive coefficient of 0.006 in Q4 2021, followed by a systematic deterioration in subsequent periods. The longitudinal data demonstrates a pronounced negative trajectory during 2022, with sequential quarterly declines manifesting increasingly severe shortage conditions. The index registered -0.085 in Q1 2022, deteriorating to -0.43 in Q2 2022, and further declining to -0.743 in Q3 2022. This downward progression culminated in a substantial nadir of -1.432 in Q4 2022, representing the most acute shortage conditions observed within the measurement period.

However, the empirical evidence suggests a marked inflection point entering 2023, characterized by a significant amelioration in shortage conditions. The index exhibited initial recovery to -1.256 in Q1 2023, followed by a more substantial improvement to -0.704 in Q2 2023. This recovery phase represents a notable deviation from the linear regression trend line, potentially indicating a structural shift in Labour market dynamics. The linear trend analysis, represented by the dotted regression line, indicates a persistent negative coefficient throughout the observation period. Nevertheless, the actual data points demonstrate considerably higher volatility, particularly evidenced by the precipitous decline in Q4 2022 and the subsequent robust recovery phase. This divergence between the linear projection and observed values suggests the presence of complex underlying factors influencing occupational availability, possibly attributable to policy interventions, structural market adjustments, or macroeconomic variables during this period.

Occupation wise shortage Index Values

Occupations	Oct-Dec 21	Jan-Mar 22	Apr-Jun 22	Jul-Sep 22	Oct-Dec 22	Jan-Mar 23	Apr-Jun 23
Administrative And Commercial Managers	-6.35	-8.44	-10.26	-10.87	-11.28	-11.36	-10.98
Agricultural Forestry And Fishery Labourers	-2.94	-3.63	-4.49	-4.34	-4.52	-3.33	-2.87
Assemblers	-1.64	-0.24	0.30	0.22	0.00	-0.40	-0.32
Building And Related Trade Workers Excluding Electricians	1.66	2.04	2.25	2.70	2.27	2.57	2.13
Business And Administration Associate Professionals	-6.02	-6.30	-6.68	-7.09	-7.76	-7.38	-7.40
Business And Administrative Professionals	-5.12	-5.53	-5.95	-6.57	-6.62	-5.67	-3.76
Chief Executives Senior Officials And Legislators	12.53	12.90	12.74	12.40	10.98	10.54	10.29
Cleaners And Helpers	1.52	1.44	0.69	0.39	-0.67	-0.64	1.08
Customer Services Clerks	-0.85	-0.90	-1.32	-1.34	-2.32	-2.43	-1.33
Drivers And Mobile Plant Operators	7.39	7.59	8.19	8.81	8.71	9.28	9.17
Electrical And Electronics Trades Workers	-1.00	-1.66	-1.47	-2.61	-3.08	-2.43	-2.94

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Food Preparation Assistance	0.85	0.66	0.14	0.02	-0.08	-0.01	1.60
Food Processing Woodworking Garments And Other Craft And Related Other Workers	-1.42	-1.88	-2.11	-2.88	-4.22	-4.89	-6.27
General And Keyboard Clerks	-1.62	-0.73	-0.13	-0.52	-1.38	-1.21	-0.09
Handicraft And Printing Workers	4.39	4.84	4.98	4.80	4.00	3.02	2.38
Health Associate Professionals	-4.60	-5.67	-7.10	-7.76	-8.54	-9.43	-7.88
Health Professionals	-2.88	-3.90	-4.52	-5.30	-5.92	-5.79	-5.72
Hospitality Retail And Other Service Managers	4.89	4.48	3.37	3.52	2.99	2.86	4.00
Information And Communication Technology Professionals	-0.64	-0.14	0.50	-0.73	-1.33	-0.78	0.13
Information And Communication Technicians	-1.00	-1.65	-2.04	-2.76	-2.98	-2.91	-0.93
Labourers In Mining Construction Manufacturing And Transport	-2.37	-2.06	-1.38	-1.70	-1.98	-1.37	-1.35
Legal Social And Cultural Professionals	5.60	5.02	4.58	3.70	3.70	3.62	3.60
Legal Social Cultural And Related Associate Professionals	-0.30	0.02	-1.98	-2.13	-3.24	-3.35	-3.44
Market Oriented Skilled Agricultural	-0.25	0.47	0.81	0.15	-0.32	0.02	-0.17
Market Oriented Skill Forestry Fishery And Hunting Workers	-1.48	-1.84	-3.32	-3.69	-4.45	-4.72	-4.42
Metal Machinery And Related Trade Workers	3.53	4.12	4.27	4.36	3.05	4.17	5.29
Numerical And Material Recording Clerks	1.13	2.58	2.47	2.30	1.41	2.36	3.49
Other Clerical Support Workers	2.22	1.68	1.73	1.17	0.24	0.03	-0.40
Personal Care Workers	-8.01	-7.65	-9.29	-10.02	-10.66	-10.11	-9.82
Personal Service Workers	2.93	2.41	2.07	2.50	2.25	2.65	3.53
Production And Specialized Services Managers	-3.05	-3.73	-4.21	-4.68	-5.28	-5.14	-3.22
Protective Service Workers	-6.25	-6.84	-6.80	-7.39	-8.18	-8.12	-7.74
Refuse Workers And Other Elementary Workers	5.11	6.25	6.24	5.98	5.12	4.98	3.61
Sales Worker	3.94	4.16	4.94	5.43	4.98	5.12	5.01
Science And Engineering Associate Professionals	2.35	2.49	2.57	2.54	1.53	1.61	1.85
Science And Engineering Professionals	2.54	2.87	2.19	1.99	1.34	1.96	5.21
Stationary Plant And Machine Operators	-0.21	-1.18	-1.99	-1.51	-2.32	-1.83	-0.83
Street And Related Sales And Services Workers	2.90	2.08	2.11	2.05	1.33	1.20	2.20
Subsistence Farmers Fishers Hunters And Gatherers	-1.23	-1.53	-0.55	-1.31	-1.02	-0.77	-1.03
Teaching Professionals	-6.00	-5.62	-6.03	-6.60	-7.32	-7.14	-7.06

Source: Ministry of Labour and Employment

An analysis of occupational Labour market dynamics from Q4 2021 to Q2 2023 reveals significant variations across different professional sectors, where negative values indicate Labour surplus and positive values represent shortages. The data demonstrates notable patterns of persistent shortages in specific occupational categories, with Chief Executives, Senior Officials, and Legislators exhibiting the most substantial shortage (ranging from +12.53 to +10.29), although showing a gradual decline over the observed period. Similarly, Drivers and Mobile Plant Operators display an increasing shortage trend (from +7.39 to +9.17), while Sales Workers maintain consistent shortage levels (approximately +4 to +5), indicating sustained demand exceeding available workforce. Conversely, several sectors exhibit significant Labour surpluses. Administrative and Commercial Managers show the most pronounced surplus, deteriorating from -6.35 to -10.98. Personal Care Workers maintain a substantial oversupply (-8.01 to -9.82), and Health Associate Professionals demonstrate an increasing surplus trend (-4.60 to -7.88). These patterns suggest structural imbalances in these sectors' workforce supply and demand dynamics. The data also highlights interesting fluctuations in certain occupational categories. Information and Communication Technology Professionals oscillate between slight surplus and shortage (-

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0.64 to +0.50), while Science and Engineering Professionals show an increasing shortage, particularly in the latest period (reaching +5.21 in Apr-Jun 23). Cleaners and Helpers demonstrate notable volatility, shifting between surplus and shortage conditions (+1.52 to -0.67 to +1.08). Additionally, Food Processing and Related Workers exhibit a steadily worsening surplus (-1.42 to -6.27), while Business and Administrative Professionals show improvement in their surplus conditions (-5.12 to -3.76).

These patterns suggest significant structural imbalances in the Labour market, particularly evident in the contrasting conditions between executive and operational roles versus administrative, healthcare, and personal care sectors. Such disparities might indicate underlying mismatches between educational output and market demands, or reflect broader structural changes occurring across various industries. The dynamic nature of these changes highlights the complexity of Labour market adjustments and the potential need for targeted interventions in workforce development and educational planning.

State wise Occupational Shortage Index

States/UTs	Oct-Dec 21	Jan-Mar 22	Apr-Jun 22	Jul-Sep 22	Oct-Dec 22	Jan-Mar 23	Apr-Jun 23
Jammu &Kashmir	1.00	1.57	3.96	2.69	2.84	2.30	3.03
Himachal Pradesh	-3.34	-4.05	-2.19	-3.25	-3.95	-2.81	-3.61
Punjab	0.98	1.19	-0.98	-1.73	-1.49	-1.97	-3.64
Chandigarh	0.85	0.92	-0.11	0.28	-0.07	1.74	-1.07
Uttarakhand	5.46	6.47	3.99	4.92	4.35	5.38	4.87
Haryana	-3.41	-3.12	-3.40	-4.59	-4.42	-6.50	-6.17
Delhi	0.78	1.68	0.06	0.17	0.48	-1.91	0.53
Rajasthan	-6.42	-7.58	-7.60	-9.18	-8.99	-8.63	-7.72
Uttar Pradesh	4.26	3.50	3.13	3.58	3.37	3.03	4.17
Bihar	0.10	1.00	0.77	3.18	1.81	5.30	8.60
Sikkim	1.84	-0.56	-1.19	-3.10	-2.40	-2.75	1.14
Arunachal Pradesh	9.49	9.30	9.96	8.63	11.95	11.25	10.04
Nagaland	-3.89	-4.34	-4.85	-7.13	-7.52	-10.11	-8.64
Manipur	-0.39	0.71	-0.53	-3.41	-2.23	-4.72	-0.97
Mizoram	0.98	0.13	-0.63	-0.35	-1.19	-1.42	-0.81
Tripura	-3.27	-2.65	-4.20	-6.08	-6.10	-5.45	-4.38
Meghalaya	-5.11	-6.26	-4.78	-5.45	-7.25	-5.88	-7.14
Assam	-2.11	0.69	0.14	2.45	-2.80	-2.88	-0.99
West Bengal	1.16	1.65	1.91	1.38	0.44	0.60	0.15
Jharkhand	-1.63	0.32	0.57	-3.06	-3.61	-2.30	-1.18
Odisha	3.18	2.02	3.35	-0.05	1.10	0.39	1.72
Chhattisgarh	-0.73	-2.91	-3.71	-1.98	-3.99	-5.30	-6.09
Madhya Pradesh	7.63	4.09	2.48	3.18	3.63	5.42	5.06
Gujarat	-0.77	-1.12	-2.54	-1.80	-1.64	-1.72	-1.40
D & N. Haveli & Daman & Diu	0.76	0.47	-0.39	-0.42	-1.54	0.94	-0.34
Maharashtra	5.66	5.46	2.25	4.34	4.65	4.57	5.38
Andhra Pradesh	-1.33	-1.13	-1.77	-2.49	-4.32	-2.28	-1.9
Karnataka	0.69	-1.11	-0.56	-0.84	-0.09	-0.48	-1.46
Goa	-1.25	1.02	0.21	0.16	-1.95	-4.14	-0.90
Lakshadweep	-0.50	-1.00	-0.53	0.89	0.65	-0.36	-0.57
Kerala	-2.10	-1.46	-3.69	-3.80	-2.88	-2.95	-4.04
Tamil Nadu	2.50	1.83	2.67	3.83	3.09	3.42	4.61
Puduchery	-1.15	-1.38	-1.24	1.64	-4.54	-0.14	0.17
Andaman & N. Island	-0.66	1.84	-0.11	1.25	-3.61	-2.99	-2.33
Telangana	-6.88	-9.09	-8.91	-9.19	-10.50	-9.95	-8.29
Ladakh	-2.15	-1.16	2.98	-1.45	-2.84	-1.94	-1.20
Total	0.006	-0.085	-0.43	-0.743	-1.432	-1.256	-0.704

Source: Ministry of Labour and Employment

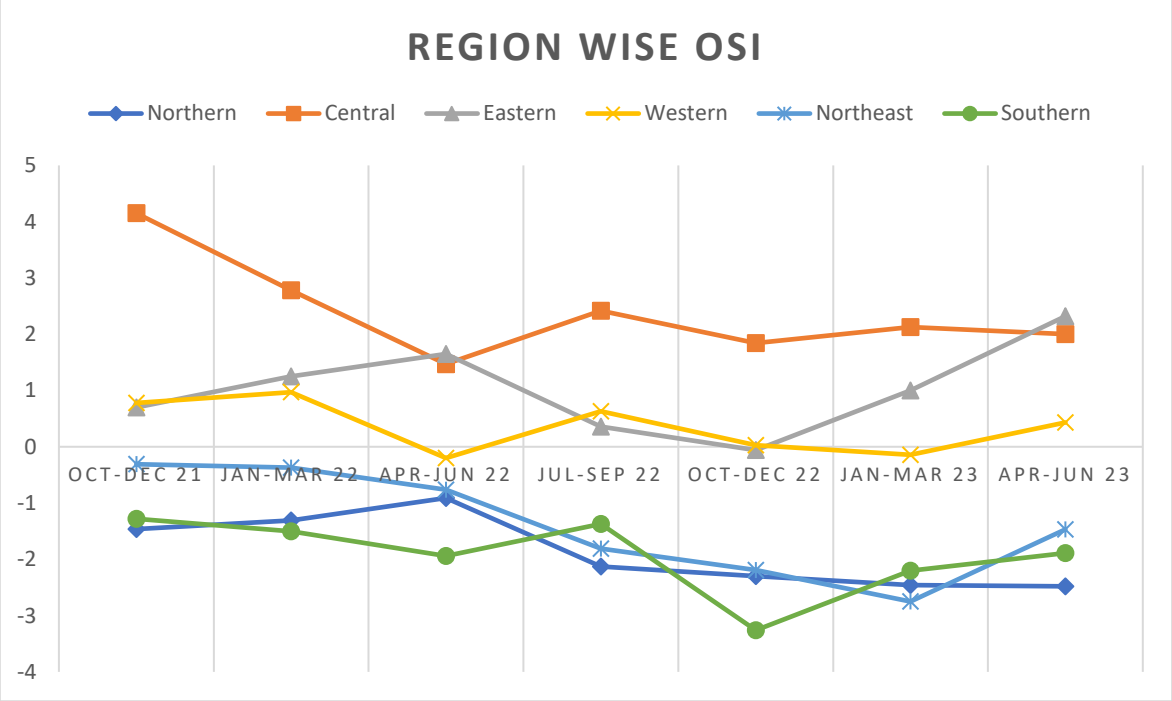
The labor market indicators across Indian states and Union Territories from October 2021 to June 2023 reveal fascinating patterns of occupational surpluses and shortages, where negative values indicate excess labor supply and positive values represent excess labor demand. The data paints a complex picture of regional disparities and evolving labor market dynamics across the country. Looking at regions with persistent labor shortages, Arunachal Pradesh stands out with consistently high positive values, averaging

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around +10.09, indicating a significant and sustained demand for workers. Similarly, Uttarakhand maintains steady positive values averaging +5.0, while Tamil Nadu demonstrates moderate but consistent labor shortages with an average of +3.14. These patterns suggest structural factors driving continuous labor demand in these regions. In contrast, several states exhibit significant labor surpluses. Telangana shows the most severe surplus with an average of -8.97, followed by Rajasthan with -8.02. Nagaland also displays a concerning trend of increasing labor surplus over the period. These persistent surpluses might indicate underlying structural challenges in these regional economies, possibly relating to job creation or skill mismatches.

The national aggregate tells an interesting story of gradual transformation, moving from near equilibrium (0.006) in October-December 2021 to a mild surplus (-0.704) by April-June 2023, with the most pronounced surplus (-1.432) occurring in October-December 2022. This trajectory suggests a broader shift in the country's labor market dynamics during this period. Some states show notable transitions during this timeframe. Bihar, for instance, demonstrates a remarkable shift from minimal shortage (0.10) to significant shortage (8.60), possibly indicating rapid economic expansion or changing labor market conditions. Delhi's labor market exhibits considerable volatility, fluctuating between shortage and surplus conditions, reflecting its dynamic urban economy.

This Graph provide a comprehensive interpretation of the regional labor market dynamics across India from October 2021 to June 2023. The data reveals distinct regional patterns in India's labor market conditions, with clear divergences between different geographical zones. The Central region consistently maintains a positive position, indicating persistent labor shortages throughout the period, though with a gradual moderation from a high of 4.15 in October-December 2021 to 2.00 in April-June 2023. This sustained shortage suggests robust economic activity and continued demand for workers in the central states.



Source: Ministry of Labour and Employment

The Eastern region shows an interesting trajectory, generally maintaining labor shortages with positive values throughout most periods. Starting at 0.70 in October-December 2021, it strengthened to 2.32 by April-June 2023, indicating an increasing demand for workers. However, it briefly dipped into slight surplus territory (-0.06) during October-December 2022, suggesting temporary labor market adjustments. The Western region demonstrates relatively stable conditions, fluctuating between modest shortages and surpluses. Beginning with a shortage of 0.78 in October-December 2021, it experienced minor variations, ending at 0.43 in April-June 2023. These small fluctuations suggest a relatively well-balanced labor market in the western states.

In contrast, the Northern region shows a concerning trend of deepening labor surplus. Starting from -1.46 in October-December 2021, the surplus progressively worsened to -2.48 by April-June 2023, indicating growing challenges in labor absorption or job creation in this region. The Northeast region presents a pattern of persistent and worsening labor surplus. From a relatively modest -0.31 in October-December 2021, it deteriorated to -2.75 in January-March 2023, though showing some improvement to -1.47 by April-June 2023. This pattern might indicate structural challenges in the regional economy or limited job opportunities. The Southern region consistently shows labor surplus conditions throughout the period. Starting at -1.28 in October-December 2021, it reached

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its most severe surplus of -3.26 in October-December 2022, before moderating to -1.89 by April-June 2023. This persistent surplus might suggest a mismatch between job creation and the available workforce in the southern states.

Overall, this regional analysis highlights significant geographical disparities in India's labor market, with the Central and Eastern regions generally experiencing labor shortages while the Northern, Southern, and Northeastern regions grapple with persistent surpluses. These patterns suggest the need for region-specific policy interventions to address these imbalances and promote more equitable labor market conditions across the country.

CONCLUSION

This empirical investigation into India's occupational shortages reveals complex structural challenges within the nation's labor market ecosystem, particularly in the post-COVID-19 context. The research findings demonstrate significant sectoral and spatial heterogeneity in labor market conditions, highlighting both systematic inefficiencies and potential areas for policy intervention. The observed pattern of initial decline followed by an upward trajectory in occupational shortages suggests dynamic labor market adjustments in response to post-pandemic economic recovery.

The sectoral analysis illuminates a pronounced dichotomy between high-skill professional categories experiencing acute shortages and sectors characterized by disguised employment. This disparity underscores the fundamental mismatch between labor market supply and demand dynamics, particularly evident in the stark shortages among executive-level positions and healthcare practitioners. Such imbalances indicate structural inefficiencies in skill development and professional education systems.

The spatial dimension of the analysis reveals notable regional asymmetries, with the central region experiencing severe occupational shortages while the northern region exhibits labor surplus conditions. The state-wise variations, particularly pronounced in Madhya Pradesh, Uttar Pradesh, and Maharashtra, reflect deeper structural inequalities in regional economic development and labor market institutions. These geographical disparities necessitate differentiated policy approaches tailored to specific regional contexts.

The research implications suggest the imperative for a multifaceted policy framework that addresses both immediate labor market inefficiencies and long-term structural challenges. Such a framework should encompass targeted skill development initiatives, systematic educational reforms, and strengthened public-private partnerships. The findings underscore the critical importance of adopting a regionally nuanced approach to policy implementation, considering the significant variations in labor market conditions across different geographical contexts.

This study contributes substantially to the scholarly understanding of India's contemporary labor market dynamics, offering empirically grounded insights for policy formulation. Future research directions might explore the temporal evolution of these patterns and investigate the effectiveness of various policy interventions in addressing identified occupational shortages. The findings ultimately emphasize the necessity of coordinated policy actions to optimize India's demographic dividend and enhance labor market efficiency in an increasingly complex economic landscape.

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