Estimating the Impact of Human Capital Underutilization on the Productivity and Economic Growth in India

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ESTIMATING THE IMPACT OF HUMAN CAPITAL UNDERUTILIZATION ON THE PRODUCTIVITY AND ECONOMIC GROWTH IN INDIA

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Abstract

This study investigated the effect of human capital underutilization on productivity and economic growth. It has used time-series data accessed from the International Labor Organization (ILO) and World Bank database. This paper estimated the relationship between the underutilization of human capital on productivity and economic growth by applying the econometric tests like Augmented Dickey-Fuller (ADF) Test, Johansen Integration Test, and the Autoregressive Distributed Lag (ARDL) model. The results revealed that in the long run human capital underutilization has a negative relationship on GDP and labor productivity and it does not in the short run. The study recommends that specific policy legislations in the Indian labor markets are required for addressing the problem of human capital underutilization and thereby accelerating the economic growth and productivity for the current and future generations.

Keywords: India, Human capital, Underutilization, Economic growth, Labor Productivity

1. Introduction

India has witnessed an accelerated GDP growth rate trend during the last decards since the early1980s and this was further strengthened after the 1990s due to the introduction of new economic reforms. Resilence is considered a remarkable feature of India's growth story. But paradoxically it is said that the rapid growth has not transformed the labor market and employment conditions in India. All indicators show that a wide range of disparities are not being addressed properly and there is a strong urge for inclusive growth. It means that all people are benefited from the process of growth. The labor market in India is enriched with a sizable proportion of its workforce. The total workers in India account for about one-sixth of the total

workforce in the world. The unique characteristics of the nation like the demographic dividend in the young population and the geographical advantage make India stand strong among the world economies. As far as a country is concerned maintaining sustainable economic growth and development is a major challenge to reserve prosperity. One of the pertinent issues faced by developing countries is the underutilization of human capital and it is detrimental to the economic growth and development of a nation. (UIA, 1997) identified human capital underutilization as the world problem or global issue of all developing and developed countries in the world.

Even though the unemployment rate is considered a measure of labor underutilization, it does describe everything about human capital underutilization. So eliminating unemployment is not enough to curb the problem of human capital underutilization. There are other types of labor underutilization in existence. Human capital underutilization is happening when there is a mismatch between labor supply and labor demand (Hashem, 2021), and it is due to the abundant supply of laborers or underutilization of their qualifications and skills or workers does not get enough working hours to work otherwise called time-related underemployment. As per the three-year action agenda of Niti Aayog opined that India is facing a serious problem of severe underemployment than unemployment. As per the qualitative terms, overqualification is also considered a factor of labor underutilization and it is a common issue in all labor markets.

Many of the developing countries fail to generate enough employment opportunities for their population. It is due to underutilizing or not allow them to utilize their skills, qualification, and expertise to increase productivity. The majority of the studies have been done to assess the relationship between unemployment and economic growth ignoring the other types of human capital underutilization. In this study, we investigate the relationship between different types of human capital underutilization and its impact on economic growth and productivity in India.

2. Review of Literature

Human capital is considered an important organizational resource for sustained competitive advantage. (Mubibul Haq, 2016) attempted to introduce an integrated conceptual framework consisting of both micro-level human capital and macro-level strategic human capital resources. They have developed a conceptual model by bringing a connection between social capital, relational capital, and knowledge, as they are the components of human capital resources and thereby linking these to create and maintain competitive advantage. The study says that it is difficult for competitors to reproduce or imitate human capital resources as it uniquely exists in organizations.

The concept of underemployment was a serious issue in most of the underdeveloped economies than unemployment, but they were given little stress to measure the extent of underemployment among their population. In 1952 The Bureau of Labour Statistics of the Commonwealth Department of Labour was decided to introduce a measure through the labor force surveys which has been continued since 1946. For this purpose they have given two classifications for workers namely; fully employed and partially employed. One of the main factors which cause underemployment is the gap between the real productivity of labor and that allowed by upgraded science and technology. The unused or inefficiently used worker is one of the major aspects of underemployment. The attitude toward work concerning the desire to work more productively and get extra pay is relative and underemployment can happen when an economy fails to give opportunities for additional productive work. They employed a survey method of data collection and was asked among the agricultural workers and non-agricultural workers and three questions were to measure the extent of full and partial or underemployment. The questions were the need for additional work required (to find the unfilled jobs in the economy), why didn't work for more hours, do they want more hours to work. This paper (Berdecia & Jaffe, 1955) concludes by saying that there is no uniform measurement for underemployment or partial employment and it is a relative term that differs when socio-economic conditions changes.

(Hashem, 2021) done a study to estimate the effects of human capital underutilization on the economic growth and productivity in Egypt. He has used various econometric techniques to analyze the time-series data from the period of 1991 to 2019. The study finding says that human capital underutilization has a long-term impact on economic growth in Egypt, but it does not in the short run. The study found that Egypt has a weak link between education output and the requirements of the labor market.

A conducted by (Viswanath et al., 2017) on human capital contributions to economic growth in India based on aggregate production function analysis. They have employed cross-section data relating to the years 1995-96 and 1998-99 of 26 Indian states and union territories to estimate the contributions of physical and human capital to economic growth. The results of the study reveal the existence of a strong positive relationship between human capital and economic growth. (Curea & Ciora, 2013) investigated the relationship between human capital and economic growth and analyzed the presence of human capital in macroeconomic growth models.

As per the credence of the theoretical view, human capital is positively related to economic growth. (Ali et al., 2018) has conducted a study to validate the empirical aspects of human capital and how it is positively associated with economic growth. For this study, they had been surveyed 132 countries over 15 years and the study results reveal that human capital has a

positive association with economic growth provided there exists a presence of high-quality legal institutions and better economic opportunities.

(A et al., 2019) conducted a study to measure the manpower underutilization and the performance of ICT-driven government ministries in Nigeria. They have employed a strategic sampling method to collect data and used the structural equation modeling technique for analyzing data. The result of the study reveals that there is strong a relationship between human resource underutilization and organizational performance. The study has proposed a model of the effect of human resource underutilization with skill underutilization knowledge underutilization skill mismatch and untapped resources.

From reviewing various studies we noticed that various studies were conducted at the organizational level and there are limited studies to assess the human capital underutilization at the national/ general level, but there are a few studies to measure the impact of human capital underutilization on economic growth and productivity and especially in the context of India. So here fills the research gap to conduct the current study.

3. Data and Methodology

The current study is based on the annual time series data from 2005 to 2019 and has been collected from the International Labor Organization (ILO) and World Bank database. The applied econometric techniques like Augmented Dickey-Fuller (ADF) Test, Johansen Integration Test, and the Autoregressive Distributed Lag (ARDL) model were used to estimate the relationship between the human capital underutilization on economic growth (GDP) and labor productivity and to analyze the causal relationship that exists among these variables.

4. Okun's law and its validity in India

4.1 Okun's law

It refers to the relationship between aggregate output and the unemployment of an economy. According to Okun's law, a shift in aggregate demand causes aggregate output to fluctuate around the potential. This leads organizations to hire new employees and the resulting employment rate to shift in the opposite direction

$$E_t - E_t^* = \gamma (Y_t - Y_t^*) + \eta_t, \gamma > 0; \tag{1}$$

$$U_t - U_t^* = \delta (E_t - E_t^*) + \mu_t, \delta < 0; \tag{2}$$

Where;

Et = log of employment

Yt = log of output

Ut =unemployment rate

*= long-run level

Now the Okun's Law can be derived by substituting (1) into (2):

Ut – Ut* = β (Yt – Yt *) + εt, β < 0   **(3)**

where $\beta = \gamma\delta$ and $\varepsilon t = \mu t + \delta\eta t$. The coefficient β in Okun's Law depends on the coefficients in the two relationships that are fundamental to the Law (Ball et al., 2013).

4.2 Validity of Okun's law in India

A study conducted by (Bhat, 2019) to assess the validity of Okun's Law in India revealed that there is a negative relationship between economic growth and the unemployment rate in India. Their model suggests that a 1 percent increase in GDP will decrease the unemployment rate by 0.4 percent. So various pieces of literature proved that Okun's is valid in the context of India. Unemployment is considered as a measure of labor underutilization and a significant decline in the rate of unemployment will have a direct and positive impact on the aggregate level of output and productivity.

5. Measurements of Human Capital

5.1 Human Capital Index (HCI)

The Human Capital Index (HCI) measures how the outcomes of current health and education conditions prevailing in a country influence the upcoming generations' labor productivity.

5.1.1 Aggregation Methodology of HCI

The Human Capital Index components are combined into a single index by converting them into contributions to productivity (world bank group, 2020).

HCI = Survival × School × Health

$$\textbf{Survival} = \frac{1 - under\ 5\ mortality\ rate}{1}$$

$$\textbf{School} = e^{\emptyset}\left(expected\ years\ of\ school \times \frac{Harmonized\ test\ score}{625} - 14\right)$$

$$\textbf{Health} = e\left(\gamma_{ASR}(Adult\ survival\ rate - 1) + \gamma_{stunting} \times (not\ stunded\ rate - 1)\right)/\ 2$$

The resulting index has values that lie between 0 and 1. So a score of 0.75 indicates that a child born in today's productivity is 25 percent lower than could be attained by complete education and health.

5.2 *The Utilization of Adjusted Human Capital Index UHCI*

The Human Capital Index (HCI) indicates the quantum of human capital expected to accumulate by a child when he attains the age of 18, considering the current education and health condition in the country. It also helps to assess how changes in education and health influence the productivity of workers in the upcoming generation. A child born in a country is expected to grow up and becomes a future worker and assumes that he will find suitable work. It is said to be incorrect that a sizable proportion of the population in developing countries are unemployed/ working in jobs that do not allow them to utilize their full skill and potential. The effective utilization of adjusted human capital will rectify the problem of underutilization of human capital in labor markets. The working-age population should effectively utilize their skills, abilities, education, and another potential to enhance productivity.

So the UHCI is a supplementary measure of HCI are;

$$\textbf{\textit{UHCI}}\ (\textbf{\textit{basic or full}}) = \textbf{\textit{Utilization rate}}\ (\textbf{\textit{basic or full}}) \times \textbf{\textit{HCI}}$$

Basic UHCI = Income gains of potential [Unemployed] workers

Full UHCI = Increased employment rate + Gains from relocating workers to locations

$$\textbf{Utilization (Basic measure)} = \frac{\textbf{Employment}}{\textbf{Working Age Population}}$$

$$\textbf{Utilization (Full measure)} = BER \times 1 + (1 - BER) \times \frac{Minimum\ HCI}{HCI}$$

$$\textbf{\textit{BER}}\ (\textbf{\textit{Better Employment Rate}})$$
$$= \frac{Non\ agriculture\ wage\ employees + Employers}{Population\ working\ age}$$

$$UHCI\ (\textbf{Full measure}) = BER \times HCI + (1 - BER) \times (Minimum\ HCI)$$

The world bank analyzed the HCI utilization measures for more than 160 countries and discovered that GDP per capita will be $\frac{1}{UHCI}$ higher in a sphere of complete utilization of education can health (Akyüz, 2017).

6. Human Capital Underutilization in India

6.1 Human Capital in India

Human capital comprises of educational, health, and other competencies of an individual which are intangible and can be used for a long period. Human capital has the potential to increase countries' productivity and economic growth. Human Capital Index (HCI) is the index of the World Bank that measures the potential productivity of a country.

The overall value of HCI in India for 2020 is 0.49.

Table 1: HCI in India 2020

	Boys	Girls	Overall
HCI	0.49	0.50	0.49
Survival to Age	0.96	0.96	0.96
Expected Years of School	11.0	11.2	11.1
Harmonised Test Scores	399	399	399
Learning Adjust Years of School	7.1	7.2	7.01
Adult Survival Rate	0.80	0.85	0.83
Not Stunted Rate	0.65	0.66	0.65
HCI Ratio (richest/ poorest 20 percent)			1.39

Source: World Bank Database

It indicates that a child born in India today will be only 49 percent as productive when he grows up as he could be benefited the full health and complete education. The HCI value of higher than for the South Asia region and other lower-income Countries (World Bank, 2020).In last year, India had ranked 116th position among the 157 countries in the world.

6.1.1 Components of HCI

These are the major components or measurement matrix of the Human Capital Index (HCI)

- **Survival to Age**

   It indicates the probability of a child's survival to the age of 5. (World Bank, 2020) reports that 96 children out of 100 born in India survive to age 5.

- **Expected Years of School**

   (World Bank, 2020) reports that a child in India expects to complete 11.1 of school by 18 years.

- **Harmonized Test Scores**

   It is the test score from international student achievement. As per (World Bank, 2020) the score for India the score is 399.

- **Learning Adjust Years of School**

   It refers to that what children learn and expected years of schooling. For overall score for India is 7.01 (World Bank, 2020).

- **Adult Survival Rate**

   It is the rate of health risk, under the current conditions a child born today has an adult survival rate of 83 percent in India (World Bank, 2020).

- **Not Stunted Rate**

   It is a healthy growth rate and for India, the value is 0.65 (World Bank, 2020). It indicates that 65 out of 100 children in India have a healthy growth rate.

6.2 *Problems of Human Capital in India*

Human capital has a significant role in the creation and development of aggregate economic growth in the country. Improving human capital will help to reduce poverty and foster the welfare of the people as a long-term goal. But It has many challenges to address at the general level.

6.2.1 Unemployment in India

Table 2: Unemployment in India (2004-2019) (in Percentage)

Indicator	2004	2009	2014	2019
% Total Unemployment Rate	**5.72**	**5.61**	**5.6**	**5.27**
Male	**5.72**	**5.59**	**5.6**	**5.28**
Female	**5.71**	**5.67**	**5.63**	**5.21**

Source (ILO, 2021a)

- In India, the Unemployment rate has shown a continuous decrease from 5.72 percent in 2004 to 5.24 percent in 2019.
- Even though the female unemployment rate in India is higher compared to males, both values had shown a decreasing trend from 2004 to 2019.
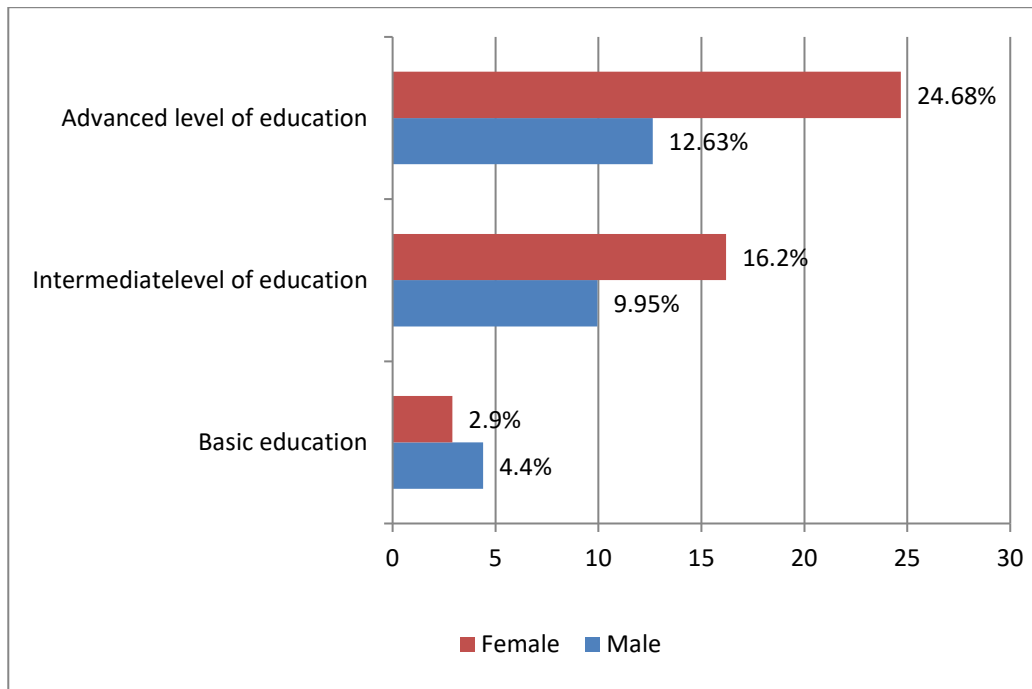
Figure 1: Distribution of unemployed by level of education and sex in India in 2018

Source:(Statista, 2021)

- In India majority of the females with an advanced level of education are unemployed and account for 24.68 percent of the aggregate population, and the male population with the percentage of 12.63.
- In the case of intermediate level of education, 16.2 percent of the female population and 9.95 percent of the population in India are unemployed.
- In the case of basic education in India, females are less unemployed 2.9 percent compared to the males with 4.4 percent.
- The report published by (Statista Research Department, 2021) revealed that graduate has the highest share of 16.3 percent of unemployment and the budget estimates by the Indian government also say that there has been a deficit in the estimates of the actual number of jobs created compared to the real jobs created over years.

6.2. 2 Labor Underutilization in India

The unemployment rate is considered as a measure of labor underutilization, but it has limited to a specific population ignoring those who are employed and those who are outside the labor force. Being the unemployment rate is only a component of labor underutilization the Nineteenth International Conference of Labor Statisticians (ICLS) has introduced the four measures of labor underutilization (Gammarano & Mathys, 2018).

Indicators to measure labor underutilization *(Gammarano & Mathys, 2018).*

$$LU1 - \text{ Unemployment rate } = \frac{Unemployment}{Labour\ force} \times 100$$

LU2 − Combined rate of time − related underemployment and unemployment

$$= \frac{Time-related\ underemployment\ +\ Unemployment}{Labour\ force} \times 100$$

Time-related underemployment can be defined as the category of employees who want to work for more hours if they have been allowed to work.

LU3 − Combined rate of unemployment and Potential labour force

$$= \frac{Unemployment\ +\ Potential\ labour\ force}{Labor\ force\ +\ Potential\ labour\ force} \times 100$$

The potential labor force is the category of the labor force which they are actively search for jobs or will enter the labor market shortly.

LU4 − Composite measure of labour underutilization

$$= \frac{Time-related\ underemployment\ +\ Potential\ labour\ force}{LLabor\ force\ +\ Potential\ labour\ force} \times 100$$

Table 3: Underutilization in India (2010-2019)

Year	LU2	LU3	LU4
2010	8.9	6.8	10
2011	8.8	6.8	9.9
2012	8.7	6.8	9.9
2013	8.7	6.9	9.9
2014	8.6	6.8	9.8

2015	8.5	6.8	9.7
2016	8.4	6.8	9.6
2017	8.3	6.7	9.5
2018	8.2	6.7	9.5
2019	8.1	6.6	9.4

Source:(ILO, 2021b)

- The Combined rate of time-related underemployment and unemployment in LU2 of India decreased from 8.9 percent in 2010 to 8.1 percent in 2019.

- For LU2, we found that youth labor underutilization (15-24) LU2 was high 25.8 percent in 2019. It increased between 2010 and 2019 (From 24 to 25.8 percent). Youth labor underutilization was particularly high among young women. In 2019, female labor underutilization LU2 26.8 percent. Although it was 25.6 percent among males.

- In terms of geographical coverage of disparities in labor underutilization, the rate in urban areas is higher than that of rural areas, and it accounts for 9 percent in urban areas and 7.7 percent in rural areas in the year 2019.

- The combined rate of unemployment and Potential labor force LU3 of India decreased from 6.8 percent in 2010 to 6.6 percent in 2020

- In 2019, Youth labor underutilization (15-24) was 27.1 percent for LU3. It grew between 2010 and 2019 (23.2 to 27.1 percent. Female youth labor underutilization was higher compared to male youth underutilization.

- In 2019, the female had an LU2 of 29.2 percent, while males had an LU2 of 26.6 percent. We also discovered that the LU3 rate was low in the high age group (25+), with 3.2 percent in 2010 and 3 percent in 2019.

- The composite rate of labor underutilization in LU4 decreased from 10 percent in 2010 to 9.4 percent in 2019.

- In terms of geographical coverage of disparities in labor underutilization, the rate in urban areas is higher than that of rural areas, and it accounts for 10.4 percent in urban areas and 8.9 percent in rural areas in 2019.

- The youth labor underutilization (15-24) LU4 in 2019 was 29.7 percent [31.4 percent for females and 29.4 percent for males].

- We also discovered that the LU4 rate was constant in the high age group (25+), with 6 percent in 2010 and 2019.
- LU4 for females was 8.4 percent in 2019 [13.4 percent in urban and 6.4 percent in rural], and the LU4 youth females increased from 28.3 percent in 2010 to 31.4 in 2019.
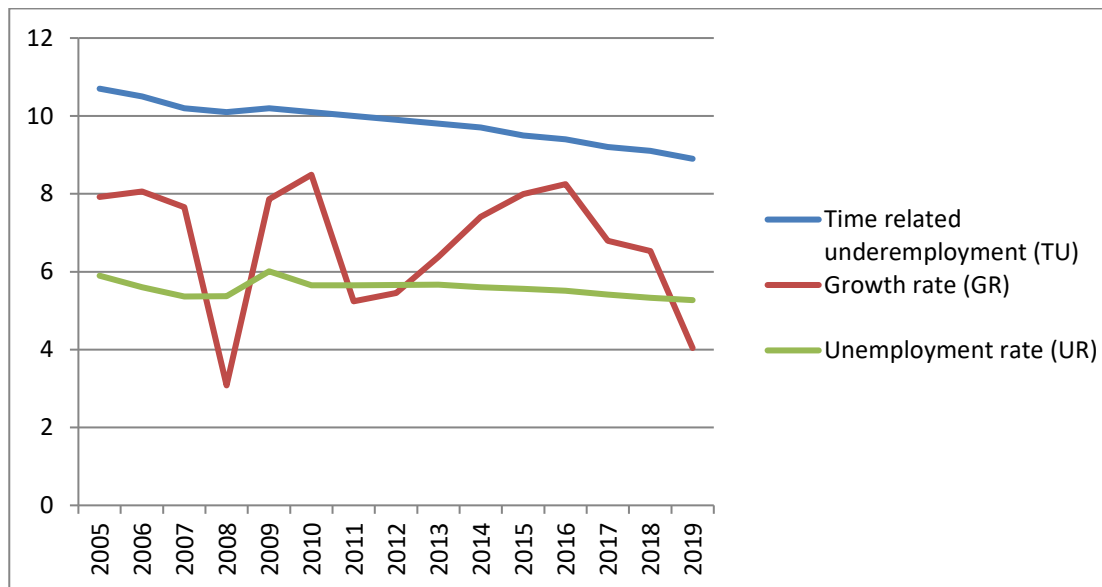

Figure 2: Relationship between underutilization and Economic growth in India (2005-2019)

Source: (World Bank, 2021) and (ILO, 2021b)

It is important to note that the economic growth in India fluctuates over time from 2005 to 2019. During 2008 the world has witnessed the great depression and it has adversely affected the Indian economy and the GDP has crippled to 3.08 percent during the year. After that, a remarkable recovery had brought out and a hike of GDP to 7.86 in 2010. It remains stagnant in 2010 and again decreased to 5.24 percent in the year 2011. In 2016 the real economic growth attained the highest values in 2010 and 2016 with a percentage of 8.49 and 8.25 respectively. After 2016, it has shown a downward trend and reduced to 4.04 percentage in 2019. It is due to various policy agendas of government like demonetization of currency, tax reforms, and also due to the collapse in private consumption.

Unemployment is considered an indicator of labor underutilization. In India, the unemployment rate was consistent during 2010-2011, then it started fluctuating through years and shown a downward slope from 2015 to 2019. But as per the latest data of (World Bank, 2021), the unemployment rate in India has increased to 7.11 percent in 2020 which is a record hike compared to the last decade. This is due to the outbreak of the Covid 19 pandemic that also hurts

the global economy. The unemployment of the total workforce in India was at 5.27 percent in 2019, which was a less percentage compared to the previous year. So it can be inferred that India was successfully implementing measures to abolish the unemployment scenario and this might be interrupted due to the outbreak of the Covid-19 pandemic.

6.3 *The Impact of Covid-19 on the Human Capital in India*

Human capital is considered as the non-transferable asset of an individual, whereas the physical and financial capital can be destroyed. Human capital comprises of educational, health, and other competencies of an individual which are intangible and used for a long period. The advancement of the human capital of an individual will have a positive direct impact on countries productivity and economic growth. But the Covid-19 pandemic has hit this valuable asset and affected the health of millions of people and the education of hundreds of children (world bank group, 2020). To mitigate the loss caused due to effect pandemic, governments should make more investment in human capital at the global level. And the gap of human capital accumulation can be removed by enhanced access to proper education and health among the population.

Table 4: Impact of Covid-19 on Employment and Unemployment in India

	2019 (Annual)	2020 (Annual)	Change
Employment rate (%)	46.74	43	↓
Unemployment rate (%)	5.27	7.11	↑

Source: (ILOSTAT database labor force estimates, n.d.)

India slid into the Covid-19 pandemic crisis that has a long-term impact on the general economic outlook. The impact was persistent and led to a further economic slowdown. As per the (ILOSTAT database labor force estimates, n.d.) the annual employment rate in India falls from 46.74 percent to 43 percent. This declining trend in employment rate shows the absence of generating new employment opportunities or existing employees lose their jobs due to the current economic slowdown. The unemployment rate in India has increased to 7.11 percent from 5.27, it was a record hike and the potential labor force will suffer the most. It has long-term damage to potential output, Productivity growth in India. The significant increase in the

employment rate leads to a negative impact on human capital utilization in India. So due to the outbreak of the Covid-19 pandemic long-run damage to and large economic shock have stimulated an uncertainty in the growth prospects among nations.

7. Estimating the relationship between underutilization of human capital and economic growth in India

7.1 Augmented Dickey Fuller (ADF) Test & Johansen Integration Test

The purpose of this study is to know if there is a link between underutilization of human capital, productivity, and economic growth in India employing a different range of applied econometric tools like the Augmented Dickey Fuller (ADF) test & Johansen Integration test, and the ARDL model. The initial step is to determine if the time series data are stationary or non-stationary. That is the time series data has unit root or not. There are various tests, one of the commonly used is the Augmented Dickey Fuller (ADF) Test.

Table 5: Results of Augmented Dickey Fuller (ADF) Test

Variable	Level			First Difference		
	Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
GDP	-3.102	-2.998	-0.974	-4.313	-4.110	-4.426
	(0.049)*	(0.016)*	(0.279)	(0.006)**	(0.032)*	(0.000)***
UR	-2.624	-2.873	-0.808	-4.358	-4.184	-4.470
	(0.111)	(0.198)	(0.347)	(0.006)**	(0.029)*	(0.000)***
EAG	-1.795	-1.763	0.072	-3.790	-3.769	-3.911
	(0.366)	(0.667)	(0.689)	(0.015)*	(0.048)*	(0.000)***
LP	-3.522	-3.356	-0.784	-4.572	-4.406	-4.735
	(0.023)*	(0.097)	(0.358)	(0.004)**	(0.020)*	(0.000)***
TU	-0.097	-1.654	-5.261	-3.412	-9.536	-1.455
	(0.931)	(0.716)	(0.000)***	(0.032)*	(0.000)***	(0.000)***

Note: GDP- Gross Domestic Product, UR- Unemployment Rate, EAG- Employment in Agriculture, LP- Labor Productivity, TU- Time Related Underemployment

From table 5, we can say that with using 0.05 level of significance level GDP is stationary at level, while all other variables are stationary at first difference.

Table 6: Johansen Integration Test (Trace and Maximum Eigen value)

Hypothesised No. of CE	Eigen value	Trace test	P-value **	Max- Eigen Statistic	P-value **
None *	0.99170	129.16	0.0000	67.089	0.0000
At most 1 *	0.93177	62.074	0.0010	37.588	0.0011
At most 2	0.73341	24.486	0.1865	18.508	0.1143
At most 3	0.34057	5.9771	0.7012	5.8294	0.6404
At most 4	0.010499	0.14776	0.7007	0.14776	0.7007

Table 6 shows the results of Johansen test for the trace test and maximum Eigen value, the results reveal that at the 0.05 level of significance there are two co-integrating egn(s). So the findings confirm the presence of long- term relationship between those variables.

7.2 ARDL model

Variables are found integrated in mixed order that is four variables are stationary in the first difference and the other one is stationary at level. Then we can use the ARDL model.

Table 7: ARDL model estimates for GDP

Variable	Coefficient	t-Statistic	Prob.*
GDP(-1)	-0.574787	-1.462811	0.2397
GDP(-2)	-0.313045	-3.251823	0.0474
LP	1.199969	16.94667	0.0004
LP(-1)	0.650510	1.369039	0.2645
TU	3.072639	1.659123	0.1957
TU(-1)	-3.202499	-1.997912	0.1396
EAG	-0.120203	-2.508106	0.0871
EAG(-1)	0.085724	3.067444	0.0547
UR	-2.589599	-1.825402	0.1654
C	19.18778	3.865473	0.0306
R-squared	0.995694		

Adjusted R-squared	0.982778		
S.E. of regression	0.220148		
Sum squared resid.	0.145395		
Log likelihood	10.75992		
F-statistic	77.08551		
Prob. (F-statistic)	0.002173		

ARDL model estimates reveal that GDP is significantly positively affected by labor productivity only. Table 8 indicates that over the long run if time-related underemployment decreased by 1 percent GDP will significantly increase by 3.2 percent. Also, if the unemployment rate decreased by 1 percent GDP will increase by 2.58 percent. Employment in agriculture decreased by 1 percent and labor will choose industry or service sector will increase GDP 0.085 percent (but this is insignificant).

Table 8: F- Bounds Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.869218	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

The cointegration test results here indicate that F- statistic value is 5. 869218, it is greater than the lower bound and upper bound at 5 percent level of significance, it shows that there is a long-run equilibrium relationship between GDP (Dependent variable) and Labor productivity, Time related underemployment and Employment in agriculture (Independent variables).

Table 9: ECM Regression for GDP

Variable	Coefficient	t-Statistic	Prob.
C	19.18778	8.282217	0.0037
D(GDP(-1))	0.313045	6.268172	0.0082
D(LP)	1.199969	37.80160	0.0000
D(TU)	3.072639	4.455564	0.0210

D(EAG)	-0.120203	-5.827519	0.0101
CointEq(-1)*	-1.887832	-8.274915	0.0037

Table 9 shows the short-run ARDL results of GDP on its independent variables. The value of cointegration is -1.887832, it is statistically significant and less than zero, less than -1 and greater than -2, it means that moving from the short run to the long run the system will oscillate above and below the equilibrium value in a diminishing nature until it reaches to the equilibrium path. The results also reveal that there is no significant effect of the unemployment rate on GDP.

Table 10: ARDL Long Run Form and Bounds Test

Variable	Coefficient	t-Statistic	Prob.
LP	0.980214	17.84084	0.0004
TU	-0.068788	-0.303025	0.7817
EAG	-0.018264	-1.211863	0.3123
UR	-1.371732	-1.518161	0.2263

Table 10 shows the result of the ARDL long-run form and bounds test. It indicates that the Labor productivity (LP) is the only variable with statistical significance as it lies in the cut off of 0.05 level of significance, so it can be inferred that in the long run labor productivity has a significant positive relationship with GDP and all the other variables has a negative relationship with GDP.

Table 11: ARDL model estimates for LP

Variable	Coefficient	t-Statistic	Prob.*
LP(-1)	-0.476146	-1.006445	0.3883
LP(-2)	0.312322	2.544830	0.0843
GDP	0.888921	13.60152	0.0009
GDP(-1)	0.416650	1.080519	0.3590
UR	2.020132	1.499666	0.2307
TU	-3.771755	-2.119318	0.1243
TU(-1)	3.961483	2.459738	0.0909
EAG	0.091244	1.931530	0.1489
EAG(-1)	-0.082174	-2.746307	0.0710

C	-15.76880	-3.736593	0.0334
R-squared	0.995273		
Adjusted R-squared	0.981093		
S.E. of regression	0.219900		
Sum squared resid.	0.145068		
Log likelihood	10.77456		
F-statistic	70.18711		
Prob. (F-statistic)	0.002497		

ARDL estimates show that labor productivity is significantly positively affected by GDP only. In the long run, if unemployment decreases by 1 percent labor productivity will increase by 2.02 percent, also time-related underemployment decreased by 1 percent labor productivity will increase by 3.77 percent.

Table 12: F- Bounds Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.215421	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

The cointegration test results indicate that F- statistic value is 5.215421, it is greater than the lower bound and upper bound at 5 percent level of significance, it shows that there is a long-run equilibrium relationship between Labor productivity (Dependent variable) and GDP, Time related underemployment and Employment in agriculture (Independent variables).

Table 13: ECM Regression for LP

Variable	Coefficient	t-Statistic	Prob.
C	-15.76880	-7.845742	0.0043
D(LP(-1))	-0.312322	-6.047508	0.0091
D(GDP)	0.888921	39.38601	0.0000
D(TU)	-3.771755	-4.482832	0.0207
D(EAG)	0.091244	4.887251	0.0164
CointEq(-1)*	-1.163824	-7.800422	0.0044

Table 13 shows the short-run ARDL results of labor productivity on its independent variables. The value of cointegration is -1.163824, it is statistically significant and less than zero, less than -1 and greater than -2, it means that moving from the short run to the long run the system will oscillate above and below the equilibrium value in a diminishing nature until it reaches to the equilibrium path. The results also reveal that there is no significant effect of the unemployment rate on labor productivity.

Table 14: ARDL Long Run Form and Bounds Test

Variable	Coefficient	t-Statistic	Prob.
GDP	1.121794	9.132030	0.0028
UR	1.735771	1.101096	0.3513
TU	0.163021	0.442239	0.6883
EAG	0.007793	0.311740	0.7756

Table 14 shows the result of the ARDL long-run form and bounds test. It indicates that GDP is the only variable with statistical significance as it lies in the cut-off of 0.05 level of significance, so it can be inferred that in the long run only GDP has a significant positive relationship with labor productivity, and all the other variables are not statistically significant for the model.

8. Conclusion

This paper examines the effects of human capital underutilization on the economic growth and productivity of India. The study employed the annual time-series data from 2005 to 2019. The findings of the study revealed that moving from short run to long run the effect of human capital underutilization on GDP will oscillate above and below the equilibrium value in a diminishing nature until it reaches the equilibrium path. The results also revealed that in the short-run there is no statistically significant effect of the unemployment rate on GDP and labor productivity. But in the long run, human capital underutilization has a negative relationship with GDP and labor productivity. The study revealed that both in the short run and long run there exists a positive relationship between GDP and labor productivity.

The long-run effect of human capital underutilization on GDP is specifically addressed as a major concern for India as the human capital of a nation is considered a vital tool for achieving social, economic, and political goals. As far as India is concerned it has a strong feature of demographic dividend and the potential of the younger population should effectively be utilized to reduce the issue of human capital underutilization. One of the main challenges faced by India

is the problem of severe skill-related youth underemployment as the majority of the youngsters have attained an advanced level of education. So there is a strong urge for specific policy measures in Indian labor markets is required for addressing the problem of human capital underutilization and thereby accelerating economic growth and labor productivity. Generation of productive and skill-oriented job opportunities for the future labor force and proper training for the existing labor force is a feasible option for curtailing labor underutilization in India.

References

A, O. O., O, F. H., & A.A, A. (2019). Measuring Manpower Underulisation and Performance of ICT Driven Ministries and Parastartals in Neigeria. *International Journal of Civil Engineering and Technology (IJCIET)*, *10*(3), 1056–1064.

Akyüz, Y. (2017). Global Economic Prospects: In *The Financial Crisis and the Global South* (Issue June). https://doi.org/10.2307/j.ctt183pb3w.5

Ali, M., Egbetokun, A., & Memon, M. H. (2018). Human capital, social capabilities and economic growth. *Economies*, *6*(1), 1–18. https://doi.org/10.3390/economies6010002

Ball, L. M., Leigh, D., & Loungani, P. (2013). Okun's Law: Fit at 50? In *IMF Working Papers* (Vol. 13, Issue 10). https://doi.org/10.5089/9781475574265.001

Berdecia, F. S., & Jaffe, A. J. (1955). The concept of and Measurement of Underemployment. *Monthly Labor Review*, *78*(3), 283–287.

Bhat, T. A. (2019). The validity of Okun's Law: Evidences from Indian economy. *Theoretical and Applied Economics*, *XXVI*(4), 273–278.

Curea, Ş. C., & Ciora, C. (2013). The impact of human capital on economic growth. *Quality - Access to Success*, *14*(SUPPL. 1), 395–399. https://doi.org/10.1016/s2212-5671(15)00258-0

Gammarano, R., & Mathys, Q. (2018). *Spotlight on Work Statistics: Avoiding unemployment is not enough* (Issue August). https://www.ilo.org/global/statistics-and-databases/publications/WCMS_644467/lang--en/index.htm

Hashem, E. A. (2021). The Impact of Human Capital Underutilization on Productivity and Economic Growth in Egypt. *Journal of Economics and Business*, *4*(2), 231–244. https://doi.org/10.31014/aior.1992.04.02.359

ILO. (2021a). *Unemployment, male (% of male labor force) (modeled ILO estimate) - India | Data*. World Bank. https://data.worldbank.org/indicator/SL.UEM.TOTL.MA.ZS?locations=IN

ILO. (2021b). *Unemployment and labour underutilization - ILOSTAT*. ILOSTAT. https://ilostat.ilo.org/topics/unemployment-and-labour-underutilization/

ILOSTAT database labor force estimates. (n.d.). *Employment to population ratio, 15+, total (%) (modeled ILO estimate) - India | Data*. 2021. Retrieved August 31, 2021, from https://data.worldbank.org/indicator/SL.EMP.TOTL.SP.ZS?end=2020&locations=IN&start=2014

Mubibul Haq. (2016). Human Capital Resources: A Review and Direction for Future Research. *International Journal of Management Development*, *1*(4), 261–286.

Statista. (2021). *Unemployment with advanced education (% of total labor force with advanced education) - India | Data*. Statista Research Department. https://data.worldbank.org/indicator/SL.UEM.ADVN.ZS?locations=IN

Statista Research Department. (2021). • *India - unemployment rate by education level 2019 | Statista*. Statista Research Department. https://www.statista.com/statistics/1001039/india-unemployment-rate-by-education-level/

UIA. (1997). *Underutilization of human resources | World Problems & Global Issues | The Encyclopedia of World Problems*. The Encyclopedia of World Problems & Human Potential. http://encyclopedia.uia.org/en/problem/137000

Viswanath, J., Reddy, K. L. N., Pandit, V., Viswanath, J., Reddy, K. L. N., & Pandit, V. (2017). *Human Capital Contributions to Economic Growth in India : An Aggregate Production*

Function Analysis Published by : Shri Ram Centre for Industrial Relations and Human Resources Linked references are available on JSTOR for this article : Human Capital Contr. 44(3), 473–486.

World Bank. (2020). *Human Capital Index 2020 -India* (Issue October). https://databank.worldbank.org/data/download/hci/HCI_2pager_IND.pdf?cid=GGH_e_hcp external_en_ext

World Bank. (2021). *GDP growth (annual %) - India | Data*. https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2020&locations=IN&st art=1991

world bank group. (2020). *Covid-19 and Human Capital*.