

**THE EFFECT OF ECONOMIC GROWTH ON THE HUMAN CAPITAL OF BRICS  
COUNTRIES: A CASE STUDY OF INDIA AND CHINA**

## **ACKNOWLEDGMENT**

## **DEDICATION**

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**List of abbreviations**

BRICS – Brazil, Russia, India, China and South Africa

Covid-19 – Coronavirus Disease 2019

GDP – Gross Domestic Product

GNI – Gross National Income

IMF – International Monetary Fund

OECD – Organisation for Economic Co-operation and Development

PPI – Producer Price Index

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## ABSTRACT

Human capital is the most significant asset that can be found in all countries, either developed, developing and underdeveloped. It plays a significant role in how the economy evolves and how they experience development. It is the totality of who is skilled, trained and qualifies to work. Several variables influence the activity of human capital. Variables such as education, health and technology are deciding factors of how the countries human capital develops. Investment in the human capital variables indirectly affects the economy. When a country experiences improvement in their education, health and technology, their human asset increases and indirectly, they experience improved performance, increased productivity and economic development.

This research evaluates the effect of economic growth on human capital, using China and India as case studies. Analysis of different economic growth models was done, with a focus, especially on the Solow growth model. An explanation of economic growth breaks was also done and the factors that influence them. It was discovered that economic growth has a positive effect on human capital and vice versa. When one experiences growth, the other is also affected.

It was discovered that human capital influences the economic development of China and India, especially, their GDP. The empirical findings emanating from the study revealed that the growth in the GDP per capita of China and India over the past years were not in isolation of the development of human capital over the years. As the human capital experiences development, so does the overall economy of the countries.

It was however shown that the pace at which GDP as a whole increased in both China and India was relatively higher than the rates of GDP per capita growth that was witnessed in the two countries. It was therefore recommended that a lot of resources should be invested in harnessing the human resources in these two countries. It was also suggested that the governments of both countries should possibly diverse a means through which the productivity level of the population could be maximised.

## INTRODUCTION

This section is an introduction to the pivot of the research and why the study is relevant. This section will provide background information on the research topic by discussing present-day trends, statistics and data to indicate the effect of economic growth on the human capital of BRICS, using India and China as a case study. This chapter will also explain why the phenomenon issue needs to be addressed and discussed. The chapter will also explain the rationale behind the topic and its importance. Beyond that, there will also be an outline of how the entire study is shaped. The structural framework of this chapter includes the background to the problem, aims and objectives, research rationale, significance of the study and the structural dimension of the entire dissertation.

### **Background to the Problem**

Pelinescu (2015) argues that human capital has a direct contribution to the sustainable development of countries as there is a great diffusion of knowledge and skills in the manufacturing industries and other industries that require smart, sustainable and inclusive growth. Horwitz (2005) and Pistorius (2004) posit that the increase in the rate of the competitiveness advantage through innovation and diffusion technology is also influenced by the rate in the development of the human capital. This shows that human capital is an important factor of economic growth for companies and countries at large (Riley, 2012). Therefore, the role human capital plays in economic growth cannot be overemphasised, as it is an invaluable asset and an important prerequisite.

Studies such as Fernandez and Mauro (2000), Diebolt and Hippe (2019) and Muhammed, Egbetokun and Memon (2015) identify several roles played by human capital in economic development to include the labour force participation force, age, educational attainment, the GDP ratio and the unemployment rate. According to Alatas and Cakir (2016), human capital has been characterized in terms of health facilities and services, on-the-job training, formally organized education at all levels, adult study programs, and individual and family migration to react to changing job prospects. The concept of human capital is, therefore, the abilities, skills and knowledge of human resources of countries in relation to the process of acquiring and increasing the number of people with good health, skills and educational attainment. An increase in the human capital of countries around the world is invariably an increase in the productivity and competitiveness of such countries.

Technological change is the primary source of economic growth (Osiobe, 2019), but To effect transformation, a country must participate in an invention that focuses primarily on human capital as an input. Technology, innovation and education are important tools in the maximisation of the country's human capital capacity. Retrospectively, the maximisation would help in fighting poverty, create more opportunities, increase productivity and facilitate socio-economic development (Osiobe, 2019). As a result, investing in education, technology, and development would benefit both individual productive capacity and the economy as a whole.

Nonetheless, there has not been a consensus on the study of scholars on the phenomenon. Several studies have argued that there is a poor link between human resources investment and economic growth, while others have concluded that there is a positive correlation. The disparities in different studies are one of the reasons that necessitated this study.

## **AIM AND OBJECTIVES**

This research aims to investigate, estimate and compare empirically whether and to what extent does the economy of China and India with human capital accumulation being the driver of economic growth.

The specific objectives of this research are:

- i. To investigate if there is an existing relationship between human capital and GDP per capita growth for China and India
- ii. To critically analyse and compare the influence of human capital accumulation on GDP per Capita growth for China and India
- iii. To identify and asses other key economic growth drivers for China and India
- iv. To make recommendations based on the findings of the research

## **The rationale of the study**

As explained earlier, human capital has a direct influence on the economy of countries. However, little study has been done on how the economic impact on human capital. This study aims to fill the knowledge gap by examining and investigating the effect of the economy on the human capital in China and India. Engaging in this study is important because many studies have identified that there is a link between human capital and economic development. There are specific factors that

either lead to economic stability or instability. This study will identify the factors and prove ways they can be channelled positively.

## **JUSTIFICATION FOR CHOOSING CHINA AND INDIA**

In China, there has been an improved effort to accelerate and better invest in people for equity and growth. World Bank (2020) estimated that children born each day in China would be 65% productive when grown-up if she enjoys complete education and full health. In the index they provided, it was also stated that students in China are well educated compared to other Asian countries. China ranked 45th in the world human capital index with 0.65% potential reached in 2020 with Singapore ranking in the first position with 0.88% (World Bank, 2020).

The following data was collated by China Centre for Human Capital and Labour Market Research (CHLR) (2020). In 2018, they stated that the average age of labour was 38.4 years. In the same year, the average number of years of school in the labour force was 10.4. The proportion of the labour force with high education or higher education was 39.8% with 20.7% in the rural and 52.7% in urban areas while those with a college education or above was 19.2% with 5.4% in rural and 28.6% in urban. People aged 25-45 years represented 55.7% of the labour force and accounted for 66.1% of the total labour force of human capital. The human capital of people in the urban area surpassed those in the rural. The average growth rate of human capital in China between 2009 and 2018 was 9%.

The data shows that 59% of China's labour have formal education. It is important to note that not all the remaining 49% are illiterate, as informal education also counts as a form of education and adds to the growth of human capital. China has experienced a tremendous change in their educational system.

On the other hand, India ranks 116th with 0.49% potential reached. World Bank (2020) estimated that children born each day in India would be 55% productive when grown-up if she enjoys complete education and full health. World Bank estimated that India has a total labour force of 471,689,092, of which 60% have advanced education. They also state that ages 15+ covers 48.1 of the total labour force participation. There has been an overall progression in the literacy rates of both China and India. However, it was discovered that there is a disparity in the preprimary

meducation in the two countries, with Indian children going to school earlier than Chinese children. This led to a higher number in the number of years used in schools in China.

The two countries have big economies, high population and growth potential. Also, there is high human capital accumulation, abundant natural resources, balanced trade and high technology that makes their economies open.

## **CHAPTER 1**

### **SOLOW GROWTH MODEL**

#### **1.1 INTRODUCTION**

This chapter is an analysis and review of different literature on the Solow growth model. This section will comprehensively explain the circumstance that led to the postulation of the model while also giving different definitions of the model as explained by different scholars. The section will also explain the different contributions of the model to the study of the economic growth of countries while also explaining the limitations of the model and the criticism against it. The importance of the model in respect to human capital development will be identified while an analysis of the application of the model will be given.

#### **1.2 THE MODEL**

Daniele (2017) states that the model has an enormous impact on economic analysis. Based on the study of Acemoglu (2009), it was hypothesised that the model influenced how we think about growth in the economy and macroeconomic factors in general. The model was propounded by Robert Solow in 1956 to provide answers to the question of why some countries are more developed than others. The model is a criticism of the Keynesian Harrod-Domar long term growth model (Daniele, 2017). Although it agreed with the assumptions of Harrod-Domar, it disagrees with its fixed proportion analysis (Solow, 1956). The model is also known as the neoclassical growth model (Sims, 2012).

Solow advocated that society saves a fixed percentage of its revenue and that the population and labour supply expand at the same rate. Corporate Finance Institute explained it as an exogenous model of economic growth that believe that change in the economy is a result of a change in the population growth rate, the savings rate and the rate of technological advancement. Ramanayake (2019) on the other hand opines that since economic growth is the dynamic process between capital, labour and technology, which are inputs and outputs, the model will explain the differences between the consumption and the population and how they can affect the output. Therefore, the model is aimed at differentiating between savings, consumption and population on one hand and capital, labour and technology on the other hand.

Mankiw, Quah and Wilson (2014) described the model as an extension of the theory of Cobb Douglas. Soejoto, Cahyono and Solikhah (2017) discuss how production, or GDP, is affected by technology, the number of employees, the number of human assets, and the number of natural assets. They argued that the factors that determine the GDP of a country are labour, physical capital, human capital and natural resources. They added that the mastery of science and technology is also a determinant of the GDP (output). The impact of technology is increased productivity as it will lead to the need for less labour.

In the study done by Jones (1995), it was discovered that the Solow growth model allows the rate of growth of population to determine the long run of capital accumulation to which the economy converges and give room for the existence of a globally unique equilibrium and trajectories that converge monotonically to it (Guerrini and Sodini, 2013). A model is a mathematical approach to knowledge. The following assumptions were embedded in the theory. There is a constant savings rate ( $s$ ) while it is also believed that the economy produces a single commodity ( $Y$ ). Savings  $S = Sy$ ; there is “no scarce nonaugmentable resource like land”; prices and wages are flexible; there is constant full employment of factors of production; and an ex-ante is always equal to ex-post investment (Verena, 2014). The model’s fundamental equation shows its equilibrium mechanism:  $\dot{r} = Sf(r,1) - nr$  (Verena, 2014). This shows that the change of the capital-labour ratio  $r$  equals the difference between the two terms.

The first term is the amount of investment (equal to saving) in the model economy while the second term shows the amount of investment needed to maintain the workforce (expanding at rate  $n$ ) at the same capital-labour ratio so that the difference between them (amount of capital surplus to requirement) shows the rate at which the capital-labour ratio changes. Thereafter, Solow demonstrates the stability of the equilibrium value by showing how the capital-labour ratio changes over time when  $r \neq r^*$ . The model was not aimed at analyzing production but growth. Toye (2009) believes that Solow’s model is an embodiment of the utopian idea that in the long run, a better world would be achievable through the appropriate macroeconomic planning. In other to use the model to explain the growth rate of an economy, the population, consumption rate, present capital stock and the output rate are represented. On the other hand, argues that technology, capital accumulation and savings are essential components of the model.

The production function equation is  $Y = K^a(HL)^{1-a}A$ ; the growth accounting equation is  $gY = agK + (1-a)(gL + gH) + gA$ ; the balanced growth equation is that  $gY = gK$ . The result of the model would be to get the balanced-growth capital-output ratio, convergence, output per worker growth and endogenous growth (Daniele, 2017). Cottrell (2019) however, state that the Cobb-state requirement is  $sy = (n+\delta)k$ .

The model takes the assumption that higher saving and investment does not increase the rate of national income and product but could be a long-run economic growth. Zhong and Huang (2018) argue that there exist multiple steady states in the Solow model when the production function is not concave for any level of capital. Conclusively, the growth rates of knowledge and labour are constant. Labour is represented by  $L$ , Capital by  $K$ , Output by  $Y$  and Knowledge by  $A$  (Solow, 1956). The model assumes that GDP is produced based on the aggregate production function technology. In addition to the production function, the model has four other equations, namely:

Capital accumulation which is  $k_t = Y_t - C_t - \delta k_t$

Labour input grows at rate  $n$ :  $\frac{\dot{L}_t}{L_t} = n$

Technological progress grows at rate  $g$ :  $\frac{\dot{A}_t}{A_t} = g$

While a fraction  $s$  of output is saved each period:  $Y_t - C_t = sY_t$  (Whelan, 2005)

One of the main attributes of the model is that it allows for the distinguishing of the two types of growth: catching up on growth and cutting-edge growth. Sims (2012) state that the model is stylised on two parameters, namely; population growth and productivity growth. It predicts that countries should converge to steady states in which per efficiency units of variables do not change and in which per capita versions of those variables grow at a constant rate. This means that there should be a convergence of all parameters of countries that are the same except in the case where some countries are initially endowed with more or less capital. The basis of the whole study will be reflective of the GDP of China and India. The growth rate of China's GDP was 6.87% in 2016 and was 2.27% in 2020 (Textor, 2021). India, on the other hand, has a GDP growth rate of 8.26% in 2016 and -7.97% in 2020 (O'Neil, 2021).

### **1.3 SUMMARY**

The Solow growth model is very useful in the analysis of the economic growth of countries. The model examines the level of labour, technological advancement and different capitals to explain the trends of development. The model has evolved with the inclusion of health and education in the variables. The chapter is a comprehensive analysis of the different variables of the model and how they impact the economy.

## **CHAPTER 2**

### **ECONOMIC GROWTH MODELS**

#### **2.1 INTRODUCTION**

This chapter is a comparative analysis of different economic growth models against the Solow growth model. The chapter will evaluate the impact of the models on economic growth and the variables that influence such growths. Variables such as education, human capital, population growth, technology and health would be used as the basis of the analysis.

#### **2.2 GROWTH MODELS**

Pietak (2014) argues that the simplifications of the models of economic growth are based on whether the model is exogenous or endogenous. The classification and aggregation of this are that the models show the depreciation and appreciation for capital, in terms of its growth. These models are used to establish the conditions for economic development and determine the pathway to the realisation of sustainable growth (Keita, 2016; Wozniak, 2008). Apart from the case of the savings rate, Pietak (2014) further states that the models can also be divided according to the capital ratio.

According to Masoud (2014), the development of the different models of economic growth is concerned with the level of national output and its growth over time. They investigate challenges such as unemployment, stagnation, interest rates, inflation, exchange rate, stock market and the fiscal and monetary policies adopted by the government in dealing with such problems (Masoud, 2014).

The common models apart from the Solow model of growth include Lewis' (1954) Dual-sector model (Bauer, 1956), Rostow's (1960) Stages of growth (Khan and Marinaro, 2017), Harrod-Domar's (1939) model (Hochstein, 2020), Arrow (1962) "Learning by doing" model of growth (Mishra, 2016) and Romer's (1986) Endogenous growth model (Jones, 2019).

## **2.3 LEWIS' DUAL-SECTOR MODEL OF ECONOMIC GROWTH**

Lewis believes that the gap between capability and opportunity is what leads to growth (Dookeran, 2019). The capability of such an economy is dependent on savings, technology and the government. The opportunity on the other hand include factors such as infrastructure, rainfall, access to license and the market (Dookeran, 2019). The model is a complex approach to economic growth as there is one growth theory but with a set of complementary theories. The duality of the model is based on the division of the economy into two sectors, namely the subsistence sector and the capitalist sector. Hirota (2002) states that Lewis argues that the capital sector expands by absorbing unlimited labour supply in the subsistence sector that makes the accumulation of capital attainable, which would invariably help in developing the countries.

The model also theoretically explains the existence of inequality between the rich and the poor as this would be an important process in the demystifying of the growth process. In the subsistence sector which include the agricultural and rural industries, Hirota (2002) argues that the population is relatively larger to products and this would lead to low or zero marginal productivity of labour. Therefore, there would be underemployment which would open opportunity for labour supply to the capitalist sector.

When the labour supply exceeds demand, the labour market would be in favour of capitalists and they can keep the wage constant (Kindleberger, 1988). The model states that the level of wages in the capitalist sector is decided by the wages in the subsistence sector (Hirota, 2012). If the wage in the capitalist sector is less than the consumption of the subsistence sector, those in the subsistence sector would not have gone to seek a job in the capitalist sector.

Nonetheless, despite the higher wage rate of capitalist workers in an urban area, the wage is no more than the subsistence level in the urban area. The main profit of the economy is being controlled by the capitalist entrepreneur.

## **2.4 ROSTOW'S STAGES OF GROWTH**

Unlike the dual-sector model where development is not linear, development is linear under Rostow's stages of growth. Rostow presented five stages through which all countries must pass through before becoming a developed country. The identified stages of the model are the traditional society, preconditions for take-off, take-off, drive to maturity and age of high mass

consumption (Khan and Morinaro, 2017; Brooks and Kulkarni, 2011). The model sees industrialisation, trade and urbanisation as important spectrum for the development of a country. As the population of a country increases, so does its growth. This is a result of the urbanization that comes with a large population.

During the traditional society stage, every country has a structure that is characterized by limited production capacity (Brooks and Kulkarni, 2011). Countries have primitive methods of production and are more given to agriculture than other industries. They either don't have advanced technological innovations or have not applied them. Their standard of living is low and their consumption is tailored to necessities such as clothing, food and shelter (Brooks and Kulkarni, 2011). In the precondition take-off, countries transitioned through learning and their productivity increases as they have started introducing technological techniques to their production model. They tend to move from agricultural industry to technological industry (Rostow, 1990). Education is very important during the precondition for the take-off era.

In the take-off stage, countries begin to experience steady growth that can be sustained (Rostow, 1990). There is a political revolution and technological innovation that would lead to a positive and sustained result. Employment will increase in the manufacturing industry and a service sector will begin to emerge (Brooks and Kulkarni, 2011). Also, in the drive to maturity stage, the economy would have been stabilised and modern technology would have been effectively applied. Brooks and Kulkarni (2011) see it as a stage of prosperity. Agriculture continues to employ less labour while the manufacturing industry remains prevalent.

The workforce experience changes in their wage and their skills. The figure of the workforce in agriculture would drop, skilled and semi-skilled workers increases and the overall population in the urban areas would also increase. In the final stage of growth, societies become affluent and consumer power increases (Rostow, 1990). There is increased productivity and consumer demand is no longer a function of money alone. Brooks and Kulkarni (2011) argue that there would be a shift from supply to demand at this stage. The most important feature of this model is a shift from agriculture to the manufacturing sector.

## **2.5 INFLUENCE OF ECONOMIC GROWTH VARIABLES**

Different economic variables play an important part in the process of economic growth as they serve as an indicator for measuring the growth itself (Chughtai, Malik and Aftab, 2015). Every country experiences a period of recession and expansion. The process of growth is a cycle, no country is fully developed irrespective of the structure they have put in place (Issah and Antwi, 2017). This is evident in the result of the Covid-19 pandemic on the economy in which every country of the world experienced a mandatory economic break. The macroeconomic variables include employment statistics (Issah and Antwi, 2017), inflation, exchange rate, education, GDP, PPI (Chughtai, Malik and Aftab, 2015), human capital (Gundblach, 1996), technology (Ball, 1957) and health (Bloom et al. 2018).

Bloom et al. (2018) hold the view that improvements in health affect the pace of income growth in different ways. Strauss and Thomas (1998) opine that improved healthcare increases labour market participation and worker productivity. When workers have access to good healthcare, they would be able to work to their ultimatum and increase the output. Also, Prettnner (2013) believes that increased life expectancy creates the opportunity to invest in education and innovation. The government of countries invest more in the education, physical capital and innovation of their population when their life expectancy improves. This also means that workers will be well equipped to function well. Furthermore, Galor (2005) states that better health reduces fertility in women and effect an economic change from a stagnant state toward a sustained income. Therefore, there is a correlation between economic growth and health.

Marquez-Ramos and Mourelle (2019) argue that education is an important determinant of human capital growth and invariably, the economy. It is generally believed that increased knowledge and skill is capable of influencing the productive level of people living in a country. In their study, they observed that education has an impact on the wages of an individual which led to a positive correlation between education and economic growth. Grant (2017) believes that education affects the economy in three ways. First, it improves the ability of the workforce to carry out existing tasks more effectively. Secondly, it accelerates the transfer of knowledge and information about technologies and products and thirdly, it increases the creative ability and boosts the capacity of the workforce to innovate and create new products and technology.

It is generally believed that technology is the main driver of the economic growth of countries. Loo and Soete (1999) state that new theories of economic change hold the view that a continued increase in the level of resources spent on the invention of new technologies leads to a sustained increase in economic growth. The important factor of technology is innovation. When the rate of innovation in a country increases, they tend to also experience growth in their economy. Caliskan (2015) argues that technological transformation does not only mean a way to increase the wealth of the nations but also to give people the capacity to do things that they have not done before. It, therefore, influences human capacity and indirectly the economy.

## **2.6 SUMMARY**

The debate of economic growth has developed over time. The conversation has experienced evolutionary contribution that has aided the complexity of growth. However, scholars hold the view that growth is caused by external factors. They identified factors such as savings, investment, capital and technology as the convergence factors as they are almost important in all the models. The chapter is an explanation of the contribution of some of the contributions of scholars to the debate of economic growth.

## **CHAPTER 3**

### **ECONOMIC GROWTH BREAKS**

#### **3.1 INTRODUCTION**

This chapter will investigate and explain the different economic breaks that have been experienced in China and India over the years. The chapter will investigate the different factors that led to the breaks. The explanation of the breaks will be based on recessions, pandemics and wars. How they influence the economics and the prevalence of their trends.

#### **3.2 ECONOMIC DOWNTURN**

Kose, Sugawara and Terrones (2020) opine that the world economy has experienced four global recessions over the past seven decades, between 1975, 1982, 1991 and 2009. In these periods, the annual real per capita global gross domestic product contracted. The contraction was followed by the weakening of other key indicators of economic activities. The four downturns were caused by the financial crisis. However, an economic downturn could also be caused by war and pandemics (Jomo and Chowdhury, 2020; Thies and Baum, 2020) as experienced during the world wars and the advent of coronavirus in 2020 respectively.

The economic downturn is the decline in economic fortunes at both the country and individual levels which would create a circle in which there would be a reduction in consumer demand and lead to lower production and a higher rate of unemployment (Kenny, 2019). There would be a reflection of financial hardship in rising poverty, debt, bankruptcy, hunger in third world countries and job insecurity. Mann (2015) tagged the downturn circle as “vicious” as it causes damages to the economy and leads to a protracted period of stagnation. Mann states that some of the underlying challenges of economic breaks are slow productivity, high long-term unemployment and falling labour force participation. However, countries of the world react and are affected by the downturn on varying levels, based on their infrastructure, financial vulnerabilities and both resources and technological advancement. There are inequalities in every variable, including capital, labour and technology (Gurtner, 2010). The inequalities are reflected in the way every country is affected by economic stagnation.

The GDP of countries is directly affected by economic breaks. However, during the 2008/2009 recession, the GDP of countries fall drastically, except that of China (Khudyakova and Shmidt, 2019). The crisis in the real sector of the economy affected the global job market during this period and led to an increase in the unemployment rate of countries. The Solow growth model also linked labour as a factor that affects economic growth. India, like other BRICS country, except China experienced an increase in the dynamics of their labour productivity.

### **3.3 PANDEMIC AS A FACTOR OF ECONOMIC GROWTH BREAK**

The covid-19 pandemic has greatly affected the economies of the global market. The advent of the pandemic has made the global economic situation remain unpredictable with varied uncertainties plaguing even the most successful of economies (Jomo and Chowdhury, 2020). The virus originated from China has spread to all parts of the world and has led to countries enforcing stringent measures that have shattered the core sustaining pillars of the world economy (Ibn-Mohammed et al. 2021). Before the advent of the virus, OECD pegged their GDP outlook for countries at 8.8% but had to reduce it to 5.6% during the recovery process of economies, due to the devastating effect the pandemic had on global economies. The virus also brought varied crisis with it, from financial crisis to health crisis and to collapse in commodity prices (Gopinath, 2020). The crises interact in complex ways that are disastrous to economies.

In an article released by the World Bank in June 2020, they argued that Covid-19 will plunge the global economy into the worst recession since world war II. The World Bank forecasted that the economy will shrink by 5.2%. This is not far-fetched from the 5.6% forecasted by OECD. Bachman (2020) states that the pandemic has affected the production industries of countries, disrupt their supply chains and has consequentially unsettled their financial markets. The pandemic, according to Jomo and Chowdhury (2020) has led to the collapse of incomes and demand, declined export and import rates, fall of commodity price, shrieked travelling and tourism industry and decreasing remittances and foreign exchange. These variables have implications for the development, employment and poverty level of the countries.

The pandemic mostly affected third world countries and countries that are into manufacturing and tourism. China and India are affected by the pandemic, with India not yet knowing how to salvage what is left of its economy. China is the key manufacturing hub for several trades and businesses worldwide (Sikder, Zhang and Ahmod, 2020). Before coronavirus in 2019, the GDP of China was

5.82% but declined drastically to 2.27% in 2020 (Textor, 2021). That was a 3.59% reduction. Pan et al. (2020) opine that although the epidemic situation in China has gradually stabilised, they are still impacted by the severe situation in other countries since they make fortune from exporting to other countries, most of which are not yet free from the grip of the virus. Duan, Wang and Yang (2020), in their output analysis, estimated that sensitive industries such as tourism, transportation, retail and entertainment may lose up to 18% of normal output. They also state that 18 million small and medium-sized enterprises in China have been severely affected. These businesses account for 80% of enterprise jobs and 50% of private firms' exports. They were all forced to lockdown during the pandemic. This invariably led to an increase in unemployment and a reduction in the productivity level of the country.

India on the other hand, is still severely suffering from the pandemic, mostly, due to the ineptitude of the government. Before coronavirus in 2019, the GDP of India was 4.04% but declined drastically to -7.97% in 2020 (O'Neil, 2021). Despite India having one of the largest GDP growth rates before the pandemic, they still have a relatively high unemployment rate. Goyal (2020) states that almost 45% of households across India had reported an income drop and the economy was expected to lose £3.7 billion daily during the lockdown. Barbate, Gade and Raibagkar (2021) argue that lower consumption, reduced demand, falling prices, job cuts, supply cut and lower spending all led to a 3.5% hit to the £2.3 trillion of the entire Indian economy in 2019. During the severe stage of the pandemic, the unemployment rate in India increased by 12%. This is higher compared to the majority of the countries. In India, the pandemic also affected their hospitality sector, tours and travels, education, healthcare, real estate, hotels, retail, recreation and media (Chaudhary, Sodani and Das 2020).

### **3.4 WAR AS A FACTOR OF ECONOMIC GROWTH BREAK**

Although the BRICS countries have not experienced any war in recent times, there have been histories of the war in all the countries. Thies and Baum (2020) state that there has been an upward trend of armed conflict in the world since World War II. Many of these armed conflicts were wars of independence, insurgencies and civil wars. Although there is ambiguity as to the effect of war on GDP per capita, they argued that war can lower GDP per capita by reducing labour and total factor productivity through the destruction of existing physical and human capital. The impact of

war is also reflective in that it can lead to the reduction of gains from both domestic and foreign trade.

Serneels and Verpoorteen (2012) argue that there is no consensus about the impact of conflict on economic performance from an economic theoretical perspective. They state that the Solow growth model predicts that an economy recovers relatively quickly and revert to its steady state. They, however, state that war often has a short-term impact on the education, health and labour capacity of countries over the world.

### **3.5 SUMMARY**

Countries all over the world experienced a reduction in their GDP rate and unemployment rate in 2020. These were the first countries that would be experiencing a recession since the recession of 2009. Countries react differently to an economic downturn, but it is constant that the poverty rate of people would increase and the unemployment rate would also increase. The chapter explains the various recessions that have been experienced by China and India and the effect it has on their economic performance.

## **CHAPTER 4**

### **RESEARCH METHODOLOGY**

#### **4.1 INTRODUCTION**

This chapter provides an outline of the research techniques, methods and approaches throughout the research. It is an important chapter that provides the hypothetical strategy and theoretical framework for the project. Conclusively, the chapter will be the justification for the data used and how they were analysed.

#### **4.2 PHILOSOPHICAL PERSPECTIVE**

For any research to be effective, it is critical to define the problem the research is intended to answer as well as the knowledge gap it is intended to cover. An understanding of the situation would serve as a benchmark for determining how the research findings would be carried out and how the research objectives would be assessed. Every study has a philosophical underpinning. According to Saunders, Lewis, and Thornhill (2009), research philosophy is a set of beliefs and assumptions about the study's knowledge gap. This is the research's knowledge development phase. It's also known as the presumption made by researchers about how knowledge is created during the study process, according to Gerrish and Lathlean (2015).

The recognized difficulty in this study is the impact of human capital on India's and China's economic growth. Human capital has been related to economic growth in several studies. Human resources, according to Xu and Li (2020), have a beneficial impact on economic growth and can help improve economic performance by increasing people's knowledge and abilities. Shukla (2017) also reveals that human capital and economic growth in India have a positive association. For his analysis, he employed factors like gross capital formation and secondary school enrollment. Secondary school enrollment has been found to have the largest impact on India's GDP growth. India's GDP rises as per capita health expenditure, gross capital formation, and school enrollment rise. Because human capital is viewed as a factor of production in many studies, whenever human capital grows, the economy grows as well. The goal of this research is to investigate the phenomenon and establish whether the hypothesis is correct or incorrect. The research philosophy will justify and rationalize the chosen research methodologies as well as their relevance.

Every researcher has a philosophical perspective that explains why they are conducting their research. Glasper and Rees (2017) disagree with Saunders, Lewis, and Thornhill (2009) and Gerrish and Lathlean (2015). They claimed that research philosophy is made up of a mix of views, assumptions, and disagreements about the issue and knowledge gap. As a result, the techniques of data gathering and analysis are influenced by attitudes, assumptions, the chosen issue, and the knowledge gap.

Figure 3.1.1 below is a comprehensive summary of how research design and data collection and analysis influence the philosophical stance of the researcher.

Fig. 3.1.1 The research ‘onion’ (Source: Saunders, Lewis and Thornhill, 2009)

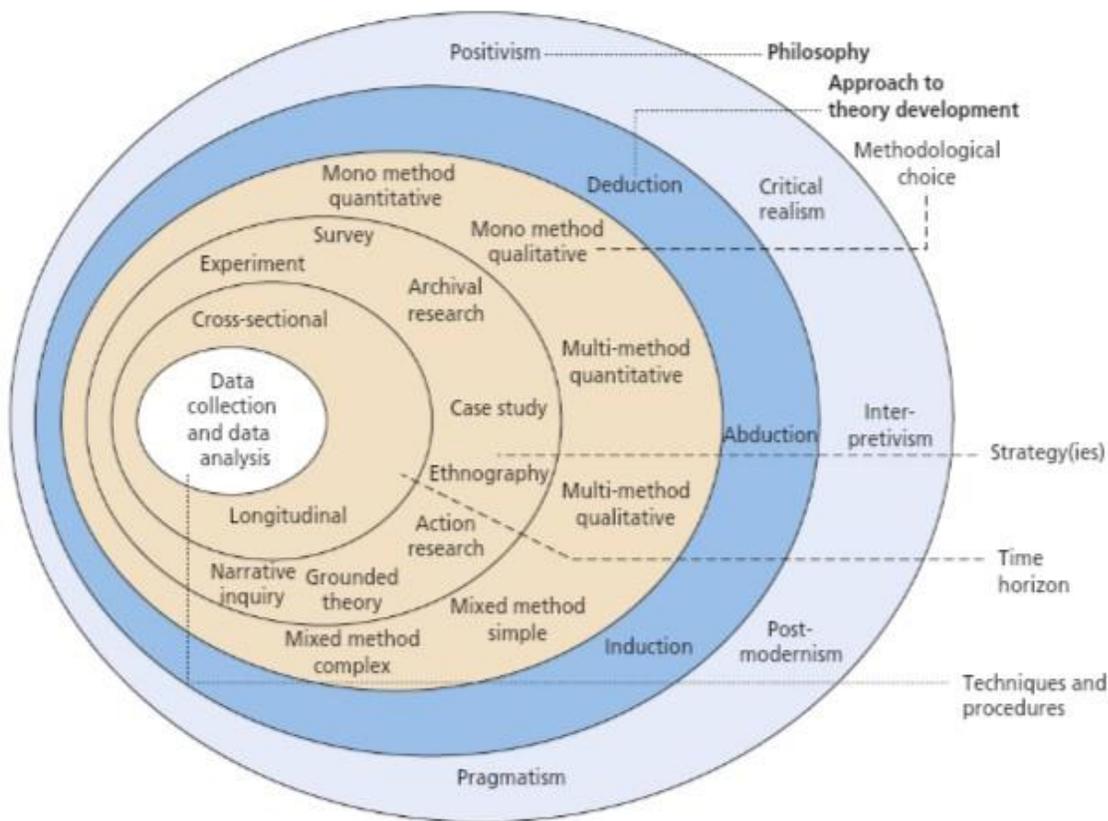
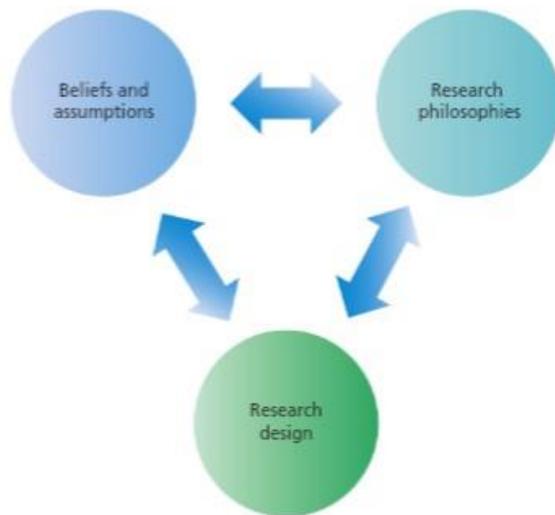


Figure 3.1.2 below also shows the reflexive process for the development of the research philosophy.

Fig. 3.1.2 Developing your research philosophy (Source: Saunders, Lewis and Thornhill, 2009)



As shown in fig. 3.1.1, there are different kinds of philosophical positions. The commonly used research philosophies include pragmatism, post-modernism, interpretivism, critical realism and positivism. The post-modernism approach has been selected as the philosophical methodology for this study.

What counts as reality and knowledge in the post-modernist perspective is determined by dominating ideologies. According to Sandu (2010), postmodernism is a phenomenon that gives a framework for understanding and anticipating postmodern civilisation. According to Glasper and Rees (2017), the post-modernism methodology is qualitative research that promotes gathering information from a variety of sources from multiple perspectives to have a comprehensive conversation. Information will be gathered from economic specialists, government policies and norms, and international organizations for this project. The data will be gathered from research studies rather than directly from the sources. The method is a proponent of utilizing a qualitative approach to data analysis.

### **4.3 DATA COLLECTION METHOD**

Data collection is at the heart of any research design, according to Parveen and Showkat (2017), and Kabir (2016) agrees, stating that it would be difficult to conduct a study without the gathering of required and sufficient data. Data, according to Mohajan (2017), are raw facts that have not been processed or analyzed. Data collection, according to Kabir (2016), is the systematic process of gathering and measuring information on variables of interest to answer stated research questions, test hypotheses, and evaluate outcomes. Hence, there are two types of data: primary data and secondary data (Parveen and Showkat, 2017).

#### **4.3.1 Primary Data**

Primary data, according to Salkind (2010), is an original data source in which the researcher collects data directly and personally for a specific research aim. Primary data is collected directly from the source (Naoum, 2013) and can be obtained through surveys, interviews, field observations, experiments, and questionnaires (Kabir, 2016).

#### **4.3.2 Secondary Data**

Secondary data, according to Parveen and Showkat (2017), are data that have been previously collected and collated and are available to the public. Because of the stringent adherence to the Covid-19 protocol, which prohibits physical interaction, secondary data has been adopted for this study.

Hence, this study will use a secondary approach for data collection. The information will be gathered from reliable and accurate sources. According to Johnston (2014), the secondary data collection approach is the study of data collected by someone else for a different purpose. It's a method for gathering data in real-time. Thus, secondary data sources used in this analysis include World Bank indicators, IMF publications, academic books, and government publications. The study is qualitative as a result of the impossibility of researchers to do physical research owing to the Covid-19 pandemic.

#### **4.4 CASE STUDY METHOD**

The case study method is adopted for the data analysis. Rashid et al. (2019) opine that the approach allows researchers to conduct an in-depth exploration of complex phenomena within some specific context. Kaarbo and Beasley (1999) hold the view that case study analysis entails the exploration of a real-time phenomenon in its naturally occurring context with the belief that context will create a difference. The research is a qualitative research analysis approach (Yazan, 2015).

Similarly, Ebneyamini and Moghadam (2018) indicated that the importance of a case study is to illuminate decisions that were taken during the process of the research, how they were implemented and what the realised results are. Scholars such as Yin (1994) view the essence of case studies as an understanding of complex social phenomena and real-life events with a holistic and in-depth investigation. Therefore, this study will be holistic, empirical, emphatic and interpretative (Stake, 1995). This research will use multiple data sources to bring out the viewpoint of the variables. The main variable for this study is human capital while other variables such as technological advancement, population growth, educational growth and health statistics would serve as control variables.

#### **4.5 Research Design**

The research design plays a crucial part in the methodology component of a specific study. This is so because it provides the investigator with the framework through which the sourced data will be collected and how it will be examined to arrive at the results of the study. A well-defined study design, according to Kumar (2019), gives an investigator a clearer image of his or her investigation. Similarly, according to Creswell (2014), the research design is critical to every study because it allows the investigator to choose between conducting an investigative, exploratory, and a combination of both types of research. More importantly, the research design reveals how the researcher intends to arrive at the sample size for the study. The level of rationality and consistency of a study is greatly determined by the study design (Walliman, 2018). Furthermore, a well-designed study will give the researcher a specific way to collecting study data, evaluating it, and interpreting it with little or no mistake at that level of the study (Walliman, 2018).

Based on the fact that this study adopts the investigative research approach, the use of a non-parametric study design is considered as being appropriate. According to Salazar, Crosby and

DiClemente, (2015) both the non-probability and non-probability sampling technique could be employed in a quantitative study. However, the latter is considered to be more appropriate. Hence, it was used. The study was a quantitative cross-sectional quantitative survey. Secondary data for China and India were extracted from the World Bank Development data bank. The dependent variable of the study was GDP per capita growth. The major dependent variable of the study was human capital accumulation, while the intervening variables (controlled variables) include: population growth, employment, trade, capital stock and technological progress. The fact that China and India are the global 1<sup>st</sup> and 3<sup>rd</sup> largest economies respectively, as well as among the member states of the BRICS nations, justified their selection for this study.

#### **4.6 Data Analysis**

The statistical analysis of data was carried out using the Stata version 14. The analysis of data was performed at both the descriptive and inferential level. The descriptive analysis was performed to address the first and third objectives of the study. The outcomes of the descriptive analysis were presented in the forms of graphs showing the growth rate trends of GDP per capita, human capital and the trends of the growth rate of controlled variables (population, capital stock, trade, employment and technological progress). The linear regression statistics was introduced at the second level of analysis. At this level of analysis, both the univariable and multivariable linear regression was carried. The inferential statistics was introduced to address the second and fourth objectives of the study. The linear regression was considered appropriate for this study since it permits the investigation of the relationship between the dependent (GDP per capita growth) and key independent (human capital, population, employment, capital stock, trade and technological progress) variables of the study. Linear regression is viewed as an appropriate tool for statistical investigation and its wide spectrum of uses consist of relationship description, estimation and prediction (Schneider, Hommel and Bletner, 2010).

To effectively achieve the specific objective two and four of the study, the development of appropriate models were considered needful. Therefore, three models were developed. The first model was developed to investigate the relationship between GDP per capita growth and human capital accumulation. The intervening variables were controlled for in the first model. The second model was developed to investigate the relationship between the intervening (trade, employment,

population, capital stock and technological progress) variables identified. Human capital accumulation was controlled for in the second model. The third model is a full one. Neither human capital accumulation nor any of the confounding variables were held constant in the third model. The confidence level for the study was set at 95%. Hence, the growth rate of GDP per capita was considered to be significantly related to human capital accumulation and the confounding variables if the p-value was found to be  $<.05$  and otherwise if it p-value  $>.05$  (Paramole, Bankole and Okunoye, 2020).

#### **4.7 RESEARCH ETHICS**

The ethical considerations that are relevant to the secondary data technique are expected to validate the relevance of this study. The studies used are those in which the primary participants' confidentiality and anonymity were respected by the original authors. The Harvard style of referencing was employed to assure the acknowledgement of the studies and avoid plagiarism, as well as to authenticate the sources of the studies collected. The research was also presented sensitively to eliminate bias and prejudice toward obese persons. This is critical so that they are not stigmatized by society and do not feel awful about themselves.

#### **4.8 LIMITATIONS TO THE RESEARCH**

Cheng and Phillips (2014) recognized the study's drawback as the lack of several critical third variables for secondary data analysis. Because comprehensive data for the selected research is not available, the investigation was limited to simply the available data. The study-specific details that were previously accessible are not available for this research's analysis. As a result, a complete interpretation of the findings is impossible.

#### **4.9 SUMMARY**

The chapter explains the philosophical aspect of the project, the data collection method and the framework for the data analysis. The adopted case study method of data analysis was also discussed in this chapter as well as the research design and data analysis.

## **CHAPTER 5**

### **RESULTS AND INTERPRETATION OF DATA ANALYSIS**

#### **5.1 Introduction**

This chapter contains the outcomes of the data analysis performed in the study. The descriptive analyses were carried out, and the outcomes arising from the study include the results emanating from the background or general information of the study area (China and India). This background information includes: life expectancy, area of territory covered, mid-year population, population per kilometre squares of arable land, the population of urban settlement inhabitants, urban population, GNI per capita, the natural rate of increase and capital cities of studied countries. Also, this chapter specifically consists of results emanating from the investigation of the connection between human resources and GDP per capita growth, the influence of human capital on GDP per capita growth, and the description and relationship between other identified key variables (population, technological progress, employment, capital stock, and trade) and GDP per capita growth for China and India respectively. The extracted data for the background information and the comparative analysis results of the trend of GDP per capita growth were presented in graphs, while the inferential analysis outcomes between the identified key independent explanatory variables and GDP per capita growth for the two countries were presented in tables. The descriptive and inferential results were presented in line with the specified objectives of the study.

#### **5.2 Background Information of the Study Area**

As indicated in Table 5.1, the capital cities of China and India are Beijing and New Delhi respectively, while the mid-year population for both countries were nearly the same. The rate at which the population increase was relatively higher for India (1.4%) than China (0.3%). Also, inhabitants of China were found to likely live longer (77 years) than the people of India (69 years). In terms of territorial area covered, China (9,600,000 km<sup>2</sup>) was nearly three times as large as India (3,287, 000 km<sup>2</sup>). Also, the availability of arable land was comparatively higher for the inhabitants of China (1179 km<sup>2</sup>) than the people of India (895 km<sup>2</sup>). In terms of the type of settlement, the proportion of the urban population for India (35%) was relatively lower than that of China (61%).

Also, China seemed to have more population living in the cities (29%) than India (16%), as well as a higher GNI per capita (US\$15,320) than India (US\$6,630).

**Table 5.1: General Information in relation to Economic Growth and Development**

	Countries	
	China	India
<b>Background data</b>		
Mid-2020 Population (million persons)	1,402.4	1,400.1
Rate of Natural Increase (%)	0.3	1.4
Life Expectancy	77 years	69 years
Area of Territory (1,000 aq. Km)	9,600	3,287
Population per kilometre square of Arable Land	1179	895
Population in Cities per 1 million (%)	29	16
Urban Population (%)	61	35
GNI per capita, PPP, 2018	US\$15,320	US\$6,630
Capital city	Beijing	New Delhi

**Sources:** World Bank, 2019; Population Reference Bureau, 2020.

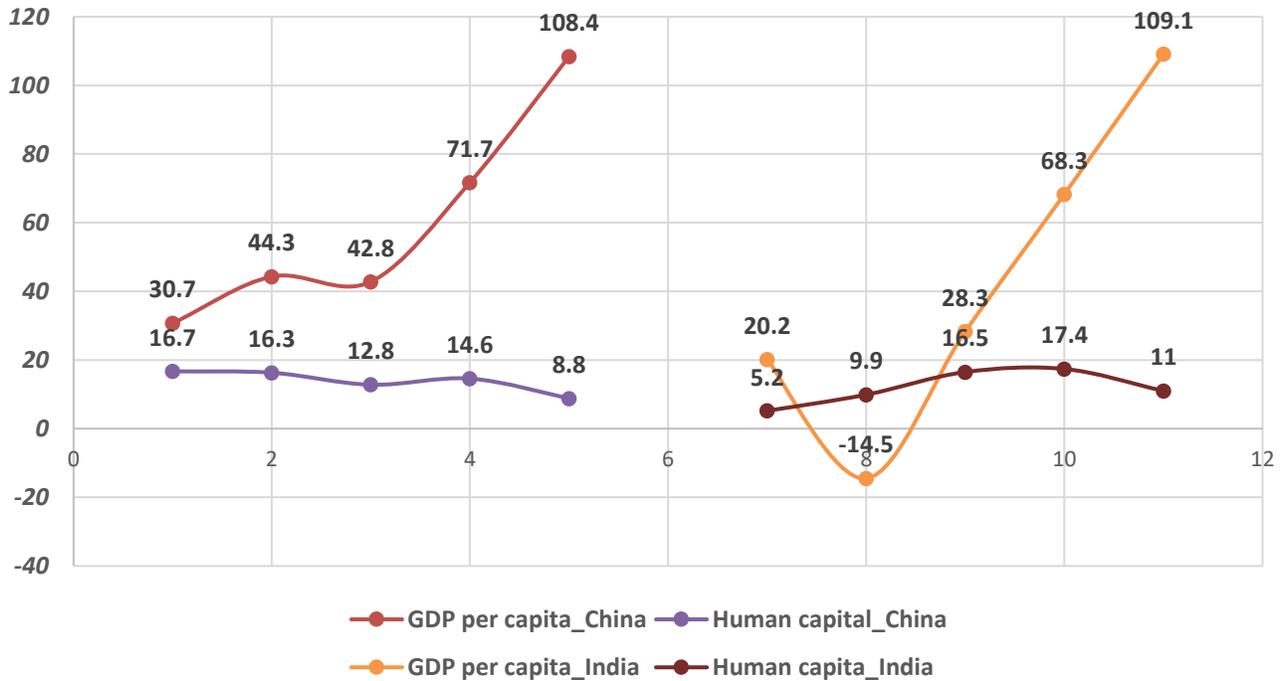
### 5.2.1 Trend of GDP per capita and Human capital Growth rates for China and India

Fig. 1 presents the results of the descriptive analysis showing the trends of gross domestic product per capita and human capital growth rates for China and India from 1958/1967 to 2008/2017. As indicated below, while the GDP per capita for China grew from 30.7% in 1968/1977 to 44.3% in 1978/1987, its human capital accumulation dropped from 16.7% to 16.3% during the same period. Unlike China, the GDP per capita growth rate for India, dropped from 20.2% recorded in 1968/1977 to -14.5% in 1978/1987. However, the human capital accumulation witnessed an upsurge from 5.2% to 9.9% over the same period. Both China and India experienced upwards trends in GDP per capita growth rates from 1988/1997 to 2008/2017. The results, however, showed that the rates of GDP per capita growth for India were relatively higher than those for China. For instance, while the GDP per capita growth rates for India increased to 68.3% in 1998/2007 from

28.3% in 1988/1997, and then peaked at 109.1% by 2008/2017; the GDP per capita growth rates for China increased to 71.7% to 44.3% and peaked at 108.4% over the same period. The human capital growth rates for China seemed relatively higher than that for India, however, the amount of increase for India seemed to be comparatively higher. For instance, while the human capital growth rates for China dropped to 16.3% in 1978/1987, the rate for China increased during these periods (5.2% in 1968/1977 to 9.9% in 1978/1987). Both China and India witnessed a significant dropped in human capital growth rates from 14.6% and 17.4% in 1988/2007 to 8.8% and 11% in 2008/2017 respectively.

In summary, the results showed that the rates of GDP per capita growth rates for both countries over the specific periods were relatively higher than the growth rates recorded in human capital accumulation. Also, while the GDP per capita growth rates for China seemed to be proportionally higher than the rates for India, the level of increase attained over the periods for India was relatively higher than that for China. A critical look at the patterns of human capital growth rates for the two countries showed that apart from the first two periods, the level of increase in the growth rates for accumulated human capital for India was comparatively higher than those for China.

**Figure 1: Trends of GDP per capita and Human capital growth rates for China and India (1958/1967-2008/2017)**



**Source:** Field survey, 2021 (GDP per capita and Human capital growth rates were generated from the World Bank 2020 extracted data set)

**Note:** The growth rate for both China and India from 1968/1977 was derived by summing the aggregated growth rates (1968 to 1977), and subtracting it from the aggregated growth rates (1958 to 1967) which were set as the base year (1958/1967). The derived value was divided by the aggregated growth rates for the base and then multiplied by 100 per cent. The same procedure was applied to calculate the growth rates for 1978/1987, 1988/1997, 1998/2007 and 2008/2017. The accumulated growth rates for real GDP per capita, real GDP, human capital, population, employment, trade and capital stock were all derived through the procedure explained above.

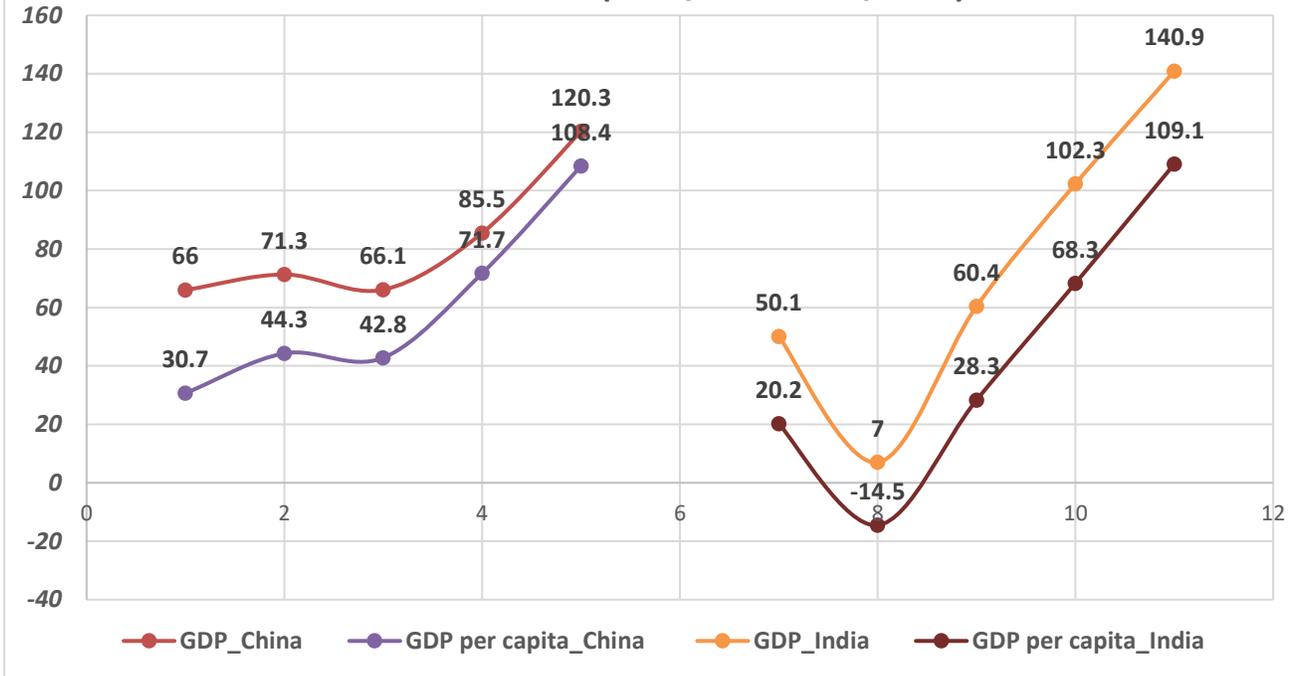
### 5.2.2 Trend of Real GDP and GDP per capita growth rates for China and India

Fig. 2 presents the results of the descriptive analysis showing the trends of GDP per capita and the GDP of the total population growth rates for China and India from 1958/1967 to 2008/2017. As

indicated below, both countries experienced a steady increase in growth rates of GDP all through the periods covered except in the 1988/1997 period for China, and the 1978/1987 period for India. During these periods, China witnessed a decline in GDP growth rate from 71.3% to 66.1%, while India recorded a huge drop from 50.1% to 7%. The GDP growth rates peaked for both China (120.3%) and India (140.9%) in the 2008/2017 period; while the least GDP growth rates of 66% and 7% were recorded in 1968/1977 for China, and 7% in 1978/1987 for India respectively. The GDP per capita growth rates have been explained in Fig. 1 above. Based on the facts emanating from Fig. 2 below, the GDP growth rates for China remained consistently higher than the growth rates of GDP per capita. For instance, while the GDP growth rate peaked at 120.3%, the GDP per capita growth rate peaked at 108.4% (2008/2017). Similarly, growth rates of GDP for India were consistently higher than the growth rates of GDP per capita over the same period for India. For instance, while the GDP growth peaked at 140.9% in 2009/2017, the GDP per capita growth for the same period was calculated to be 109.1%.

In summary, the GDP growth rates for India were relatively higher for China than for India during 1968/1977, 1978/1987 and 1988/1997 periods, while the reverse was the case for the 1998/2007 and 2008/2017 periods. The results also showed that at no point did China recorded a deficit in GDP per capita over the timeframes covered in this study, unlike for India, where the growth rate dropped from 20.2% in 1968/1977 to -14.5% in the 1978/1987 period.

**Figure 2: Trends of Real GDP and GDP per capita growth rates for China and India (1958/1967-2008/2017)**



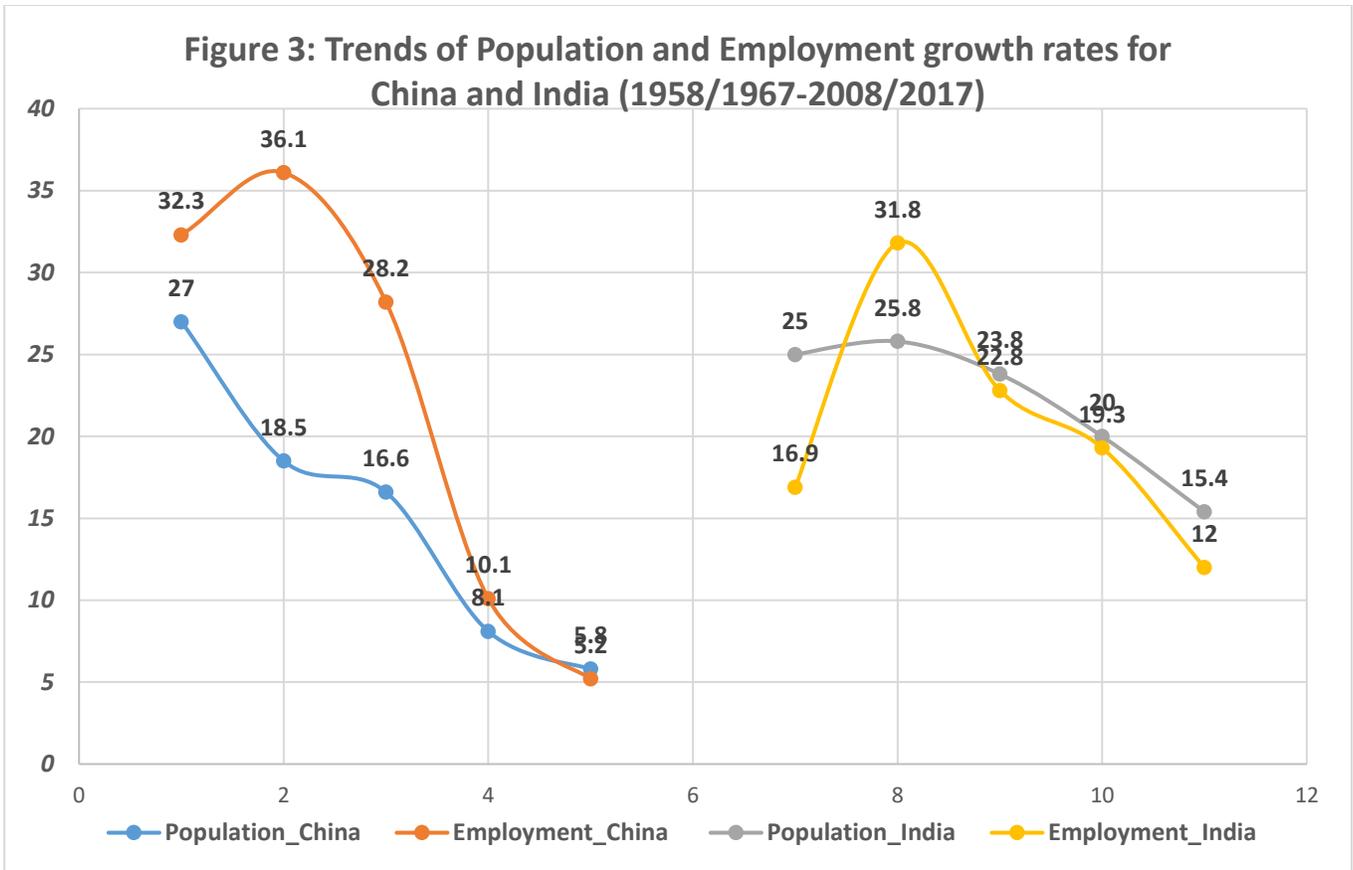
**Source:** Field survey, 2021 (Real GDP and GDP per capita growth rates were generated from the World Bank 2020 extracted data set)

### 5.2.3 Trend of Population and Employment Growth rates for China and India

Fig. 3 presents the results of the descriptive analysis showing the trends of population and employment growth rates for China and India from 1958/1967 to 2008/2017. As indicated below, the population growth rates for China over the timeframe were relatively higher than the recorded population growth rates for India. For instance, while China experienced a decline in population growth rate from 27% in 1968/1977 to 18.5% in 1978/1987, India experienced an increase in population growth of 25.8% in 1978/1987 from a prior lower rate of 25% recorded in 1968/1977. A critical look at the data for both countries showed that there was a steady decline in the population growth rates from 1978/1987 all through the time covered by the researcher. For instance, the population growth rates for China dropped from 18.5% in 1978/1987 to 16.6% in 1988/1997 and declined further to 5.2% by the end of 2008/2017. The same could be said of India – for instance, the population growth rates for the country dropped from 22.8% in 1988/1997 to 19.3% in 1998/2007, before further declining to 15.4% in 2008/2017. A critical look at the trends

of employment growth showed that both countries faced a drop and steady decline in the growth rates of job opportunities for their nationals. For example, after attaining an increased in growth from 32.3% 1968/1977 to 36.1% in 1978/1977, China witnessed experienced a drop to 28.2% in its employment growth rate in 1988/1997, with a further decline to 10.1% and 5.8% in 1998/2007 and 2008/2017 periods respectively. The trend of employment growth rates was the same for India. As indicated in Fig. 3, the employment growth rates for India dropped from 31.8% in 1978/1987 to 23.8% in 1988/1997. The growth rates further dropped to 19.3% in 1988/2007, before reaching its lowest limit of 15.4% in 2008/2017.

In summary, the results showed that while China experienced a downward trend in its population growth rates all through, the same cannot be said of India, as it witnessed both downward and upward population growth rates. Another key disparity was that the employment growth rates were relatively higher for China than the growth rates for India over the timeframe covered by the study. Also, unlike for India, the employment growth rates for China were relatively higher than the population growth witnessed by the country. Thus, at one period or another, the population growth rates for India were relatively higher than the country's employment growth rates.



**Source:** Field survey, 2021 (Population and Employment Growth rates were generated from the World Bank 2020 extracted data set).

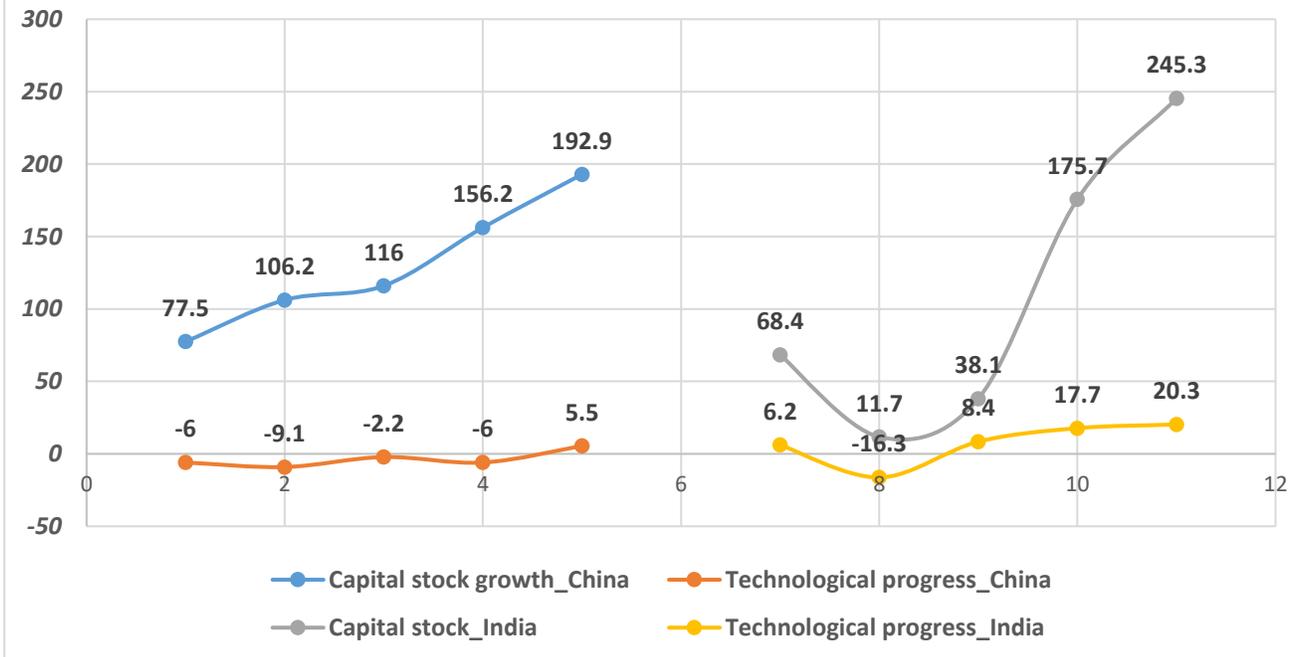
### 5.2.4 Trend of Technological and Capital stock Growth rates for China and India

Fig. 4 presents the results of the descriptive analysis showing the trends of technological progress and capital stock growth rates for China and India from 1958/1967 to 2008/2017. As indicated, China has experienced consistent growth rates in relation to capital stock compared to India whose growth has been up-and-down. For instance, the growth rates of capital stock for China grew from 77.5% in 1968/1977 to 106.2% in 1978/1987, while India witnessed a drop in capital stock growth rates from 68.4% to 11.7% during the same periods. Although India seemed to have attained a relatively higher capital stock growth rate of 245.3% in 2008/2017 than a 192.9% growth rate recorded by China over the same period, the trends of growth rates for capital stock had not been consistently upward in the movement for India. On the other hand, the growth rates of technological progress for India were relatively higher for India than for China.

Also, China had witnessed consistent declining growth rates than India. For instance, the technological progress growth rates for China dropped consistently from -9.1% in 1978/1987 to -2.2% in 1988/1997 and declined further to -6% in 1998/2007, before increasing to 5.5% by the end of 2008/2017. Whereas, for India, a deficit in the technological progress growth rate was only witnessed in the 1978/1987 period (-16.3%). The 20.3% growth rate witnessed in the level of technological progress in 2008/2017 by India was relatively higher than the 5.5% derived for China over the same period.

In summary, the results showed that the growth rates of capital stock for both countries were comparatively higher than that for technological progress. Thus, the level of growth of technological advancement was relatively lower than that of capital stock for both China and India. Nevertheless, the results showed that there was a steady growth in the inclusion of capital stock in China all through the periods, where the same could not be said of India.

**Figure 4: Trends of Technological progress and Capital stock growth rates for China and India (1958/1967-2008/2017)**



**Source:** Field survey, 2021 (Technological progress and Capital stock Growth rates were generated from the World Bank 2020 extracted data set)

### 5.3 Testing of Hypotheses and Model Specifications

The hypotheses were performed to achieve the specific objectives (2, 3 and 4) of the study.

Liner Regression Model Specification:

$$\text{Model 1: } Y = a + b_1 X_1$$

where Y is the Real Gross Domestic Product (GDP) per capita; a is the intercept,  $b_i$  is the slopes,;  $X_1$  is human capital;  $n=1$

Model 1 is an unadjusted one, thus, other key identified covariates – trade, technological progress, employment, capital stock and population - were controlled for.

Model 2:  $Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5$

where Y is the Real Gross Domestic Product (GDP) per capita; a is the intercept,  $b_i$ 's are the slopes;  $X_1$  is population;  $X_2$  is employment;  $X_3$  is capital stock;  $X_4$  is technological progress;  $X_5$  is employment;  $n=5$

Model 2 is also an adjusted one, hence, the key explanatory variable, that is, human capital was controlled for.

Model 3:  $Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6$

where Y is the Real Gross Domestic Product (GDP) per capita; a is the intercept,  $b_i$ 's are the slopes;  $X_1$  is human capital;  $X_2$  is population;  $X_3$  is employment;  $X_4$  is capital stock;  $X_5$  is technological progress;  $X_6$  is employment;  $n=6$

Model 3 is a full model; hence, no variable is held constant or controlled for.

Reject  $H_0$  if the p-value is less than alpha (sig.), otherwise, accept it

Decision: since  $p\text{-value} < 0.05$ , we have sufficient statistical evidence from the study's analysis as indicated in Table 5.2.1 to reject ( $H_0$ ) that human capital accumulation and real GDP per capita growth for China were significantly associated, thereby accepting the alternative hypothesis ( $H_1$ ). The results as indicated in Model 1 showed that while other possible predictors of GDP per capita were held constant, human capital accumulation is a predictor of the GDP per capita growth for China. The results, hence indicated that there was a direct and significant relationship between GDP per capita growth and human capital accumulation for China ( $\beta=7234.4$ ;  $t=13.5$ ;  $p<0.000$ ). Correspondingly, all other covariates being held constant, human capital accumulation accounted for about 75.5% of the growth rate witnessed by China from 1958 to 2017

Similarly, since  $p\text{-value} < 0.05$ , we have sufficient statistical evidence from the study's outcomes to reject ( $H_0$ ) that capital stock, technological progress and real GDP per capita growth for China were significantly associated, thereby accepting the alternative hypothesis ( $H_1$ ). As specified in Model 2, we controlled for human capital accumulation while we set to establish the statistical relationship between some identified covariates (population, employment, capital stock, technological progress and trade) real GDP per capita growth for China. The results, therefore

showed that capital stock and technological progress were predictors of real GDP capita growth for China, while human capital accumulation was controlled for. Thus, capital stock ( $\beta=0.0001$ ;  $t=2.99$ ;  $p<0.000$ ) and technological progress ( $\beta=8052.1$ ;  $t=3.94$ ;  $p<0.000$ ) were directly and significantly associated with real GDP per capita growth for China. The results further showed that capital stock and technological progress contributed about 98.9% to the real GDP per capita growth witnessed by China over the period covered by the study.

Correspondingly, since  $p<0.05$ , we have sufficient proofs from the study's analysis to reject ( $H_0$ ) that human capital accumulation and the identified covariates (population, employment, capital stock, technological progress and trade) and real GDP per capita growth for China were significantly related, thereby accepting the alternative hypothesis ( $H_1$ ). At this level of the analysis, no variable was held constant; thus, the full was run. The results showed that human capital accumulation, population, employment, capital stock, technological progress and trade accounted for about 99.1% of the real GDP per capita growth witnessed by China from 1957 to 2017. Hence, other factors than the aforementioned contributed the remaining 0.9% to the real GDP per capita growth witnessed by the country.

**Table 5.2.1: Relationship between Real GDP per capita and Its Indicators of Growth (China)**

Variable	Model 1			Model 2			Model 3		
	$\beta$	Std. Err.	t-stat.	B	Std. Err.	t-stat.	$\beta$	Std. Err.	t-stat.
Human capital	7234.38	536.08	13.5***				3432.44	1237.05	2.77**
Population				0.71	1.87	0.704	-2.51	2.11	-1.19
Employment				3.64	2.38	1.53	1.85	2.34	0.79
Capital stock				0.0001	2.99	40.35***	0.0001	5.64	19.01***
Technological progress				8062.13	1537.59	3.94***	6835.72	1476.83	4.63***
Trade				4849.20	3034.66	1.60	3307.52	-2915-74	1.13
<b>R<sup>2</sup></b>		0.7584			0.9903			0.9915	
<b>Adjusted R<sup>2</sup></b>		0.7543			0.9894			0.9906	
<b>F (n<sub>1</sub>, n<sub>2</sub>) = x</b>		(1, 58) = 182.12			(5, 54) = 1102.46			(6, 53) = 1033.97	
<b>Prob. &gt; F</b>		0.000***			0.000***			0.000***	

*Note: \*Significant at  $p<0.05$ , \*\*Significant at  $p<0.01$ , \*\*\*Significant at  $p<0.001$*

Decision: since  $p\text{-value} < 0.05$ , we have sufficient statistical confirmation from the study's analysis as specified in Table 5.2.2 to reject ( $H_0$ ) that human capital accumulation and real GDP per capita growth for India were significantly associated, thereby accepting the alternative hypothesis ( $H_1$ ). The results as specified in Model 1 revealed that while other likely predictors of GDP per capita were controlled for, human capital accumulation is a predictor of the GDP per capita growth for India. The results, therefore indicated that there was a direct and significant relationship between GDP per capita growth and human capital accumulation for India ( $\beta=3887.6.4$ ;  $t=12.9$ ;  $p<0.000$ ). Furthermore, by controlling for all other identified covariates, human capital accumulation accounted for about 73.8% of the growth rate witnessed by India from 1958 to 2017

In the same way, since  $p\text{-value} < 0.05$ , there are sufficient statistical proofs from the study's analysis to reject ( $H_0$ ) that capital stock, population and technological progress were significantly associated with real GDP per capita growth for India, thereby accepting the alternative hypothesis ( $H_1$ ). As indicated in Model 2, human capital accumulation was held constant, while we set to establish the statistical relationship between some identified covariates (population, employment, capital stock, technological progress and trade) real GDP per capita growth for India. The results, therefore showed that capital stock, population and technological progress were predictors of real GDP per capita growth for India, while human capital accumulation was held constant. Hence, capital stock ( $\beta=0.0001$ ;  $t=65.6$ ;  $p<0.000$ ), population ( $\beta= 1.23$ ;  $t=3.10$ ;  $p<0.001$ ) and technological progress ( $\beta=4984.3$ ;  $t=16.1$ ;  $p<0.000$ ) were directly and significantly associated with real GDP per capita growth for India. The results further indicated that capital stock, population and technological progress accounted for about 99.9% of the real GDP per capita growth attained by India over the period covered by the study.

Equally, since  $p\text{-value} < 0.05$ , we have sufficient evidence from the study's analysis to reject ( $H_0$ ) that human capital accumulation and the identified covariates (population, employment, capital stock, technological progress and trade) and real GDP per capita growth for India were significantly associated, thereby accepting the alternative hypothesis ( $H_1$ ). At this level of the analysis, no variable was controlled for, hence, the full was run. The results indicated that human capital accumulation, population, employment, capital stock and technological progress accounted for about 99.9% of the real GDP per capita growth witnessed by India from 1957 to 2017.

Therefore, other factors than the aforementioned contributed the remaining 0.1% to the real GDP per capita growth witnessed by India over these periods.

**Table 5.2.2: Relationship between Real GDP per capita and Its Indicators of Growth (India)**

Variable	Model 1			Model 2			Model 3		
	$\beta$	Std. Err.	t-stat.	B	Std. Err.	t-stat.	$\beta$	Std. Err.	t-stat.
Human capital	3887.55	300.37	12.94***				511.95	150.76	3.40**
Population				1.23	0.39	3.10**	0.95	0.37	2.56*
Employment				-1.59	0.96	-1.66	-2.22	0.90	-2.48*
Capital stock				0.0001	1.97	65.51***	0.0001	1.79	71.16***
Technological progress				4984.27	310.15	16.07***	4687.39	296.88	15.79***
Trade				426.59	212.22	2.01*	184.57	206.80	0.89
<b>R<sup>2</sup></b>		0.7428			0.9990			0.9992	
<b>Adjusted R<sup>2</sup></b>		0.7384			0.9989			0.9991	
<b>F (n<sub>1</sub>, n<sub>2</sub>) = x</b>		(1, 58) = 167.51			(5, 54) = 10445.57			(6, 53) = 10404.18	
<b>Prob. &gt; F</b>		0.000***			0.000***			0.000***	

*Note: \*Significant at  $p < 0.05$ , \*\*Significant at  $p < 0.01$ , \*\*\*Significant at  $p < 0.001$*

## CHAPTER 6

### DISCUSSION OF FINDINGS

#### 6.1 Introduction

The study aims to investigate, estimate and compare empirically the extent to which human capital accumulation serves as drivers of economic growth of the economy of China and India. The specific objectives of the study are to investigate if there is an existing connection between human resources and GDP per capita growth for China and India, critically analyse the influence of human capital on GDP per capita growth in China and India, identify and describe the key variables and explain the linkages they have in the real-time setting in China and India, assess the influence the control variables such as technological advancement, population growth, educational development and health statistics have on the human capital development and invariably on the economic growth, and make recommendations based on the findings of this research which is in relation to the extent to which China and India grow with human capital accumulation. The abovementioned chapter five (5) will be replicated, and the observed results will be discussed comprehensively

#### 6.2 Summary of discussion of key findings

Based on the present rate of natural increase (1.4%), the population of India, which was estimated at 1.4 billion will overtake the present population of China, which was put at 1.402 billion, but with a lower 0.3% rate of natural increase (see Table 5.1). A critical look at the GNI per capita for both countries shows that, with all things being equal, the standard of living of an average inhabitant of China was relatively higher than that of an average Indian national living in his or her country. This is imperative since an average Chinese national living in China earned more than twice (US\$15,320) what an Indian national (US\$6,630) living in India earned in 2018 (see Table 5.1). Considering the ratio of the human population to the available arable land, and the proportion of the population living in urban settlements, the extent of urban congestion was relatively higher in China compared to India; with the latter having access to a larger span of land for arable farming, possibly other forms of activities that require arable land (see Table 5.1).

The empirical findings emanating from the study revealed that the growth in the GDP per capita of China and India over the past years were not in isolation of the development of human capital over the years. Conversely, the trends showed that the rates at which GDP per capita grew in the

two countries were substantially higher than the growth rates experienced in the development of human capital. For instance, while the GDP per capita growth rates for China and India peaked at 108.4% and 109.1% respectively, the highest growth rates of human capital accumulation for China and India were 16.7% and 17.4% respectively (see Fig. 1). It should, however, be noted that while the highest growth rate of 17.4% for human capital accumulation was attained by India in the 1998/2008 period, the peak in human capital accumulation growth rate for China was achieved during the 1968/1977 period (see Fig. 1). Also, evidence from the study's outcomes revealed the existence of a few disparities in the growth rate of GDP per capita between China and India. While the former never experienced a deficit drop in its growth rate, the same could not be said of the latter (see Fig. 1). In summary, while the rate at which human capital grew was observed to be slower compared to the growth rates for GDP per capita in China and India, it is still imperative to point out that human capital accumulation had contributed to a recognizable extent towards the attained level of GDP per capita growth in these countries.

The influence of human capital on GDP per capita growth in China and India were statistically proved. In China, human capital was found to be significantly associated with the growth rates of GDP per capita over the time covered. The results showed that human capital had a direct and significant influence on GDP per capita growth in China (see Table 5.2.1). The reports for India is similar to those for China. As noted in the study's analysis, human capital accumulation was observed to have a direct and significant influence on GDP per capita growth in India (see Table 5.2.2). In summary, evidence arising from this study clearly showed that human capital accumulation was a driver of GDP per capita growth in both China and India.

In India, human capital accumulation, capital stock, technological progress, employment and population were identified as the key variables that had a significant influence on GDP per capita growth (See Fig, 5.2.1). All these variables but employment and population were also identified to have a significant influence on GDP per capita growth in China (Fig. 5.2.2). A critical look at the 0.3 natural growth rate of China (see Table 5.1) could be used to explain the possible reason why the population was not one of the factors that drove the growth of GDP per capita in this country. On the other hand, the relatively higher 1.4% natural growth rate of India (see Table 5.1) could be seen or argued as one of the reasons why the population had a significant influence on

the growth of GDP per capita in India over the same period. The fact that India is endowed with a relatively larger area of arable land, which could be used to expand primary economic activities such as subsistent and mechanised crop farming might be the reason why employment was found to have a significant influence on the GDP per capita growth in the country, while the reverse was the case for China. Meanwhile, the growth in the rates of capital stock, technological advancement and of course human capital accumulation in China and India could be a result of how these two countries had been able to effectively utilise the scarce resources within their reach. For instance, the rates at which the GDP per capita growth for both China and India grew over the years were relatively higher than the rates of growth of GDP as a whole in these two countries.

Population, employment, capital stock, technological progress and trade were set as the controlled variables with the view of predicting the statistical relationship between human capital accumulation and GDP per capita growth in the study. Evidence from the studies revealed that a persistent positive growth rate of capital stock was witnessed in China, while an up-and-down growth rate was experienced in terms of technological progress (see Fig. 4). India, on the other hand, experienced fluctuations in both the capital stock and technological progress during the same period (see Fig. 4). Evidence from the study clearly showed that while the employment growth rate superseded the population growth rate in China; the trend of growth rates differs slightly in India over the same periods (see Fig. 3).

Evidence for China showed that while human capital was controlled for, only capital stock and technological progress were found to be significantly associated with GDP per capita growth in the country. Capital stock and technological progress accounted for about 98.9% of growth witnessed in GDP per capita growth in China, from 1958 to 2017 (see Table 5.2.1). However, it was evident that from the findings capital stock, technological progress and population contributed about 99.9% to the GDP per capita growth in India, during the same period. The results also established the existence of a significant relationship between growths in population size, capital stock, technological progress and GDP per capita growth in the country (see Table 5.2.2).

### **6.3 Linking Key Findings to Previous Studies**

It is imperative to link the findings emanating from this study with empirical facts from preceding similar studies. This is considered necessary since it will afford the investigator to explain how the statistical facts from this study confirm, relates and contributes to the existing body of knowledge, while the need for research-driven data is also enhanced.

It is evident from the study that human capital accumulation influences the growth of GDP per capita in China and India. This is a fact since the results revealed that the accumulation of human capital was statistically associated with the GDP per capita growth in both countries. Consequently, human capital indicators which include the level of education, quality of healthcare enjoyed, but not limited to access to clean and safe water were some of the possible indicators that had contributed to the GDP per capita of both China and India. It is, therefore, logical to conclude that the contribution of human capital to the economic growth of these countries is a validation of what previous studies had established. Thus, these findings are consistent with Pelinescu (2015) who argued that that human capital has a direct contribution to the sustainable development of countries as there is a great diffusion of knowledge and skills in the manufacturing industries and other industries that require smart, sustainable and inclusive growth. Also, the findings validate Bloom et al., (2018) and Thomas (1998) who maintained that the improvement in the health sector positively influenced the pace of income growth, labour force participation rate and workers level of productivity. The findings from this study are in support of Marquez-Ramos & Mourelle (2019) who argued that education was an essential determining factor of human capital growth, and invariably, the economy. In the same manner, findings from this study validate Riley (2012) who perceived human capital as an important factor of economic growth for companies and the community at large. Thus, the importance of human capital plays in economic growth cannot be overemphasized, as it is an invaluable asset and an important prerequisite.

Evidence from the study on the link between some identified controlled variables and their influence on the growth of GDP per capita revealed that factors such as capital stock, technological progress, and employment and population growth had a significant influence on GDP per capita growth in India. Unlike in India, only capital; stock and technological advancement were identified to have significantly influenced the level of GDP per capita growth in China over the years. Nevertheless, it is imperative to conclude that the level of GDP per capita growth witnessed in

China and India would have been lower if these controlled variables had not to be harnessed and factored appropriately into the economic and development plans of both countries. These findings are in line with Horwitz (2005) and Pistorius (2004) who observed that the increase in the rate of the competitiveness advantage through innovation and diffusion technology could also be influenced by the rate in the development of the human capital.

Specifically, it is evident from this study that technological advancement played significant roles in the level of GDP per capita growth in both China and India. This is backed up by the fact that technological progress was found to have a direct and significant influence on the growth of GDP per capita in the two countries. These findings collaborate with Osiobe (2019) and Caliskan (2015) who identified technological change as the primary source of economic growth, with a clause that to effect transformation, the country in concern must participate in an invention that focuses primarily on human capital as an input. Technology, innovation and education are important tools in the maximization of the country's human capital capacity. Evidence from the study was also in line with Loo & Soete (1999) who insisted that new theories of economic change hold the view that a continued increase in the level of resources spent on the invention of new technologies leads to a sustained increase in economic growth.

#### **6.4 Policy Recommendations**

Based on the empirical findings gathered from this study, it is imperative to recommend some measures that will bring about a substantial rise in the rate of GDP per capita growth in India and China. Although human capital was found to have a positive and significant influence on the growth of GDP per capita in both countries, a critical observation shows that the rates of human capital growth in both countries were relatively slower than the growth rates of their GDP per capita income. The indication of this is that both China and India still have to invest more in the development of human resources. Therefore, a lot of investment is still required in the harnessing of human resources in these two countries. On the other hand, the pace at which GDP as a whole increased in both China and India was relatively higher than the rates of GDP per capita growth that was witnessed in the two countries. This, therefore suggests the need for the government of both countries to possibly diverse a means through which the productivity level of the population could be maximized. In line with the aforementioned suggestion, the government of China and

India must make all possible effort to invest heavily in the development of human capital, for them to make the best use of the level of technological growth that they have attained over the years.

## **6.5 Conclusion**

The study was a cross-sectional quantitative survey, and it adopted the descriptive and inferential statistical approach to show the trends, as well as the influence of human capital accumulation, population growth, trade, employment, capital stock and technological progress on GDP per capita growth in China and India. Disparities were noticed in indicators of economic growth and development of the two countries based on their background data. The growth in GDP per capita witnessed by China and India were found not to be in isolation of human capital accumulation, and the controlled variables of the study. While capital stock and technological progress were identified as the controlled variables other than human resources as predictors of GDP per capita growth in China; these factors as well as employment and population growth were also responsible for GDP per capita growth in India. It is, therefore, imperative to conclude that the growth in GDP per capita witnessed by both China and India from 1958 to 2017 was as a result of the extent that these countries had been able to harness and appropriate put to use human capital and the aforementioned controlled variables that were included in the model employed in this study.

Considering the Solow growth model, the growth of capital stock in China and India over the years could be argued from two viewpoints. First, the growth in capital stock over the years perhaps is due to the ability of the governments of these countries to create a balance between population growth and technological advancement. Also, a large proportion of the gainfully populations may be neither underpaid nor underemployed. Thus, the growth in capital stock could be achieved by other BRICS countries (especially South Africa and Brazil), if they allow the rate of growth of their population to determine the long run of capital accumulation to which their economies converge and give room for the existence of a globally unique equilibrium and curves that converge monotonically to them.

The observed disparities in the influence of population and employment growth rates on GDP per capita growth in China and India could be viewed from Rostov's stages of growth. The fact that population and employment growth were drivers of GDP per capita growth in India could be argued from the point that India, unlike China is yet to complete the stages of growth as identified by Rostow. Thus, while China is getting closer to the final stage of growth, the reverse is possibly

the case for India. This assertion could be supported by the fact that the GDP per capita in China is twice higher than that for India. Therefore, India may be more involved in extractive or primary activities with a lower level of technological input than China. It is, therefore, imperative for India, and other BRICS countries with relatively lower GDP per capita growth to employ the appropriate measures that promote the capital-intensive rather than labour-intensive economies as they move towards completing the growth model stages as posited by Rostow.

## REFLECTION

Looking back at the research project, I realised that I have gathered lots of experiences. Although tedious, I was able to meet my project supervisor, who offered very useful information and help to me, at different points. I obtained practical support concerning various aspects of the research work during our meetings. Our first meeting was dedicated to the clarification of our expectations from the research, selection of the research approach and formulation of the objectives and questions. I was able to submit my introduction and information gathering chapter to my supervisor in our second meeting of which I also received detailed feedback on what I have done so far. It was in this meeting that the issue of data analysis was raised. After going back and forth, it was agreed that I should go for the case study analysis approach.

I found our meetings motivating and encouraging as I was offered valuable advice that would not only be useful for this research but also subsequent ones. Before these meeting, I was bent on conducting my analysis using the dynamic panel data method. I was, however, made to simplify my work by using the case study approach.

My ability to answer my research questions and follow through with the objectives was a result of the quality of secondary data and the choice of the methodology that I used. Therefore, I approached my data and methodology critically and ensure that my data are reliable and valid. I sourced my data from reliable sources such as the World Bank and government publications of the two countries. I conducted my methodology based on the reliability of the data and its relevance. The data analysis took a lot of effort from me as I was detailed and analytical as much as possible. I can say that the research questions have been effectively answered.

The project allowed me to demonstrate my interpersonal and communication skills. Listening to advice from my supervisor helped me as he is an authority in this area. My listening skills have afforded me an understanding of valuable information which I was able to implement. Also, my ability to relate with people helped me as I was able to seek information from different quarters without feeling intimidated. My communication skills have also been crucial as I was able to carry out the different presentation of my position on different occasions. My overall interpersonal and communication competencies have yielded good results for me.

There is no gainsaying that my ability to conclude this research work has increased my level of professional competency. I have been able to develop a critical and analytical mindset towards solving problems as a result of conducting this research. It was made known to me that it is important to critically analyse all related issues in the project. I did this by also revising by analysis until I and my supervisor reached a level of satisfaction. The critical analysis skills I have developed can be applied in real-life economic development cases. Furthermore, my writing capability has greatly improved.

On a personal basis, the research has allowed me to come across several academic materials, government publications, and opinions of individuals and organisations on the process of economic development. The information gathered will also be useful to me in the future as I might have to refer to any of them at any point in time. My level of motivation and self-confidence has also improved. I have been better motivated on the importance of education and its dynamism. The new self-confidence level attained will serve as a basis for setting new milestones for myself. Time is of the essence and I have been able to learn the art of managing time as a result of this project.

Conclusively, working on this dissertation has prepared me for the professional journey that lies ahead. I must, however, also commend the efforts of my supervisor who dedicated his time and gave helpful advice on how to come up with excellent research.

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