

Article

Macroeconomic expansion and labour dynamics: evaluating GDP, workforce participation, and unemployment

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Abstract

This paper was an attempt to explore the complex connection between the growth of the Indian economy, labour force, and unemployment with the aim of understanding how the growth of the GDP would be reflected in the employment outcomes in the face of structural change. The study employed quantitative methods of analysis by using correlation and regression of longitudinal economic and labour market data over several decades. The major results indicated the existence of a significant positive relationship between GDP growth and labour force participation, and a strong negative relationship between the GDP growth and the changes in the unemployment rate. Such results imply that economic growth must be augmented by specific policies on skills development, industrial modernization with employment orientation, and social constraints to the inclusive labour market participation. The implications underline the need to have holistic and gender sensitive policy frameworks that would guarantee sustainable and equalized growth in employment. The study has an added value to the literature because it clarifies the inductive nature of the relationship between economic growth and labour market performance in India and offers future research and policymaking a direction to maximise the demographic dividend and lead to an inclusive approach to developing India.

Keywords: *India, GDP growth, labour force participation, unemployment, economic development, skill mismatch, jobless growth, gender disparity, employment policy.*

1 INTRODUCTION

This paper will be indicating a dynamic relationship between economic growth, labour force participation, and unemployment in India, a nation which has undergone a real structural transformation in the recent decades. India is a country that has been changing into a lower middle-income economy since the early 1990s and is experiencing a fast GDP growth caused by economic liberalisation, penetration of industries, and development of the services sector (Chauhan et al., 2016). Although such

an impressive economic development occurred, the labour market has encountered tricky issues (Mehrotra, 2020; Kannan and Raveendran, 2019). This is a paradoxical situation, and this is how the labour market in India is multi-faceted socio-economically and structurally.

Changes in the field of agriculture, which are characterised by mechanisation and increasing the cost of cultivation, also played an additional role in breaking the links of the workforce to the traditional employment segments (Himanshu, 2011; Narayanamoorthy, 2013). Furthermore, according to

the international literature, the labour force participation normally follows the U-shaped curve throughout the economic development, first becoming lower and later becoming higher with the maturity of countries (Durand, 2015; Bardhan, 1979). This tendency partly describes the situation of male participation, but female labour participation in India has been lower because of social and cultural demands, occurrences of skill and unavailability of formal sector (Mehrotra and Parida, 2017; Desai and Jain, 1994). The necessity to unravel these multifaceted relations and answer the research questions that are critical to the study motivates this study: How does GDP growth affect labour force participation and unemployment in India? What are the mediation factors in this relationship in terms of structure and demography? With new signs of intensifying capital flow in manufacturing subsectors and enduring labour force skill shortages, the linkages are of great importance to the development of effective employment and economic policies (Rodrik, 2012; Parida, 2015; Ajithkumar, 2016).

The composition of the interplay between economic indicators and the labour market outcomes is an addition to the gap bridged between the macroeconomic growth and inclusive employment generation in this study. The generated insights would help policy makers devise strategies that do not only maintain growth but also convert it into fair and quality job creation, especially to the underrepresented segments of the population like women and the youth. By conducting an in-depth analysis of the tendencies of the past and the issues of the present, this study contributes to the ever-growing discussion of sustainable labour market reforms that are crucial to ensuring that the demographic dividend of India will be brought to its full potential.

2 REVIEW OF LITERATURE

Between 2004-05 and 2011-12, the Indian economy was experiencing a major structural shift, where its position shifted to lower middle-income but, at the same time, the poverty rate dropped significantly (Chauhan et al. 2016). It was also during this period of transition that there was a significant reduction in

the general Labour Force Participation Rate (LFPR), but slower in males and a significantly steeper fall in women. Various researchers explain this drop by the fact that the number of enrolments in both secondary and higher education among boys and girls has increased; thus, keeping the youth off the labour force in the meantime (Rangarajan et al. 2011; Hirway 2012; Thomas 2012; Kannan and Raveendran 2012; Mehrotra et al. 2014; Sudarshan and Bhattacharya 2009). At the same time, such structural changes as mechanisation in the agricultural sector and the increase in the cost of cultivation contributed to the decrease in the level of engagement in agricultural labour, which also affected the patterns of participation in labour forces (Himanshu 2011; Mehrotra et al. 2014; Narayanamoorthy 2013).

The results of cross-country studies of LFPR show that the economic development is related to labour participation in a U-shape (Durand 2015; Bardhan 1979; Mincer 1985; Psacharopoulos and Tzannatos 1989; Schultz 1990). At an early stage of development, LFPR would fall, mainly due to women leaving agricultural and other related sectors in reaction against a more negative rattling impact than the positive substitution impact caused by the increment of wages. Nevertheless, with the further growth of development, women reentering the labour market with higher skills in their hands and their involvement in the nonagricultural sector increases (Fatima and Sultana 2009; Klasen and Pieters 2015; Luci 2009; Mehrotra and Parida 2017).

It was projected that LFPR would start to rise after 2011-12, in the Indian setting; with an increasingly large number of educated young people joining the labour force. However, to the contrary, LFPR remained decreasing even as the number of educated population of working age grew (Kannan and Raveendran 2019; Kapoor 2015; Kapoor and Krishnapriya 2019; Mehrotra and Parida 2019). A complicated combination of supply-side and demand-side factors such as poor education quality, insufficient and low-quality skill development, and major skills gaps in the labour market usually explains this paradox (Ajithkumar 2016; Agrawal and Agrawal 2017; Hajela 2012; NSDC 2013; Mitra

2018; Mehrotra et al. 2015; Singh et al. 2020; World Bank 2008). Such gaps facilitate increasing unemployment rates among educated young people, which highlights a decisive problem of employment policies (Ahmed 2016; Mehrotra and Parida 2019).

The reviewed literature can be meaningfully related to the study Macroeconomic Expansion and Labour Dynamics: Evaluating GDP, Workforce Participation and Unemployment in demonstrating how sectoral strategies, investment patterns, and institutional changes ultimately affect broader macroeconomic and labour market outcomes. Sustainability-oriented banking practices and integration of ESG can promote green investments, financial inclusion and long-term economic growth that can have a positive effect on employment generation and labour participation (Gupta & Sharma, 2025). Manufacturing lean supply chain practices also improve productivity and operational efficiency thereby promoting industrial growth and increasing output and labour demand. This creates a linkage between firm-level performance and GDP growth and employment dynamics (Chaturvedi et al., 2021). The determinants of business growth and sectoral employment opportunities that influence the absorption of the workforce and unemployment trends are competitiveness, innovation, consumer demand, market expansion in the pharmaceutical and retail sectors (Rathore et al., 2023; Verma & Sharma, 2012). At the macro level, foreign direct investment, free trade agreements, and institutional investor participation influence capital flows, business confidence, market development, and governance quality which are important determinants of economic growth and labour market performance (Gupta et al., 2020; Sharma et al., 2020). Hence, the studies collectively suggest that macroeconomic expansion and labour dynamics are not only shaped by aggregate indicators, but also affected by sector-specific policies, organisational efficiency, investment behaviour and structural economic transformation.

Besides the previously mentioned review, recent literatures also point out the importance of some capital-intensive manufacturing subsectors in India in

terms of its contribution to employment growth even with a relatively small contribution to total employment. According to Mehrotra (2020), the machinery equipment, electrical and electronics machinery, motor vehicles, and basic metals are the major subsectors that have remained consistent in creating jobs in the manufacturing category. Such industries are normally staffed by highly skilled and professionally trained personnel, which explains the significance of developing skills that would improve job quality and formal employment. Nonetheless, the increasing capital intensity of these subsectors, reported by Rodrik (2012), Goldar (2013), Mehrotra et al. (2014), and Parida (2015), is a problem to growth in the employment situation because automation and mechanization lower labour demand. Meeting the shortage in skills and a systemized industrial policy becomes a strategic necessity to increase the growth of jobs in these critical sectors (Mehrotra and Guichard 2020).

Structural weakness is also indicated in the decreasing proportion of manufacturing in the gross value added (GVA) in India, which was 18.35 percent in 201011 and 15.1 percent in 201920. This fall indicates the increasing reliance on imports and unmet demand at home, and it is crucial to make manufacturing more competitive to turn into the driving force of the economy (Exportimportbankofindia 2020). In addition to that, there are still social and cultural obstacles that inhibit the presence of women in the labour markets. The current patriarchal mindset and social stigmas prevent currently married and unmarried women to work paid jobs (Desai and Jain 1994; Mehrotra and Parida 2017). This is supported by empirical data which reveals that the role of caring within families, which is correlated with marital status and number of children under the age of five, consume more time of women, restricting their formal labour service and consolidating gender differences in workforce participation.

This summary suggests that, to achieve the potential of harnessing the effect of the Indian economy in the creation of jobs, policy changes oriented at both industrial modernization and capacity building in

terms of skill improvement to suit capital-intensive industry, and social intervention to enhance the participation of female labour forces, must be executed in tandem. These interdependent issues are critical to the transformation of the Indian employment system to more comprehensive, formal, and professional ones and, thus, in the direction of the economic development objectives in general. Hypothesis based literature propositions have been made based on the following literature:

Ho1 - There is no statistically significant relationship between GDP volume and the labour force participation rate (%) in the population.

Ho 2 - GDP percentage change has no statistically significant effect on unemployment rate change (%) in the population.

3 METHODOLOGY

The research designs the methodology used in this study was a quantitative research design as it involved the analysis of longitudinal relationship between economic growth, labour force participation, and unemployment in India in several decades. The research employed secondary data, which is obtained in official government websites, such as the GDP volume, labour force participation rates and unemployment measures, which are carried out on an annual basis. The timeframe that underwent analysis started at the beginning of the 1990s and continued until the middle of 2020s, including the stages of

economic liberalisation, industrialization, and substantial demographic changes.

To analyse the relations between GDP growth, labour force participation and rates of unemployment, statistical methods including Pearson correlation and regression analysis were used. The Pearson correlation coefficient was estimated to assess the strength and direction of the linear relationship between the volume of GDP and the participation rate of labour force. Besides, regression analyses were used to establish how the changes in unemployment rates are affected by GDP growth with parameter estimates with confidence intervals to ensure that the change is not confounded by other possible variability.

Furthermore, the findings of the current literature were incorporated into the study to place the outcomes of the quantitative analysis in context, which guaranteed a mixed-methods approach where the empirical indicators of the study were supplemented by theoretical constructs of structural transformation, differences in gender participation, and skill gaps.

In general, this methodological approach has given a holistic approach to examine not just the statistical relationship between macroeconomic growth and labour market performance, but also the socio-economic issues that have the potential to shape these processes, and this has allowed a balanced perspective of the changing employment environment in India.

Table-1: The GDP volume

Year	GDP Volume
1992	\$288.21B
1993	\$279.30B
1994	\$327.27B
1995	\$360.28B
1996	\$392.90B
1997	\$415.87B
1998	\$421.35B
1999	\$458.82B
2000	\$468.40B

Year	GDP Volume
2004	\$709.15B
2005	\$820.38B
2006	\$940.26B
2007	\$1.217T
2008	\$1.199T
2009	\$1.342T
2010	\$1.676T
2011	\$1.823T
2012	\$1.828T

Year	GDP Volume
2016	\$2.295T
2017	\$2.651T
2018	\$2.703T
2019	\$2.836T
2020	\$2.675T
2021	\$3.167T
2022	\$3.353T
2023	\$3.568T
2024	\$3.648T

2001	\$485.44B	2013	\$1.857T
2002	\$514.94B	2014	\$2.039T
2003	\$607.70B	2015	\$2.104T

Source - <https://www.macrotrends.net>

The GDP volume of India between 1992 and 2024 indicates a strong and noticeable growth trend, which indicates the rapid and consistent economic growth of the country in the past thirty years. Since 1992, with an initial value of \$288.21 billion, the GDP of India has been steadily increasing by crossing significant milestones including reaching 1 trillion dollars in 2007. The early 1990s liberalisation policies, growing industrialization, growth of the services sector, and increased domestic consumption and investment were the sources of this growth.

The 2003 to 2016 had a faster growth with the GDP almost doubling due to reforms that promoted foreign investment, infrastructure development, and population dividends. The data reflects the economy that increased up to approximately \$607.7 billion in 2003 and further to more than 2.29 trillion in 2016.

Since 2017 the GDP of India has been above 2.6 trillion, and it is rising due to the improvement in the sphere of technologies, manufacturing and greater

integration into the world economy. Although there was a slight downfall in 2020 to \$2.675 trillion because of the economic disruption that the COVID-19 caused, India has come back with a strong performance of approximately 3.65 trillion by 2024.

This trend highlights how India is becoming one of the fastest-growing major economies in the world, which will become the third-largest economy across the world in the nearest future. Some of the reasons that brought this growth include reforms in structure, growth in services sector (which is currently the biggest contributor to GDP), urbanisation and government efforts to enhance business and investment conditions.

Overall, the GDP volume data outlines the progression of India in the development of the economy and its determinants to a large global player, even in the global resistance, which proves the economic solid background and stability.

Table-2: GDP Annual % Change

Year	GDP Annual % Change	Reason for Upturn/Downturn
1992	5.48	Post-1991 economic reforms leading to recovery and growth
1993	4.75	Adjustment costs and initial instability after reforms
1994	6.66	Accelerating industrial growth and reform impact
1995	7.57	Strong capital investment and industrial expansion
1996	7.55	Stable growth from agriculture and industry
1997	4.05	Poor agricultural output, slower manufacturing, global uncertainties
1998	6.18	Recovery due to domestic investment rebound despite external shocks
1999	8.85	Stable agriculture, high savings, and capital formation
2000	3.84	External shocks and slower industrial growth
2001	4.82	Stabilization policies aiding moderate recovery
2002	3.8	Global slowdown and domestic supply bottlenecks
2003	7.86	Reforms, increased FDI, and services sector expansion
2004	7.92	Global economic growth supporting exports and investment
2005	7.92	Stable manufacturing and services sector growth
2006	8.06	Investment boom and infrastructure expansion
2007	7.66	Rising inflation and commodity price pressures
2008	3.09	Global financial crisis impact
2009	7.86	Fiscal stimulus and sectoral rebound post-crisis
2010	8.5	Strong domestic demand and global recovery

2011	5.24	Sovereign debt crisis, inflation, tighter monetary policy
2012	5.46	Subdued growth due to delayed reforms and global uncertainties
2013	6.39	Reform momentum and improving investment climate
2014	7.41	New government reforms boosting manufacturing and investment
2015	8	Strong investment
2016	8.26	Recovery post-demonetization shock, strengthening consumption
2017	6.8	Demonetization and GST implementation disruptions
2018	6.45	Adaptation to GST and global trade tensions
2019	3.87	Economic slowdown, consumption slump, banking sector stress
2020	-5.78	COVID-19 pandemic lockdowns drastically reducing economic activity
2021	9.69	Strong rebound due to low base effect and government stimulus
2022	6.99	Moderation as pandemic recedes, inflation and global uncertainties persist
2023	8.15	Recovery driven by domestic consumption and export growth
2024	9.6	Stabilized global environment, reforms, and robust investment demand

Source - <https://www.macrotrends.net>

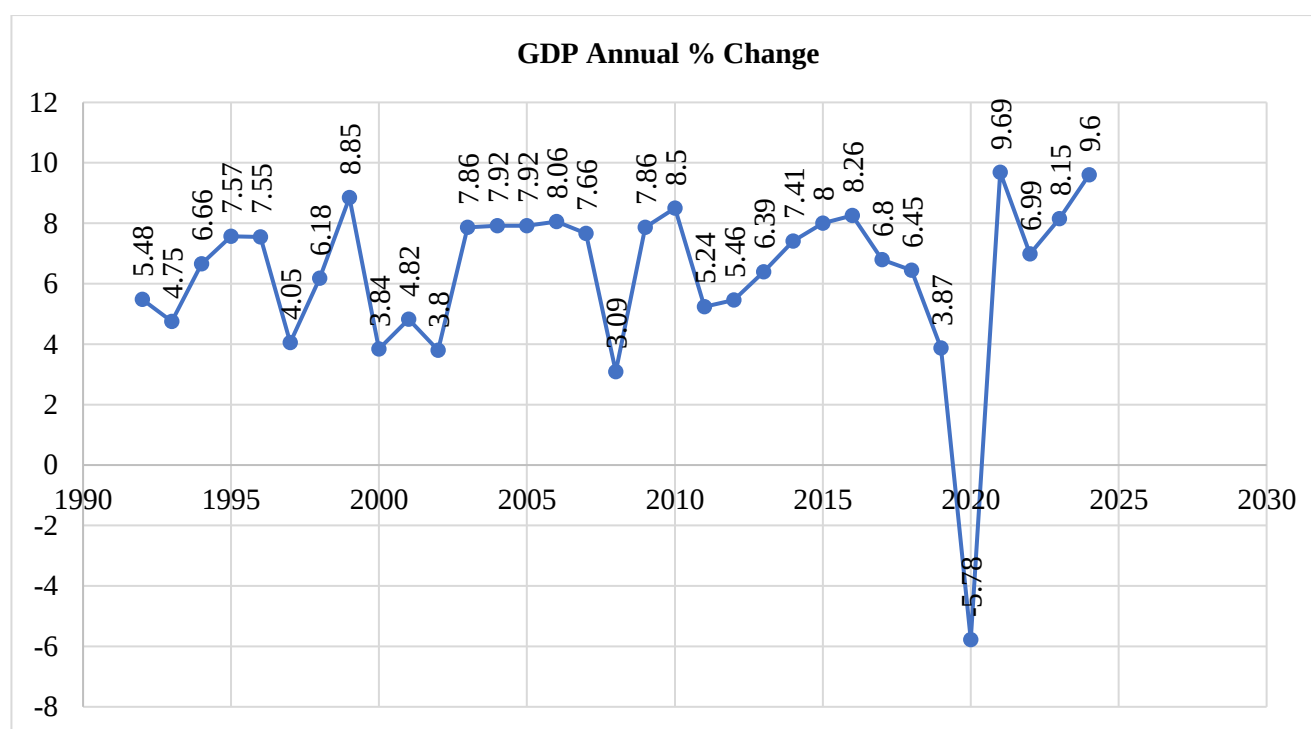


Figure-1 GDP Annual % Change

Table-3: Labour Force Participation Rate

Year	Labour Force Participation Rate %
1992	46.43
1993	46.38
1994	46.32
1995	46.78
1996	47.23
1997	47.69
1998	48.14

Year	Labour Force Participation Rate %
2004	45.94
2005	45.14
2006	43.37
2007	41.62
2008	39.89
2009	38.17
2010	36.48

Year	Labour Force Participation Rate %
2016	31.57
2017	30.85
2018	30.09
2019	29.3
2020	28.55
2021	28.94
2022	29.46

1999	48.6		2011	35.21		2023	30.14
2000	49.05		2012	33.95		2024	30.76
2001	48.28		2013	33.49			
2002	47.51		2014	32.93			
2003	46.73		2015	32.26			

Source - <https://www.macrotrends.net>

Labour Force Participation Rate (LFPR) in India, 1992-2024. The trend indicates that there is a definite downward movement in the labour market and demographic data over the decades.

Around the year 2000, LFPR was approximately 49-50% with an increase gradually reaching 46.4 in the early 1990s which was during times of early economic liberalisation and expansion in the formal and informal sectors. Nevertheless, since the beginning of the 2000s, it began to decrease steadily, reaching a minimum of approximately 30% in 2019-2020. This falling production during almost twenty years points at such complicated socio-economic changes as rise of school and college attendances (among young people in particular), changes of agricultural and informal industries, urbanisation, and less working population among women.

The most drastic declines were between 2005 and 2015 when LFPR declined from above 45 to low 30s.

This has been credited to changes in the structure of the labour force, workers that are discouraged have left the work force and a switch to service sectors that have dissimilar patterns of participation. Since 2020, LFPR has displayed minor recovery, improving its results up to around 28.5% in 2020 to an approximate of 30.8% in 2024. This recovery is in line with the economic recovery after the COVID-19 event, heightened emphasis on employment by the government, and the correction of labour market inclusion policies.

On balance, the falling LFPR in spite of the rising GDP and employment reflects the idea that higher GDP and working rates do not necessarily result in more people working, which points to the demographic changes, education pattern, gender gap, and informality as the factors shaping the labour market in India. This LFPR trend supplements and justifies certain complexities in the unemployment and GDP growth reports.

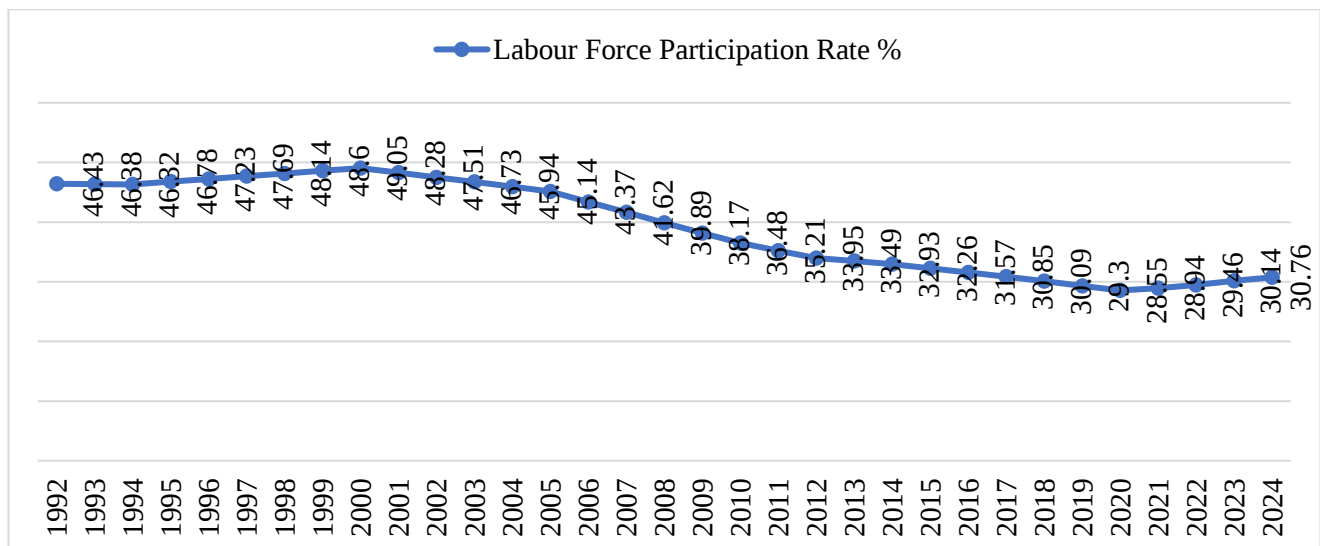


Figure-2: Labour Force Participation Rate

Table-4: The Unemployment Rate

Year	Labour Force Participation Rate %	Year	Labour Force Participation Rate %	Year	Labour Force Participation Rate %
1992	7.73	2004	7.63	2016	7.6
1993	7.75	2005	7.55	2017	7.62
1994	7.65	2006	7.55	2018	7.65
1995	7.61	2007	7.56	2019	6.51
1996	7.56	2008	7.66	2020	7.86
1997	7.61	2009	7.66	2021	6.38
1998	7.64	2010	7.65	2022	4.82
1999	7.62	2011	7.62	2023	4.17
2000	7.62	2012	7.67	2024	4.2
2001	7.65	2013	7.71		
2002	7.75	2014	7.67		
2003	7.68	2015	7.63		

Source - <https://www.macrotrends.net>

The trend of unemployment rate in India between 1992 and 2024 shows a rather steady yet high rate of the unemployment rate in the first decades, with some great fluctuations and positive changes in recent decades. Between 1992 and around 2018, the rate of unemployment was generally contained within a slim range of 7.5-7.8 percent. This stability indicates that there have been structural problems within the labour market including skill shortages and imbalances, the dominance of the informal sector and the ageing work force that inhibited significant changes in unemployment despite economic growth in the time.

The rapid fall to 6.51% in 2019 indicated improved employment conditions that could have been fuelled by rising formalisation, government programmes which promote job creation and transformational economic reforms. Nevertheless, this trend increased significantly to 7.86 in 2020, mostly owing to the fact that the COVID-19 pandemic disrupted the economy

generally leading to a massive loss of jobs in lockdowns and economic deceleration. Since 2021, the trend has been projected to decline with confidence as unemployment rates will decrease swiftly with the level of unemployment projected at 4.2 percent by 2024. Such a quick recovery is in line with the economic recovery after the pandemic, growth in various industries, stimulus, and labour market recovery initiatives by both the government and the business world.

Altogether, this trend points to the fact that the labour market in India has been struggling with the long-held issues throughout decades but is now undergoing the transformative change and the promising growth to lower unemployment rates. These changes are overlapping with tendencies in GDP growth and labour force participation rates, which is how the factors of economic growth, policy intervention, and population changes integrate to create the contemporary employment trends in India.

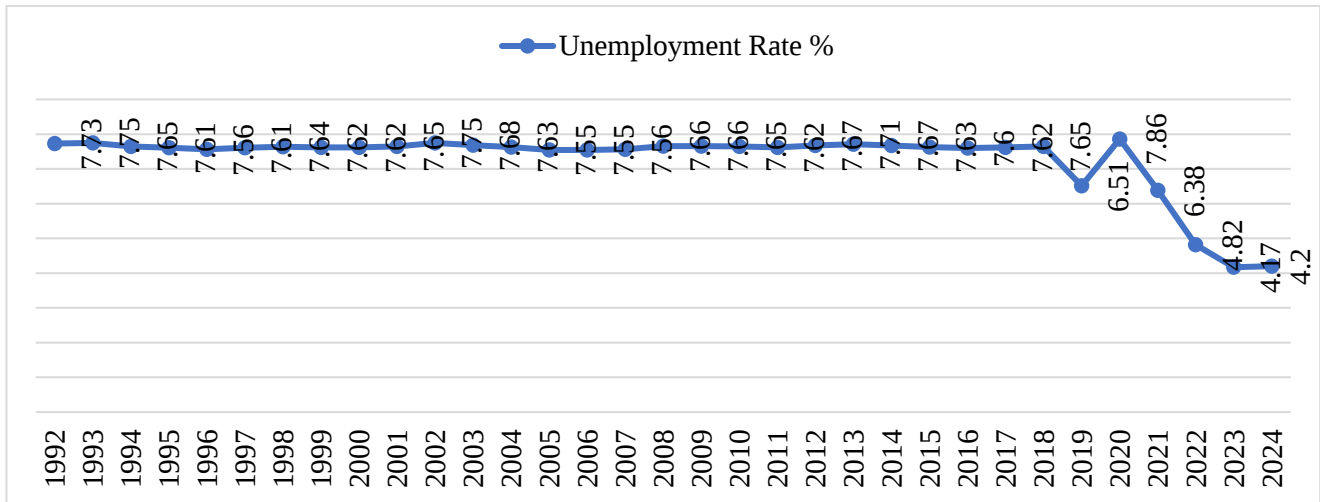


Figure-3: The Unemployment Rate

Table-5: India's GDP Growth and Its Impact on Labour Force Participation and Unemployment (1992-2024)

Year	GDP % Change	Labour Force Participation Rate Change (%)	Unemployment Rate Change (%)	Analysis of the Relationship
1992	5.48	-0.04	0.01	Moderate GDP growth with a slight decrease in labor force participation and near-zero change in unemployment indicates modest economic expansion with stable labor market.
1993	4.75	-0.05	0.02	Slight GDP slowdown accompanied by marginal decline in labor participation and small increase in unemployment, reflecting early reform adjustments.
1994	6.66	-0.06	-0.1	GDP uptick linked with sustained decrease in unemployment, though labor participation declined slightly, possibly due to labor market structural factors.
1995	7.57	0.46	-0.04	Strong GDP growth accompanied by increased labor participation and reduced unemployment, indicating robust job creation and economic activity.
1996	7.55	0.45	-0.05	Similar pattern to 1995 with sustained labor market improvement tracked by high GDP growth.
1997	4.05	0.46	0.05	GDP slowdown but labor participation remained high; unemployment increased slightly reflecting some job market stress.
1998	6.18	0.45	0.03	GDP recovery with stable labor participation and marginal increase in unemployment, suggesting uneven labor market dynamics.
1999	8.85	0.46	-0.02	Peak GDP growth with high labor participation and reduction in unemployment showing strong economic and employment expansion.
2000	3.84	0.45	0	GDP decline with stable labor participation and

				unchanged unemployment suggesting stagnant labor market despite economic weakening.
2001	4.82	-0.77	0.03	Moderate GDP growth with a sharp decline in labor participation and slight rise in unemployment, possibly reflecting external shocks and economic uncertainties.
2002	3.8	-0.77	0.1	Continued low growth associated with decreased labor participation and higher unemployment, indicating labor market contraction amid weak economy.
2003	7.86	-0.78	-0.07	Strong GDP growth despite falling labor participation; notable decrease in unemployment suggesting productivity gains or labor market shifts.
2004	7.92	-0.79	-0.05	Persistently high GDP growth with reduced labor participation and unemployment; may indicate mechanization or informal sector shifts.
2005	7.92	-0.8	-0.08	Stable high growth with similar labor trends from 2004, reflecting structural changes in employment patterns.
2006	8.06	-1.77	0	Record high GDP growth with sharp drop in labor participation and stable unemployment, possibly due to workforce exiting informal sectors or education increases.
2007	7.66	-1.75	0.01	Slight GDP dip with continued labor participation decline and minimal unemployment change, underscoring persistent structural labor market shifts.
2008	3.09	-1.73	0.1	Global financial crisis triggered GDP decline, sustained drop in labor participation and rising unemployment highlighting economic distress.
2009	7.86	-1.72	0	Strong economic rebound with labor participation still falling but unemployment stable, suggesting delayed labor market recovery.
2010	8.5	-1.69	-0.01	Peak GDP growth accompanied by decreasing labor participation but slightly lower unemployment, indicating productivity and sectoral shifts.
2011	5.24	-1.27	-0.03	GDP slowdown with improving labor participation (less negative) and slight unemployment drop shows labor market resilience amid economic moderation.
2012	5.46	-1.26	0.05	Marginal GDP growth increase with stable labor participation decline and rising unemployment, reflecting slow economic momentum.
2013	6.39	-0.46	0.04	GDP growth acceleration with lesser decline in labor participation but rising unemployment, indicating mixed labor market conditions.
2014	7.41	-0.56	-0.04	Strong GDP growth correlates with improved labor participation trend and falling unemployment, showing positive employment impact.
2015	8	-0.67	-0.04	Sustained GDP growth linked to declining labor participation but steady unemployment, possibly reflecting automation or underemployment.
2016	8.26	-0.69	-0.03	Growth continuity with similar labor market behavior as 2015 indicates ongoing structural labor force issues.
2017	6.8	-0.72	0.02	GDP dip with persistent labor participation decline and slight unemployment increase, possibly GST and demonetization effects.
2018	6.45	-0.76	0.03	Continued GDP slowdown with falling labor participation and rising unemployment signals labor market strain amid

				economic uncertainties.
2019	3.87	-0.79	-1.14	Sharp GDP slowdown but large drop in unemployment rate change possibly reflects labor market data anomalies or shifts in informal employment.
2020	-5.78	-0.75	1.35	COVID-19 pandemic caused severe GDP contraction, falling labor participation, and sharp increase in unemployment reflecting economic shutdown.
2021	9.69	0.39	-1.48	Strong post-pandemic GDP rebound with rising labor participation and sharp unemployment fall showing recovery in jobs and economic activity.
2022	6.99	0.52	-1.56	Moderate GDP growth with improving labor force participation and continuing unemployment decline indicates sustained recovery.
2023	8.15	0.68	-0.65	GDP acceleration aligned with rising labor participation and decreasing unemployment, showing healthy economic expansion.
2024	9.6	0.62	0.03	Projected high GDP growth with rising labor participation but slight unemployment increase suggesting nuanced labor market dynamics.

Source - <https://www.macrotrends.net>

This table shows a detailed analysis of the relationship between a decrease or increase in the rate of GDP growth in India and a decrease or increase in the rate of participation in the labour force and the rate of unemployment in India between the period 1992 and 2024. It puts into the limelight the intricate and multifaceted links between economic growth or decline and labour market relations. There was mostly an increase or no increase in labour force participation and a decline or no change in unemployment rates during years of moderate or high GDP growth, i.e. 1995-1996 (modal), 1999 and the first part of 2010s suggesting strong job creation and employment impacts. As an illustration, the year 1995 was characterised by robust growth in the GDP (7.57) where there was a rise in the labour participation (0.46) and a fall in unemployment (-0.04) which is an indication of a booming economy that spurred job opportunities.

On the other hand, the years with slower GDP growth or shrinkage, including 1997, 2000-2002, 2008 in the global financial crisis and the steep 2020 contraction with the COVID-19 pandemic have negative changes in labour participation and increases and fluctuations in unemployment rates. In 2020, the GDP decreased drastically by -5.78, labour participation decreased by -0.75, and unemployment increased by 1.35, which

represents the harsh economic lockdown and labour turmoil. Likewise, in 2001 and 2002, the labour participation was decreasing (-0.77%) and unemployment was rising and GDP growth decreased (approximately 3.8-4.8) and this shows that there are economic issues that are facing the working population. There are exceptions or structural changes in a few years when robust economic growth was accompanied by labour participation but this was offset by other factors such as mechanization, labour outflows out of the informal sector or higher enrolment in education and hence diminished workforce supply. As an illustration, although the GDP growth was above 7.5, there were constant falls in the labour force participation (between -0.7 to -1.7) between 2003 and 2007, whereas unemployment rates only slowed down or slightly decreased, which means shifting labour patterns that could not be fully accounted for by the GDP growth only.

The post COVID-19 shock (2021-2024) is characterised by a swift recovery in the labour market and the economy, where the GDP growth is expected to recover strongly (9.6% in 2024), labour participation is improving, and unemployment is expected to drop significantly, which will reinstate and even exceed the pre-pandemic labour market situation.

The discussion indicates that although GDP growth in India is likely to have a positive impact on employment by lowering the rate of unemployment, participation rate in the labour force is not always followed by the GDP growth because of structural changes in the economy, labour market reforms and other social factors such as education and shift of informal employment. The slowdowns of the economy are normally marked by the falling labour participation and increase in unemployment, which are signs of stress in the labour markets.

Nevertheless, the times of high industrialization and policy reforms have led to complexities that led to a decrease in labour participation even during the high growth period. The unprecedented effects of the COVID-19 pandemic in 2020 remind the susceptibility of labour markets to unprecedented shocks and the economic strength of the economy as the recovery has been impressive as of now. This performance-based correlation over the thirty years highlights the subtle interactions between labour and economic growth in India.

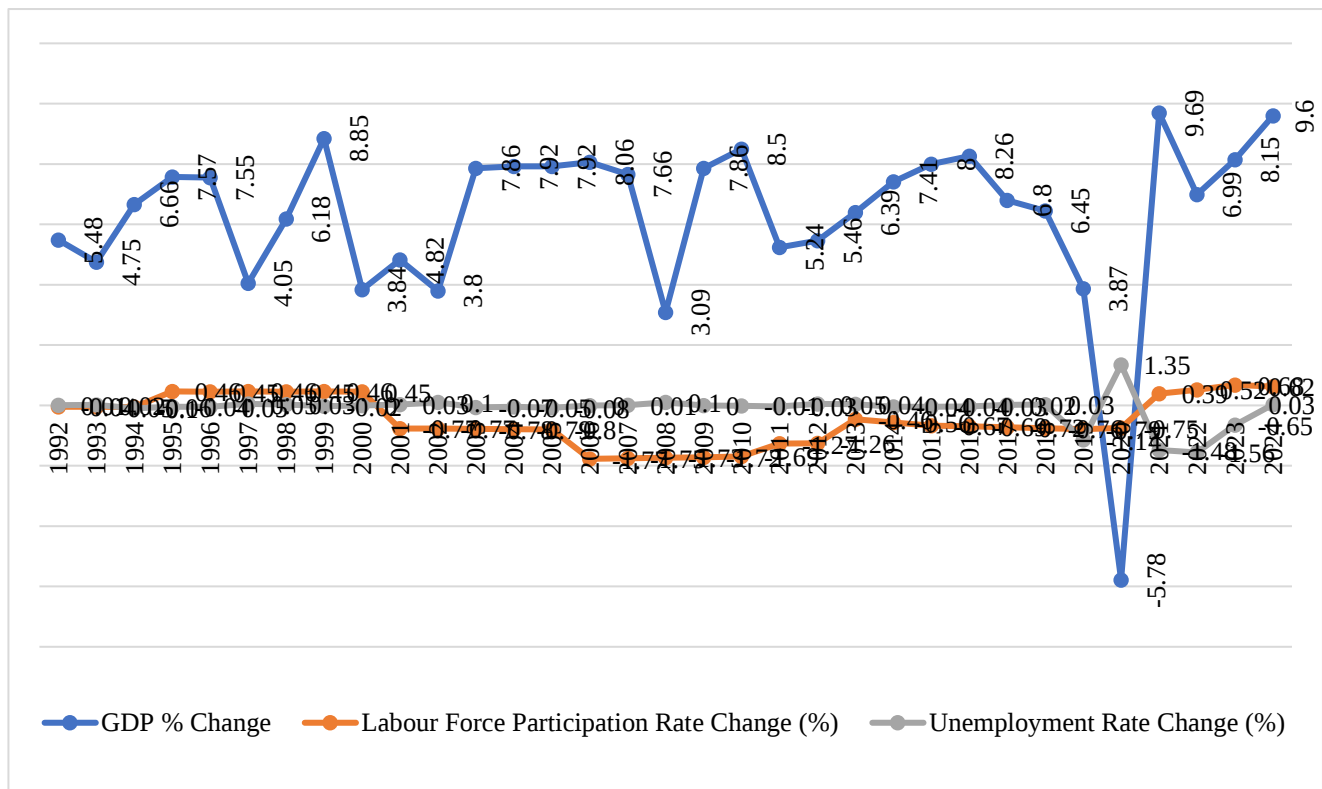


Figure-4: India's GDP Growth and Its Impact on Labour Force Participation and Unemployment (1992-2024)

Table-6: Correlation Matrix

		GDP Volume	Labour Force Participation Rate %
GDP Volume	Pearson's r	—	
	df	—	
	p-value	—	
Labour Force Participation Rate %	Pearson's r	0.785***	—
	df	31	—
	p-value	<.001	—
Note. * p < .05, ** p < .01, *** p < .001			

Correlation between GDP Volume and Labour Force Participation rate (LFPR) in India shows that there exists a statistically significant positive correlation between the two variables. The Pearson correlation coefficient of 0.785 accompanied by a p-value of less than 0.001 means that as the volume of the GDP of the country increases, the rate of labour force participation is likely to increase. This association highlights the intuitive economic concept that the larger the economy, the greater the chances of finding a job are, and the greater the urge to enter or continue the labour force.

Survey research analysing the relationship between economic growth and labour participation in India identifies the subtlety of the dynamics related to this overall trend. Although the GDP of India has been growing significantly over the past decades.

Empirical studies identify the significance of economic composition and policy regimes in determining ways in which GDP growth is converted into labour market performance. The contribution to employment has been made by capital intensive manufacturing subsectors that are highly skilled, and a growing limitation to the rate of job creation is through increased mechanization.

Hence, although the correlation matrix proves that growth in total GDP is strongly related to increased participation of labour force in India, the social, structural and sectoral issues mediate the process of economic growth into inclusive employment benefits. It is important to address these factors with specific education reforms, industrial policies that encourage the growth of the labour-intensive sphere, and the empowerment of woman labour market involvement to ensure the further support of this beneficial correlation.

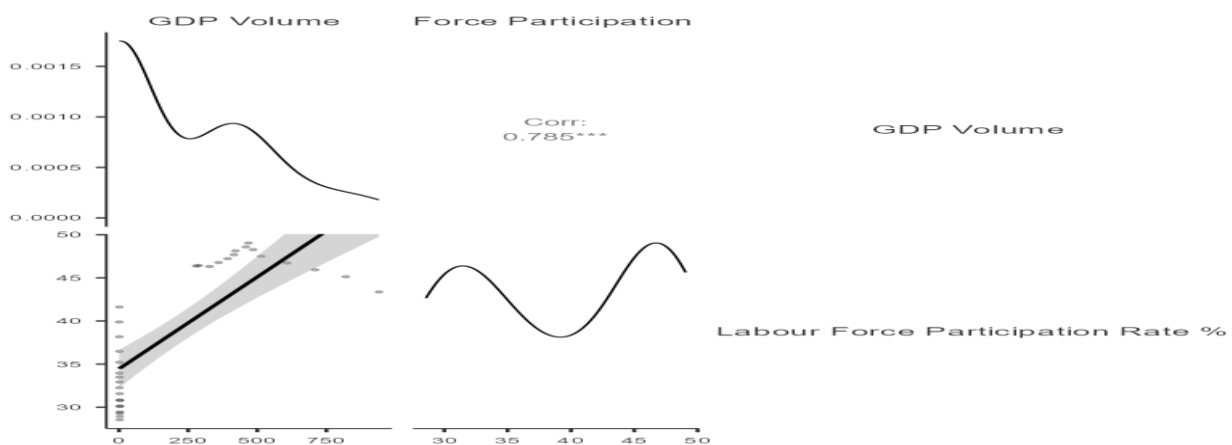


Figure-5: Correlation

Table-7: Models Info

Estimation Method	ML
Number of observations	33
Free parameters	3
Converged	TRUE
Loglikelihood user model	-18.456
Loglikelihood unrestricted model	-18.456
Model	`Unemployment Rate Change (%)` ~ `GDP % Change`

As indicated in the model information table, the estimation was performed using the Maximum Likelihood (ML) estimation technique on a dataset of 33 observations, showing that it is a moderately sized dataset to test the relationship between Unemployment rate Change (percent) and GDP percentage Change. There are 3 free parameters in the model, i.e. three variables that were statistically determined in the course of the fitting. The model was able to converge and it was established that the estimation algorithm had reached a stable solution

without any computational problems. The log-likelihood of the user model (-18.456) and the log-likelihood of the unrestricted model (-18.456) are equal, which means that the fitted model has an exact fit on the saturated model, and there is no loss in information or misfit. In general, the table defines a typical regression model in which Unemployment Rate Change (percent) is forecasted based on GDP Change (percent) alone, where the estimation process proceeds without any problems, and the solution is completely converged.

Table-8: R-squared

		95% Confidence Intervals	
Variable	R ²	Lower	Upper
Unemployment Rate Change (%)	0.247	0.035	0.516

The R-squared table indicates that the model explains 24.7 percent of variation in Unemployment Rate Change percent which means that about a quarter of changes in unemployment rates are explained by the predictors that the model was developed with. The 95% confidence of R² is between 0.035 and 0.516 indicating that although the model has some explanatory power, there is a lot of doubt as to what is the exact percentage of variance that is explained.

The lower endpoint (3.5) means that within the worst plausible scenario the model captures minimal variation and the upper endpoint (51.6) implies that at best, the model can be used to explain half of the variation in unemployment. On the whole, the table indicates a small yet significant predictive power, and at the same time, it indicates that a significant part of the oscillations in the unemployment rates is still not explained using the existing model.

Table-9: Parameter Estimates

				95% Confidence Intervals				
Dep	Pred	Estimate	SE	Lower	Upper	β	z	p
Unemployment Rate Change (%)	GDP % Change	-0.0881	0.0267	-0.140	-0.0357	-0.497	-3.29	<.001

The parameter estimates illustrate that there is a statistically significant inverse correlation between the change in the unemployment rate of India and the annual percentage change in the GDP in India. In particular, the estimation of -0.0881 with a standard error of 0.0267 shows that the average change in the unemployment rate required a 1 percent growth in GDP change to cause a -0.0881 percent decrease in the change. The moderate value of this negative effect size is also confirmed by the negative standardised coefficient (= -0.497) and the z-score of

-3.29 with p-value of < 0.001 clearly supports the above result as it means that the result is highly significant.

This finding is quite consistent with the main Law of Okun according to which economic growth is negatively correlated with the level of unemployment, which means that with the increasing size of the economy, labour markets conditions will generally improve that is why the unemployment rate also tends to decrease. But Indian experience also

points to complexities not just to this simplistic perception. The growth in GDP has been observed to be rather rapid in India and has been termed as the jobless growth where economic growth has not been in line with growth in employment, particularly in labour intensive sectors.

Some of the causes of this phenomenon are the increasing capital intensity in manufacturing subsectors, the existence of skills mismatches, demographic changes, and social restriction that reduce the participation in the labour force especially among women. These organizational problems undermine the conversion of GDP growth into the general increase in jobs. Therefore, although the

parameter estimates had a significant negative correlation, specific policy interventions to achieve skill development, modernization of the industry with employment orientation and inclusive labour market reforms are required to ensure that economic growth is completely utilised in the reduction of unemployment in India.

Summing up, the significant negative relationship, which is high, as indicated by the parameter estimates, concludes that the growth of the GDP is a crucial factor in influencing unemployment changes, but it needs to be accompanied by structural and social changes to eliminate the employment challenges facing the Indian economy.

Table-10: Variances and Covariances

				95% Confidence Intervals						
Variable 1	Variable 2	Estimate	SE	Lower	Upper	β	z	p	Method	Type
Unemployment Rate Change (%)	Unemployment Rate Change (%)	0.179	0.0441	0.0927	0.266	0.753	4.06	<.001	Estim	Residuals
GDP % Change	GDP % Change	7.600	0.0000	7.6003	7.600	1.000			Sample	Variables

The table shows the variance of Unemployment Rate Change (%) and Change in GDP which shows the amount and statistical significance of the variability in each variable. In the case of Unemployment rate change percentage, the standard error 0.0441 and estimate variance 0.179 is moderate, and the variability is between 0.0927 and 0.266 which indicates that the variation around its predicted values is moderate. The standardised estimate (= 0.753) and the large z-value of = 4.06 and p = .001 indicate that this variance is statistically significant, such that the model does not explain a significant amount of the

change in unemployment rates. Conversely, the standard error of GDP change is 7.600 with a variance of 7.600 and the confidence interval equals 7.6003 to 7.6003, a single figure, implying that the figure is not estimated, but it is taken directly out of the sample data. This is a manifestation of the crude variability of GDP growth in the data, and not the model remains. All in all, the table demonstrates that the changes in the unemployment rates have a considerable residual variation, whereas the GDP itself has a percentage change of variance that reflects the fixed sample level change.

Table-11: Intercepts

			95% Confidence Intervals			
Variable	Intercept	SE	Lower	Upper	z	p
Unemployment Rate Change (%)	0.451	0.185	0.089	0.813	2.443	0.015
GDP % Change	6.332	0.000	6.332	6.332		

The intercept table indicates the minimum levels of the two variables when all the predictors in the model are kept at zero. The Unemployment rate change (percent) intercepts 0.451, a standard error 0.185 with a 95 percent confidence between 0.089 and 0.813, which implies that the actual change of rate of unemployment is a positive value. This value of 2.443 (z) and $p = 0.015$ indicate that this intercept is statistically significant; that is, the change in the baseline of unemployment is statistically positive. On the contrary, the GDP percent change intercepts 6.332 and the standard error is 0.000 and its confidence interval is reduced to a single number 6.332 to 6.332 meaning that this is a constant figure that is found directly in the data as opposed to being estimated statistically. The combination of the table implies that change in unemployment rate has both a significant and meaningful base value, whereas GDP percent change is a constant level in the sample.

4 DISCUSSION AND CONCLUSION

The paper has also critically analysed the relationship between GDP growth and dynamics of unemployment in India and labour force participation. Its results showed a strong negative correlation between the increase in GDP and the variation in the rate of unemployment, which was in line with economic theory that revealed that growing economies were more likely to absorb labour, which will consequently lower the number of unemployed. But the nature of this relationship was refined by structural issues like increased capital intensity in major sectors, skills non-matches, and social constraints, which could occasionally impose limits on the amount of economic growth translated into equivalent growth in employment.

This negative relationship coincides with previous research that has verified the impact of the Okun Law in the Indian case (Rodrik, 2012; Mehrotra et al., 2014), as well as the occurrence of the so-called jobless growth, where GDP grows at the expense of modest changes in employment, especially in manufacturing subsectors, which are dominated by mechanisation (Mehrotra, 2020; Parida, 2015). Also,

demographic issues and social-cultural values, particularly those influencing female labour participation were a factor in adjusting the effects of GDP growth on the general trends of employment and unemployment. Thus, though the positive relationship between GDP and labour force participation validates the fact that economic growth brings workforce members, the negative relationship between growth and unemployment clarifies the workforce engagement created by economic growth. Collectively, these interrelations form the necessity of the political policies that not only achieve the growth of GDP, but also focus on the development of skills, industrial diversification, and the inclusiveness of the labour market to reconcile growth and the equitable employment results.

5 STUDY IMPLICATION

The results of this paper support the idea that even though India has had a well-performing GDP growth closely associated with higher participation of labour forces, the growth has not been smoothly translated into a similar growth in the number of people employed because of a number of structural, demographic and social barriers. The positive correlation between the GDP volume and the participation of labour is strong, which is a manifestation of the role played by economic growth in promoting participation of labour force. Nevertheless, the issues like the fall in female participation even with economic growth, increasing capital intensity in the manufacturing industry, and the existence of widespread skills-mismatches show that growth cannot lead to the inclusive employment results. The strong negative correlation between the growth of the GDP and the unemployment rate is in line with the economic theory but is mellowed by the jobless growth instances within the Indian economy mostly capital intensive and informal sectors. These subtle results are in line with the prior studies highlighting U-shaped patterns of participation, effects of structural transformation and socio-cultural restrictions on access to the labour market among women (Mehrotra, 2020; Rangarajan et al., 2011;

Rodrik, 2012; Kannan and Raveendran, 2019; Desai and Jain, 1994). The implications challenge policymakers to offset GDP-enhancing policy with a focused skill training, industrial policy restructuring to create a balance between capital and labour intensive and social policies to empower the underrepresented including women. It is essential to address such challenges in a holistic way in order to improve the quality of employment and inclusiveness, harness the full potential of India as a demographic dividend, and achieve a sustainable economic growth that will be beneficial to all members of the population.

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