ROLE OF HUMAN CAPITAL IN THE ECONOMIC GROWTH: A COMPARATIVE ANALYSIS OF INDIA AND BANGLADESH, 1991 - 2015

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DECLARATION

I declare that the thesis entitled "**ROLE OF HUMAN CAPITAL IN THE ECONOMIC GROWTH: A COMPARATIVE ANALYSIS OF INDIA AND BANGLADESH, 1991-2015**" submitted by me for the award of the degree of **Doctor of Philosophy** of Jawaharlal Nehru University is my own work. The thesis has not been submitted for any other degree of this University or any other university.

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CERTIFICATE

We recommend that this thesis be placed before the examiners for evaluation.

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This research thesis is dedicated to my mom and dad

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LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ADB	Asian Development Bank
ADF	Augmented Dickey – Fuller
AICTE	All India Council for Technical Education
ALR	Adult Literacy Rate
BANBEIS	Bangladesh Bureau of Educational Information and Statistics
BBS	Bangladesh Bureau of Statistics
BMET	Bureau of Manpower, Education and Training
BPO	Business Process Outsourcing
BTEB	Bangladesh Technical Education Board
CABE	Central Advisory Board of Education
CAGR	Compound Annual Growth Rate
CAMPE	Campaign for Popular Education
CGE	Computable General Equilibrium
CPD	Centre for Policy Dialogue
CPI	Consumer Price Index
DGET	Director General of Employment and Training
DTE	Directorate of Technical Education
ECM	Error Correction Mechanism
ELI	Effective Labour Input
EU	European Union
EYS	Expected Years of Schooling
FICCI	Federation of Indian Chambers of Commerce and Industry
GCI	Global Competitiveness Index
GDI	Gender Development Index
GDP	Gross Domestic Product
GER	Gross Enrolment Ratio
GFCF	Gross Fixed Capital Formation
GII	Gender Inequality Index
GNI	Gross National Income
GNP	Gross National Product

HDI	Human Development Index
HDR	Human Development Report
HNPSDP	Health, Population and Nutrition Sector Development Programme
HPSP	Health and Population Sector Programme
HPSS	Health and Population Sector Strategy
HRD	Human Resource Development
HSC Voc	Higher Secondary Certificate in Vocational Studies
IALS	International Assessment of Literacy Survey
IHDI	Inequality Adjusted Human Development Index
ICT	Information and Communication Technology
ILO	International Labor Organisation
IMR	Infant Mortality Rate
ISC	Industry Skill Council
ITC	Industrial Training Center
ITES	Technology Enabled Services
ITI	Industrial Training Institute
KAS	Konrad Adenauer Foundation
LAMP	Literacy Assessment Monitoring Programme
LEB	Life Expectancy at Birth
LFPR	Labor Force Participation Rate
MDG	Millennium Development Goal
MPI	Multidimensional Poverty Index
MPO	Monthly Payment Order
MYS	Mean Years of Schooling
NCERT	National Council of Educational Research and Training
NEP	National Education Policy
NGO	Non - Government Organisation
NHP	NationalHealth Policy
NOS	National Occupational Standards
NPE	National Policy on Education
NRHM	National Rural Health Mission

NSDA	National Skill Development Agency
NSDC	National Skills Development Corporation
NSDC	National Skills Development Council
NSDP	National Skill Development Policy
NSQC	National Skills Qualifications Committee
NSQF	National Skills Qualification Framework
NSS	National Sample Survey
NSSO	National Sample Survey Office
NVQF	National Vocational Qualification Framework
OECD	The Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PESP	Primary Education Stipend Project
PIAAC	Programme for the International Assessment of Adult Competencies
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
PP	Phillips Perron
PPP	Purchasing Power Parity
PRC	People's Republic of China
PRSP	Poverty Reduction Strategy Program
PTR	Pupil – Teacher Ratio
QP	Qualification Pack
R&D	Research and Development
RPL	Recognition of Prior Learning
SDGs	Sustainable Development Goals
SEIP	Skills for Employment Investment Program
SFYP	Sixth Five Year Plan
SME	Small and Medium Enterprise
SSC	Sector Skill Council
SSC Voc	Secondary School Certificate in Vocational Studies
STEP	Skills towards Employment and Productivity

SWAp	Sector Wide Approach
TALIS	Teaching and Learning International Survey
TFP	Total Factor Productivity
TFR	Total Fertility Rate
TIMSS	Trends in International Mathematics and Science Study
TTC	Technical Training Center
TTTC	Technical Teachers Training Center
TVET	Technical and Vocational Education and Training
UGC	University Grants Commission
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEVOC	International Centre for Technical and Vocational Educational and Training
VAR	Vector Auto Regression
VEC	Vector Error Correction
VET	Vocational Education and Training
VT	Vocational Training
VTTI	Vocational Teachers Training Institute
WDI	World Development Indicators
WEF	World Economic Forum
WHO	World Health Organisation

CONTENTS

Annexures

CHAPTER 1
INTRODUCTION

Skills and knowledge are key driving forces of economic growth and social development in any country, and the ability to sustain labour-intensive growth depends on whether a nation can expand the skills and capabilities of both its existing and future labour force.

- International Labour Organisation

Economic growth is often considered as one of the basic benchmarks for formulatingnational policies, plans and strategies on growth and development, in any country. Traditionally, physical capital accumulation was considered as the most robust source of economic growth besides labour, at least in the short-run, and exogenous technical progress was considered as the long-run determinant of growth.

However, the exogeneity of technological progress in the Neoclassical Solow Growth model and the problems in explaining long-run economic growth, in the background of diminishing returns to physical capital, have restricted the analytical capacity of the neoclassical model and its empirical verification. This problem is solved through Endogenous Growth models advocated by Robert Lucas Jr. and Paul Romar, who laid extensive emphasis on human capital accumulation leading to improvement in productivity of labour, innovation and research and development. Human capital, according to them, increases output and hence economic growth through various formal and informal channels.

Such theories laid the foundation framework for human capital and its relevance in development and growth. An increase in the stock of human capital leads to investment in physical capital which in turn increases growth. Moreover, human capital embodied labour generates positive externalities in terms of growth in output.

In the context of South Asia region, human capital has a significant role to play in the background of a growing young population and the ongoing demographic transition.Demographically, South Asia is a diverse region accounting for over one-fourth of the world population. The region has undergone rapid demographic changes

over the last few decades. South Asian countries are experiencing an 'age structure transition' by which high fertility and mortality rates are replaced by low ones.

The region has witnessed a rapid fall in Infant Mortality Rate (IMR) from about 160 per 1000 live births in the 1950s to about 42 in 2015 and 38 per 1000 live births in 2016. In response to falling IMR, the region's Total Fertility Rate (TFR) fell from 6 births per woman in the 1950s to a little over 2 births per woman by the year 2015. The Life Expectancy at Birth (LEB) has also improved from 40 years in the early 1960s to nearly 69 years in 2015[1]. As a result, the region is also experiencing growing working age population with the peak share of maximum working age already reached in 2010, as compared to other Asian regions. According to David E. Bloom, such changes in the age structure create a potential for faster economic growth or a demographic dividend, in other words.

A country wise comparison of demographic changes, within South Asia, reflects that some of the region's largest economies have immense potential to realise a demographic dividend. For instance, India and Bangladesh comprise bulk of the South Asian population and have witnessed early signs of demographic transition – as early as 1970s when both the countries started experiencing a youth bulge in their respective economies. According to Navaneetham and Dharmalingam (2012), they are the only two South Asian economies experiencing a similar youth bulge of around 20 percent from1970s-1980s and which is expected to last until the year 2020.

As a result, the relative share of the working age population has been rising in both the countries since the 1980s. While India's working age accounts for over 60 percent of its population, from nearly 53 percent in 1970s[2], Bangladesh's working age population has risen from 53.2 percent in 1980s to around 66 percent by 2015. Moreover, both the countries have also witnessed a significant improvement in their human development indicators, over the years, with secular declines in fertility rates, infant mortality rates and rising life expectancy at birth. According to David E. Bloom (2011), India and Bangladesh have witnessed rapid decline in infant mortality rates and a dramatic rise in life expectancy since the 1990s.

[1]The figures have been collected from various reports of United Nations Development Programme (UNDP)'s on Human Development.

[2]The figures on working age population, for India, have been taken from Census India (2011) and for Bangladesh, the corresponding figures have been taken from World Bank Data Bank (2016).

As a result of these factors, theinverse dependency ratios[3] have been rising at a rapid pace. Bangladesh's inverse dependency ratio showed a sharp increase since the mid-1980s, catching up with India's in 2003 as a result and exceeding the latter, thereafter. India's inverse dependency ratio, on the other hand, began to increase in the 1970s following the decline in fertility rates. According to Bloom et.al. (2011), region-wise South Asia is projected to add an average of 18 million people to its working-age population every year for the next two decades – and the result will be a very high ratio of working-age to non-working-age individuals, which will peak in 2040 at 2.2:1.

However the region has not been able to realize a demographic dividend nor capitalise its human capital effectively for spearheading growth and development. While the region has been experiencing varying, but generally increasing, annual average growth rate in Gross Domestic Product (GDP) per capita, these rates are far below the corresponding growth rates for a number of countries in East Asia or even Sub-Saharan Africa. Infact, South Asia's relatively slow rate of economic growth has caused its GDP per capita and GDP per capita on purchasing power parity (PPP) to fall behind some of the other developing and emerging regions of the world[4].

The region is also facing a host of development challenges. Despite an impressive two-decade decline, extreme poverty remains high in South Asia. According to UNDP (2016), nearly 61 percent earns less than USD 2 a day in the region. In countries like Afghanistan, Bangladesh, Nepal, and Pakistan, over 80 percent of the working people earn less than USD 4 daily. While the size of middle class earning between USD 4 and $13 a day is rising in India, Bhutan, Maldives, and Sri Lanka, it is still small in other parts of the region. Moreover, it has also been observed by this study that South Asia had the highest percentage of children suffering from malnutrition under the age of 5 in 2014 in comparison to other regions.

Additionally, many countries in the region suffer from extreme forms of social exclusion as well ashuge infrastructure gaps and that larger countries are experiencing

[3]Inverse dependency ratio is the ratio of working to non working age population.

[4]This inference has been drawn on the basis of data observation for GDP per capita (current US$) and GDP per capita, PPP (current US$). For instance, according to World Bank (2018) data, South Asia's GDP per capita (current US$) is at nearly US$ 1841 by 2017 in comparison to East Asia and Pacific's GDP per capita which is over US$ 10,000 by 2017.

income and gender inequalities. According to World Bank (2012), there persists a related employment challenge as well – of absorbing its growing labour force considering that the region will add between 1 million and 1.2 million new entrants to the labour force every month for the next two decades.

This study has also observed that health facilities in the region are also dismal. In a comparative data analysis viz-a-viz other global regions[5], the lost health expectancy[6] (an output indicator measuring quality of healthcare of the population) is the highest in South Asia (at 13.7 percent in the year 2016) compared to other regions, owing to lowest number of physicians (7.8 per 10,000 people between 2007-2017) and lowest number of hospital beds (8 per 10,000 people between 2007-2014).

In the background of the ongoing age structure transition in South Asia, it is critical to study the contribution of working age population and young population in realization of demographic dividend[7] and transformation of economies through growth and development. Towards this end, this research thesis is being undertaken to examine the role of human capital in the economic growth through a comparative analysis of India and Bangladesh.

Review of Literature

The objective of a review of the literature on the subject is to assess the existing theoretical framework underpinning the linkages between human capital and economic growth.

Human capital is a complex theoretical concept having no definite and uniform definition in literature. As a concept, it can be traced back to the classical school of thought in the year 1776. The basic theory was largely shaped by Gary S. Becker and was a refinement of the marginal-productivity theory. For instance, Becker (1975) advocates that in its most general form, human capital refers to resources in

[5]The inferences have been drawn on the basis of the data set collected from UNDP Report on Human Capital Development (2018)

[6]Lost health Expectancy is an output indicator to assess the progress on healthcare. It has been defined by UNDP (2018) as the relative difference between the life expectancy and healthy life expectancy as a percentage of LEB.

[7]It is defined by United Nations Population Fund (UNFPA) as the economic growth potential that can result from shifts in a population's age structure, mainly when the share of the working-age population (15 to 64) is larger than the non-working-age share of the population (14 and younger, and 65 and older)

people.Rosen (1999) states human capital as ‘an investment that people make in themselves to increase their productivity’. According to Frank and Bemanke (2007), human capital can be defined as ‘an amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness, and initiative that affect the value of a worker's marginal product’.

In its most recent form, human capital has been attributed considerable weightage in the measurement global wealth. According to Lange et.al. (2018), human capital, measured as the value of earnings over a person's lifetime, is the most vital component of global wealth. Similarly, a recent Goalkeepers Data Report (2018) has presented the concept of human capital as the sum total of health, knowledge and skills of population of a country. Therefore, it has been observed that human capital has been a widely researched and debated area of research since the 20th century and till date.

In this background, the literature review in this research study has been undertaken to examine the existing growth accounting models that measure the direct and indirect impact of human capital on the pace of growth; global evidence on cross country comparisons of human capital contributions in the growth processes; and finally, a review of the existing research on the subject in South Asian context viz-a-viz other regions of the world.

Measurement of Human Capital in Economic Growth: Existing Growth Models

Theexogenous growth models were the earliest breakthrough in growth accounting frameworks, starting with the Neoclassical Growth Model introduced by Robert Solow in 1956. Solow growth model primarily describes the relationship between growth and only two factor inputs - physical capital and labour with the fundamental assumption that growth would eventually come to a halt in the absence of technological process. In other words, the model does not explicitly determines the role of human capital. Vinod and Kaushik (2007) have analysed Solow's findings and quoted, "Solow found out that the increased use of capital explained 12.5 percent of the change in gross output per man-hour while the concept of technical change explained the residual 87.5 percent". Gradually, it was realized that much of this residual might be due to human capital.

Mankiw et.al (1992) presented an extension of the Solow model, known as the human capital augmented Solow model, by including human capital as a separate factor input besides physical capital and labor. The model predicts that, ceteris paribus, a country would have a higher level of per capita income if it has a higher amount of human capital. However, the rate of economic growth does not getsdirectly impacted from investment in human capital but indirectly through changes in income levels. According to the model, growth, in the steady state, only depends on the rate of exogenous technological progress. Therefore, if all countries happen to be in their steady state, differences in growth rates could arise only because of different rates of technological advancement across countries.

However, it has been observed from the literature, that there lay several drawbacks of neoclassical models pertaining to their inherent assumptions on which the models are based. Wilson and Briscoe (2004) have argued that neoclassical models remain restricted by their underlying assumption of constant returns of scale. Critical property in the two models is that there are diminishing returns on accumulation of capital. This implies that in the absence of any technological progress, diminishing returns would eventually obstruct economic growth. They have also pointed out that while the inclusion of human capital accumulation in augmented Solow model increases the impact of physical investment on the steady state of output but ultimately growth is affected by exogenous technological change. As Romer (1994) pointed out, "In models with exogenous technical change and exogenous population growth, it never really mattered what the government did." Therefore, Romer, among others, have proposed to make technological advances explainable within the framework of Solow model.

As against neoclassical models, endogenous growth models have 'endogenized' the sources of growth so that the rate of growth get determined within the model. The role of human capital has been examined through two distinct approaches as proposed by Robert Lucas and Paul Romer, respectively.

Lucas (1988)'s endogenous growth model regards human capital as an engine of growth. Contrary to Mankiw, et.al (1992), in the Lucas model, there are two sectors of production - one for consumption goods and physical capital, and another for human capital. The latter enters into production function in a labor-augmenting form- same

way as technology does in the Solow model - leading to positive externalities in the form of productivity improvements and hence growth. Lucas assumes that individuals invest in human capital by spending part of their time acquiring skills through education, instead of investing a fraction of their income and expecting returns. In other words, the only input in the production of human capital is education. The model is characterised by self sustained growth driven by accumulation of human capital.

Romer (1990)'s growth model, on the other hand, emphasizes the role of human capital stock in innovation, research and development, adoption of new technologies and imperfect competition. According to Romer (1990), it is the stock or level of human capital which influences the rate of productivity growth, not its rate of accumulation since human capital is an input in production of new ideas and therefore an important determinant of the pace of innovations. Consequently, economic growth should tend to accelerate as more human capital is employed in research and development practices. In other words, economic growth, in the endogenous growth model proposed by Romer, is driven by technological change that arises from intentional investment decisions made by profit-maximizing agents.

Therefore, endogenous growth models which suggest permanent effects in growth rates have the same empirical implications as the Solow model predicting only transitory changes through the convergence mechanism. Moreover, such models clearly highlight theoretically the assertion that skills and competency could have a significant impact on productivity and technical change. In addition, this may feed into economic growth one way or the other. It remains to be seen whether there is robust country specific evidence to corroborate the theoretical propositions.

Country Case Studies: Evidence

Country specific research in literature that examines the impact of human capital on economic growth has taken into consideration different proxies for human capital, laying its emphasis on quantitative indicators of human capital.

Early researchers like Mincer (1970; 1974) Barro (1991; 1997), Mankiw, et.al. (1992) recognized that varying amounts of schooling determined different amounts of human capital, and thus could be a clear measure or proxy for human capital.

For instance, Mincer (1974) laid his premise on the grounds that schooling developed the general skills of students and hence could be considered as an appropriate measure of human capital. He supported his argument by analyzing the impact of how wage differentials could be significantly explained by school attainment and on-the-job training. Mincer concluded in his analysis that the rate of return to additional years of schooling is large, by all accounts.

Barro (1991) in his analysis made use of gross enrollment ratio in schools as a proxy for human capital and concluded that GDP per capita was positively related to the initial level of human capital.

Similarly, Abbas (2000) used a growth accounting framework with the help of an Ordinary Least Squares (OLS) regression method, to analyze the effects of human capital on the economic growth of India and Pakistan for the period 1970 to 1994. Primary, secondary and senior secondary levels of schooling were taken as proxies of human capital.

However, such studies ignore the quality dimension of human capital across countries. These research studies have assumed that a year of schooling renders the same increase in knowledge and skills regardless of the education system in all the sample countries and they also consider formal schooling as the primary and only source of education, ignoring the variations in the quality of non-school factors on education outcomes.Measures such as technical and vocational training, research and development and tertiary education play a significant role in development processes as well, which have largely been left outside the gambit of such research studies.

Another measure with considerable appeal is an analysis of cognitive skills achievement of individuals. Hanushek and Woessmann (2011a) have analyzed the skill differences across countries through test score measures - namely, International Assessment of Literacy Survey (IALS), Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS) - on mathematics, science and reading achievement. The cognitive skill measure is scaled as the standard deviation of achievement tests and the model concludes that only the portion of schooling that is directly related to skills has an impact on cross county differencing in growth.

Evidence from the advanced economies reinforces the alternative measure suggested by Hanushek. For instance, Mulligan (1999) obtain estimates of the value of cognitive skills from different data-sets for the United States that evaluate students after they leave school and enter the labour force. They suggest that one standard deviation increase in mathematics performance at the end of high schools translates into 12 percent higher annual earnings.

However, such a model misses the subject of non-cognitive skills completely. Levin (2012) underlines the need to measure the effects of education on the development of non-cognitive proficiencies of individuals rather than just depending on the test scores or cognitive skills of the students. Any model which misses the non-cognitive element of human capital is, according to him, restrictive and therefore a narrow assessment of the individuals' skills.

Moreover, the model proposed by Hanushek and Woessmann (2011a) is of relevance more for those countries which have participated in such international skills assessments. The literature on returns to cognitive skills for the developing world is restricted to a relatively limited number of developing countries and the results are difficult to summarize easily. South Asia has not been a participant in any of the international tests since the early 1970s. Thus, it is difficult to benchmark student performance on the basis of cognitive skills measurement in such countries.

Levin (2012) underscored the importance of non - cognitive skills of individuals and their inter-linkages to economic growth. According to Levin, human capital comprises of cognitive as well as non-cognitive elements and any estimation model which misses the latter, is restrictive and presents a narrow assessment of individual's skills and its impact on economic growth.

Infact, skilled human capital has also been examined as a significant contributor to export led growth. Johanson (2004) argues that it is not possible to disentangle the interlinked factors which lead to changes in skill demands and at least three main forces are responsible in increasing the demand for skills worldwide— technological change, changes in work organization and trade openness.Wood (1994) claimed that the development of skills through the means of education proxied for human capital

development is a key determinant of comparative advantage and manufacturing export performance.

Literature has also examined the impact of regulatory framework and financial support (governing human capital development) on growth and development of economies. For instance, the need for an enabling policy framework supporting adequate investment in skills development to realize a sizeable demographic dividend has also been reflected in the studies of David Bloom.

Bloom and Williamson (1998) have studied the impact of increasing inverse dependency ratios on economic growth in East Asia. In this region, very large increases in working age-non working age ratio took place at the time when economic growth surged in the region. Estimates suggest that one-third of that region's economic growth during the 'East Asian Miracle' period can be accounted for by the effects of demographic change.

Ireland is yet another example where a steep decline in fertility rates,on account of population control policies led to an increase in working age population in the 1990s. Bloom and Canning (2003) underlined that an increased share of working age people in the population was a key element underlying Ireland's subsequent rapid economic growth

Similarly, a well-educated labor force, higher saving and investment ratios and well directed export oriented development strategies contributed towards sustaining economic growth in the Republic of Korea. As early as 1960, the Republic of Korea had accumulated a substantial stock of human capital. According to Asian Development Bank (2017), nearly 56 percent of its population had received some primary education, and 20 percent had some secondary education, surpassing the attainment of most developing countries. Over the next three decades since then, the country experienced an unprecedented rate of educational growth - adding almost 6 years in its school attainment - as demand for higher education also increased with income, while public investment in education remained high.

Dauda (2010) empirically examined the role of human capital in Nigeria's economic development. Empirical results indicate that there is, indeed a long-run relationship among labour force, physical capital investment proxied by real gross domestic

capital formation, human capital formation, proxied by enrollment in educational institutions and economic growth in Nigeria. Thus, the policy implication of the findings is that the government should place a high priority on human capital development.

The experience of such economies suggests that the countries were able to achieve higher growth rates due to effective accumulation of human capital.According to Khan (2007), At the outset, only a large fraction of unskilled workforce and a minuscule stock of physical capital were the available resources at hand. With an accumulation of human capital stock, these countries eventually attracted high value-added multinationals which led to faster economic growth. Therefore, trends in the demographic composition of the workforce play a crucial role in shaping productivity and income growth at the aggregate level.

Various studies have also emphasized on improving health and nutrition as a way of developing human capital, besides education and literacy (cognitive and non-cognitive) skills. In fact Becker (1993) and Schultz (1997) have argued that health and nutritional expenditure is also a part of human capital investment. According to Schultz (1997), good health helps to forge improved levels of education by increasing levels of schooling and scholastic performance. In his earlier work, Schultz (1961) had also underlined the direct linkages between increase in investments in human capital through knowledge and skills enhancement of the work force, and the rise in their earnings.

In addition, the health dimension of human capital has also been examined in terms of its relationship with national income. The long-term relationship between income and health has also been also examined by Arora (1999) considering the advanced economies and confirming his hypothesis that health of the population influences economic growth and hence should be an integral component of the productivity of economies and supporting the endogenous growth models. A similar study undertaken by Arora (2001) underlined that in the co-integrated relation between health and income, innovations in health lead to economic growth and not vice versa.

In analyzing cross-country data over the past 25 years, Bloom and Sachs (1998) obtained empirical evidence that health (indicated as coefficient of life expectancy at

birth) and demographic variables play a vital role in determining rates of economic growth. Moreover, they also expand the determining variables of economic growth to include measures of human capital (indicated by status of health of a population set in their study), abundance of natural resources and economic policy.

In a nutshell, theory acknowledges role of human capital on economic growth. according to Lindh (2004), if labour productivity is considered the heart of economic growth, human capital is one of the key factors driving such growth. Moreover, literature also underlines the investment of human capital in terms of skill development, education and healthcare, to enhance productivity and development. In the words of Harbison (1973), "Human resources constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production; human beings are the active agents who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to develop anything else".

However, on the basis of the review of global country specific evidence, which examines the impact of human capital on growth, it may be inferred that most of the existing research studies do not take into consideration the qualitative dimension of human capital. Therefore, a holistic perspective of human capital has not been presented through such studies.

The next section of literature examines the impact of human capital specifically in the South Asian context.

Evidence in South Asian Context

The South Asia region has been undergoing a demographic transition leading to rising inverse dependency ratio. According to Bloom (2011), a rising working age to non working age ratio not only generates an opportunity to reap a demographic dividend but also augurs well for regional economic growth. Therefore, there lies a potential and possibility of realizing demographic dividend in this region. However, literature does not provide a clear understanding of whether human capital has been contributing to economic growth of the region. The evidence is mixed.

Abbas (2000) empirically examined the effect of human capital on economic growth in India and Pakistan (for the period from 1970 to 1994) with the help of a standard human capital augmented production function and applying OLS regression methodology. Enrolment ratio at primary, secondary and higher secondary levels were taken as proxies for human capital in the study. The regression results deduced that human capital plays a crucial role in the growth of these economies.

Duma (2007), on the other hand, studies the sources of growth in Sri Lanka for the period from 1980 to 2006, using a human capital augmented Cobb-Douglas production function According to the results of the researcher's analysis, human capital only contributed around 10 percent of output growth while physical capital and labour contributed 17 percent and 27 percent, respectively. Therefore, it may be inferred that human capital's contribution to economic growth process, for the period under consideration in Sri Lanka, was quite low compared to other factor inputs like physical capital and labour. The researcher justified the results on the ground that in the period after 1980's there was a slowdown in the labour intensive product line along with a rapid growth in the output of capital intensive industries with higher productivity level.

Abbas and Foreman-Peck (2007) use the co-integration technique for estimating the effect of human capital on economic growth of Pakistan during the period 1961 to 2003. In this study, the stock of human capital was used as a proxy for human capital which was calculated through the perpetual inventory method by using the secondary enrolment data. Another proxy for human capital used in the study was health expenditures as a percentage of GDP. They found an increasing return to physical and human capital specially in case of investing in health sector.

Pradhan (2009) investigates the causal relationship between education dimension of human capital and economic growth in India. The researcher undertakes a bi-variate causality analysis using using vector error correction model in a cointegration framework. The study takes in consideration public expenditure on education as a proxy of human capital and per capita GDP as an indicator of economic growth. The regression results deduce that public expenditure on education has no effect on economic growth, though the reverse is true. One of the drawbacks of this study is that the researcher restricts the human capital measurement to public expenditure on

education only. Therefore,it may be inferred that the empirical results do not indicate the clear impact of human capital on economic growth.

Haldar and Mallik (2010), in their case study of India, examine theimpact ofinvestment in human capital stock (comprising education and health dimensions) on output with the help of a multivariate co-integration framework. The stock of human capital is divided into education stock measured by enrolments rates at upper primary level of education and expenditure on education as a percentage of GDP. The health stock is measured by infant survival rate and expenditure on health as a percentage of GDP. The structural adjustment programme of 1991 (termed as 'openness' by the researchers) is taken as a dummy variable in the model. The results suggest that investment in human capital measured through the indicators of education and health have a significantly positive long run effect on growth rate.

While the researchers confirm a positive impact of human capital investment on economic growth, this study has observed some drawbacks in their analysis. Theresearchers have undertaken their empirical analysis on the assumption of planned economy wherein the growth rate of population remains equal to the rate of growth of employment.This does not exist in the real world. Moreover, the qualitative dimension of human capital in terms of skills development, training, research and development is completely missing in their analysis.

Qadri and Waheed (2011) evaluated the relationship between human capital and economic growth with the help of time series data from 1978 to 2007 of Pakistan. Health adjusted education indicator[8]was used as a proxy for human capital and included in the analysisusing standard Cobb Douglas production function. On the basis of the linear regression results, the researchers deduce a positive relationship between human capital and economic growth in Pakistan, especially in the long run.

Existing studies also reinforce the importance of demographic transition in socio-economic development. For instance, World Bank's Poverty Assessment (2013) for Bangladesh showed that, during the period 2000-2010, poverty reduction was closely linked to the growth in labour income and changes in demographics.

[8]Health adjusted education indicator was calculated represented by EH – enrolment rates at the primary level multiplied by the expenditure on health as a percentage of GDP.

Fertility rates have been steadily dropping over the last several decades in the country which has resulted in lower dependency ratios, thereby increasing income per-capita and leading reduction in poverty.

Yet, the literature also emphasizes that there is nothing automatic about the effects of demographic change on economic growth. According to Bloom et.al. (2003), 'demography is not destiny'. Changes in age structure simply affect the supply-side potential for economic growth. Seizing the demographic potential depends on the nature of investment in human capital.

Various studies have underscored the importance of quality of human capital, in terms of skills development,as a strong determinant for high productivity and growth in South Asia. According to FICCI (2015), skills development is critical for the economic growth and the social development of India. In its latest report, UNDP has also drawn attention to the quality of human capital development which is equally vital for development, besides its quantity. According to UNDP (2018) for instance, achievements in human development should not only be expressed in terms of quantity (such as life expectancy, mean and expected years of schooling and gross national income), but also in terms of quality of investment in education and health. Therefore, it may be inferred that an accurate measurement of human capital is through an assessment of the progress achieved in the provision of quality education, health and skills development services.

Similarly, Bhat and Siddharthan (2013) have placed human capital as an evolving technology in India which is needed for sustained growth of per capita income and investment. Such technology, according to the researchers, cannot be harnessed in the absence of skills development or knowledge-led innovation. Hajela (2012) argues that skills shortage is leading to unemployment in India. The research mentioned India lacks sufficient skilled workers as its existing vocational training system does not target the casual or informal workforce which constitutes a sizeable percentage of the country's working age population.

Literature also underscoresthe need for an enabling policy framework supporting human capital development and economic growth.Bloom, et.al. (2011) in their study argue that existing skills levels are far from adequate to derive demographic dividend

and impel economic growth in South Asia. According to them, if the governments are to capitalize on the high share of working-age people in the population, they will have to ensure that those people are healthy, well educated, and well trained in the skills demanded by the labour market.

In reference to the relevance of demographic dividend in development, Bloom (2011) argues that in the case of India and Bangladesh, the demographic dividend has not been enjoyed to an appreciable extent, because it has been choked off by a non-enabling policy environment. Therefore a set of enabling policies and circumstances must be in place if a country or region is to receive an economic boost from a change in the age structure of its population.

According to World Bank (2012), without an effective policy reform in South Asia, demographic dividend cannot be realized or used to boost growth and living standards. World Bank (2015) has emphasized the need of public investments in human capital as an essential means to generating inclusive and sustainable growth in India over the next century.

Thus, the existing literature pertaining to human capital and its interlinkages with economic growth presents mixed empirical inferences, largely on account of the use of different proxies to human capital and varying research methodologies. As Judson (2002) pointed out, "despite the conventional wisdom that output growth and human capital should be positively correlated, statistically significant results have been mixed, and strong and positive correlations between growth and human capital accumulation have been the exception rather than rule".

Rationale and Scope

On the basis of literature review on this subject, it may be inferred that the existing research studies and theories present mixed empirical results pertaining to the role of human capital on economic growth. This may be largely due to the approach that has been followedof only restricting the measurement or proxies of human capital to quantitative indicators. While there has been considerable acknowledgement to qualitative indicators, they have not been adequately used in human capital studies. As a result, most of the empirical results and inferences drawn in the existing literature on human capital, is biased and may not be examining the impact of human

capital on economic growth, accurately. In other words, inherent bias in the use of proxies of human capital has contributed towards mixed empirical results in the existing studies which examine the relationship between human capital and economic growth in South Asia.

In the background of the existing shortcomings and limitations, this research thesis makes an attempt to fill in the gaps in measurement of human capital and empirically examine the causal relationship between human capital and economic growth in South Asian countries, taking into consideration quantitative as well as qualitative indicators of human capital. While underlining a regional overview on human capital in South Asia, this thesis presents a comparative analysis of India and Bangladesh, examining the impact of human capital on economic growth of these countries during the period from 1991 to 2015.

The two countries are large economies of South Asia accounting for bulk of the population in the region. India, which is the largest economy in South Asia in terms of GDP and PPP, accounts for over 80 percent of the region's GDP and constitutes 74 percent of the region's total population[9]. Moreover, the country is also credited for having the largest share of young population, besides contributing to the economic growth of the region.

In comparison, Bangladesh is the third largest country and accounts for an abundant labour force as compared to other regional countries. According to World Bank (2013), Bangladesh's labour force participation rate has remained consistently the highest[10] in South Asia during the period 2000-2010. Moreover, the country has also out-performed India by achieving a higher Human Development Index (HDI) value. According to UNDP (2014), Bangladesh achieved the highest annual average increase in HDI value in South Asia, by 2015[11]. Similarly, on gender development index and multi-dimensional poverty index, Bangladesh stood better than India. According to Bloom (2011), India's demographic indicators are similar to those of the South Asian

[9]The data source for this information is World Development Indicators (2015)

[10]The labour force participation rate of Bangladesh has remained between 60 - 70 percent during 2000-2010.

[11]Bangladesh's HDI value increased from 0.336 in 1980 to 0.579 in 2015. In comparison, India's HDI value stands at 0.624 and 0.396 in 2015 and 1980, respectively.

region as a whole. Compared with the two other large South Asian countries, it is ahead of Pakistan in the demographic transition, but behind Bangladesh.

As mentioned before, age structural transitions from pace of fertility and mortality transitions are underway in almost all South Asian countries but the timing and pace of transition vary among them. India and Bangladesh are the only two countries in the region which have experienced similar phases of demographic transition. They have witnessed a youth bulge since 1970s that has led to rising working age population, thereby generating a potential for demographic dividend.While India maintains an edge in the human development index ranking every year – ahead of all the countries in the region, Bangladesh is the only country in South Asia region which has demonstrated extraordinary progress in achieving a higher HDI value.

Nevertheless, both countries have immense potential to realise a demographic dividend in the background of their growing working age population, inverse dependency ratios, active contribution to the regional work force and improving human development indices, over the years. Therefore, an attempt has been made in this thesis to undertake a comparative analysis of India and Bangladesh with respect to the institutional framework, policy structure governing human capital and the relevance of its quantitative and qualitative indicators on economic growth, in these countries.

Research Methodology

In line with the rationale and scope, this research thesis attempts to examine the impact of human capital on economic growth in India and Bangladesh. Under this broad objective, the research work is being carried out to study the profile and stages of demographic transition in India and Bangladesh, compare their performance with respect to the institutional framework and policy structure on human capital development, and finally deduce its impact on economic growths of the two countries.

A detailed review of the existing literature on the subject has been undertaken to examine the theoretical inter-linkages between human capital and economic growth supplemented bythe evidence in South Asia viz-a-viz globally, and also identify the limitations and challenges of existing research on this subject, in the process. In other words, a study of the literature helps to form the basis and framework for undertaking

this research thesis. Taking cue from the existing theoretical underpinnings, empirical analysis and several rounds of interactions with subject experts from India and Bangladesh have been undertaken to examine a holistic impact of human capital on economic growth in India and Bangladesh. The results of the empirical work and the interactions with experts help to identify existing challenges in policy frameworks governing human capital development in the two countries. Various inferences and policy suggestions are finally drawn, in the process, as suitable learning for growth and development.

In this respect, the primary hypothesis presented in the thesis is that human capital indicators such as skills development, vocational training, research and development and fund allocation on education and healthcare services(which are the qualitative or input indicators of human capital) have a positive impact on the economic growths of India and Bangladesh during 1991 to 2015.

The reference time period for the study is 1991 to 2015 since the beginning of the 90s' witnessed a shift in economic regimes when South Asia as a region really opened up to the outside world with an accelerated pace of global trade integration and 2015 has been selected as the end point since the year was recognized by United Nations as the target deadline to achieve the Millennium Development Goals (MDGs), that wereinitiatedat the start of the Millennium around a common 15-year agenda to tackle the indignity of poverty; therefore MDGs are an important benchmark to measure the progress of a country's socio-economic development. It was also the year when Sustainable Development Goals (SDGs) or Global Goals were introduced by the United Nations, build on the successes of MDGs. With the same objective as that of the MDGs, SDGs are an extension to the millennium goals, and also include new issues surrounding economic inequality, innovation, sustained consumption, among others, under their agenda for action.

In order to conduct the empirical analysis for this thesis, the estimation framework has been designed by primarily referring to Lucas (1988)'s endogenous growth model. The growth accounting equation takes into consideration human capital, physical capital and labour as the factor inputs or independent variables and growth rate as the dependent variable.

Data has been collected on various indicators of human capital, physical capital, labour and growth rate. Various tests for stationarity and multicollinearity have also been conducted on the data set using suitable statistical methodologies. Ordinary Least Squares linear regression method has been applied on the estimation equation (human capital augmented Cobb Douglas production function) formulated for the empirical analysis.

On the basis of the literature review on the subject, human capital has been characterized by the qualitative as well as quantitative dimensions. The measurement variables of human capital identified for this study are Gross Enrolment Ratio (GER) at different levels schooling enrolment rates, Adult Literacy Rate (ALR), Mean Years of Schooling (MYS), formal and non formal vocational training, enrolment ratios in vocational training programmes at various levels of education, percentage of teachers employed in providing vocational training. All these parameters also reflect the education and skills development dimension of human capital. The health dimension of human capital is primarily measured by life expectancy at birth. Moreover, parameters indicating the budget allocation or financial architecture governing education, health and research and development services have also been taken into consideration. All these variables are considered as proxies for human capital, slotted into the same model, to assess their impact on economic growth in India and Bangladesh.

Besides human capital, labour input is proxied with Labour Force Participation Rate (LFPR) and physical capital with Gross Fixed Capital Formation (GFCF). Economic growth has been measured by annual percentage growth rates of Gross Domestic Product (GDP) at market prices in constant prices.

Annual data has been collected by this study on all the variables indicated above, for the time period 1991-2015. The study has assessed and collected information through both primary and secondary sources. The primary sources include reports and studies of the governments and regulatory bodies such as Niti Ayog(India), Ministry of Labour and Employment (India), Ministry of Skills Development and Entrepreneurship (India), Bureau of Manpower, Employment and Training (Bangladesh), Ministry of Labour and Employment (Bangladesh), Ministry of Human Resource Development (India), etc.

Data has been collected from United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nation Asia - Pacific Yearbooks and database for different years. Besides, the World Tables and the World Development Reports published by the World Bank for different years have also been used. Furthermore, the Statistical Yearbooks and Labour Force Surveys of the relevant countries have also been sorted out.

Various research reports of academic and research institutions and industry surveys of various sector skills councils and chambers of commerce have been referred. These include Institute for Human Development (India), Federation of Indian Chambers of Commerce and Industry (India) Skills Development Institute (Bangladesh), National Skills Development Corporation (India) etc;

Additionally, the working papers, reports and studies published by international developmental institutions such as World Bank, International Labour Organisation, Asian Development Bank, United Nations Development Programme, have also been very useful for relevant information and data collection.

The secondary sources include books, journal articles, newspapers, unpublished research documents and other relevant materials published from time to time. STATA and SPSS statistical modeling techniques have been applied for conducting all the empirical work inthis thesis.

Chapters Scheme

The study consists of six chapters, including this *Introduction* that provides a comprehensive backgroundon the subject, giving a clear exposition of the context and rationale of this study; and a detailed *Conclusion*which summarizes the main research findings and implications of this study.

Second Chapter is a review of the literature on the subject. The chapter largely concentrates on the endogenous and exogenous growth models, studying how human capital fits in the estimation of growth, empirical evidence supporting the relationship between human capital and economic growth as well as the weaknesses of the existing research on the subject. Therefore, the theoretical framework underlining the role of human capital in the economic growth globally viz-a-viz South Asia, has also

been discussed. This chapter also lays the rationale and framework for putting together a research thesis on this subject in South Asia, with a focus on India and Bangladesh.

The *Third Chapter* outlines the performance of South Asia vis-a-viz other emerging regions of the world on human development indicators and economic growth. Against a regional overview on the subject, the demographic profile, institutional framework and policies governing human capital in India and Bangladesh has been delineated in this chapter. A focus on the qualitative dimension of human capital, primarily, the operational and policy framework governing skills development and TVET in India and Bangladesh has been elaborated in this chapter.

Against the background of this research thesis, a review of the literature on the research topic and the existing institutional mechanism and policy frameworks in India and Bangladesh, *Chapter Four*empiricallyexamines the role of human capital on economic growth in the two countries during the period from 1991 to 2015. The empirical analysis is undertaken on the basis of the time series data set from 1991 to 2015 taking into consideration the human capital augmented growth accounting model. Physical capital, labour and human capital are the independent variable and growth rate is the dependent variables. OLS linear regression method has been used as the regression method for the analysis once the data set has been tested for stationarity and broken down into principal components with the help of Principal Component Analysis. Inferences and conclusion have been drawn during the course of the empirical study on the basis of the regression results. The regression results have also helped to underline the challenges of the existing policy frameworks in India and Bangladesh, which are delineated in the next chapter.

Chapter Five describes the socio-economic challenges of the policy frameworks governing human capital development in India and Bangladesh. Furthermore, international best practices from the advanced economies and emerging economies of Asiahave also been referred to deduce suitable learning for South Asia.

The Concluding Chapter (*Chapter Six*) of this thesis summarizes the outcomes of the research, drawing relevant inferences and underlining policy suggestions on the basis of regression results deduced from empirical analysis and expert interviews. In other

words, the chapter synthesizes the relevant findings of this research work. This thesis has been put together to serve as a ready reference resource for policy making on human capital and its contributions to growth and development in South Asia.

CHAPTER 2
ROLE OF HUMAN CAPITAL IN THE ECONOMIC GROWTH: THEORETICAL FRAMEWORK

The idea that human beings should be considered as 'capital' could be traced in the earliest works of distinguished economists - J.B.Say, Adam Smith, Fredrich List, Nassau Senior, Ernst Engel, Walras and Irving Fisher. Alfred Marshal disregarded the notion as 'unrealistic' since human beings are not a commercial commodity and non marketable[12]. Nevertheless, most of these economists argued that the expenditure incurred on human beings indirectly improves their output productivity and hence they contribute in increasing the national wealth of a country. Therefore, by some accounts, the impact that human beings could have on the economic development of a nation was prevalent in the history of economic thought for a long period of time.

It was not until the middle of the 20th century that Gary S. Becker and others such as Theodore Schultz, formalized a theory of human capital. The basic theory shaped by Becker was a refinement of the marginal revenue productivity theory of wages under neoclassical economics. It views schooling and training as an investment in skills and competencies (Becker, 1964). The theory holds that earnings in the labour market are dependent upon the individual's information, knowledge and skills set. It is further argued that based on the assumption of rational expectations of returns on investment, individuals make decisions on education and training they wish to receive as a way of augmenting their productivity. In other words, investments in human capital depend on the costs of acquiring the skills and returns in terms of greater productivity and output, that are expected from that investment.

Growth accounting experts such as Denison (1962) and Jorgenson and Griliches (1967) have examined to what extent changes in the quality of workforce could explain the "residual" Total Factor Productivity (TFP) unaccounted for by increases in labor and capital inputs. However, it was the emergence of 'new growth theory' and, in particular, the contribution by renowned economist Robert Lucas Jr. that really sparked an interesting debate over the relationship between human capital and growth.

[12]Alfred Marshall's position on this concept has been widely debated. His notion of human capital as 'unrealistic' was debated by Schultz in F. Harbison and C.A. Myers, *Education, Manpower and Economic Growth,* (McGraw Hill, New York, 1964, pg. 12), who later retracted his statement.

The objective of this chapter is to assess the theoretical framework underpinning the linkages between human capital and economic growth that the existing literature has produced. Before proceeding into the assessment, it seems appropriate to give cursory attention to certain terminological aspects concerning human capital.

Human capital is a complex theoretical concept which does not have a definite and uniform definition in literature. However, it has been a widely researched and debated area of research since the 20th century and till date.

Becker (1975) advocates that in its most general form, human capital refers to resources in people. Historians of pre-modern economies applied the definition of human capital at a broader level. For instance, Nakamura (1981) defines human capital broadly as 'labor skills, managerial skills, and entrepreneurial and innovative abilities-plus such physical attributes as health and strength'. Newland and San Segundo (1996) use several measures as indicators of human capital such as physical strength and skills of the slaves living in Peru and La Plata in eighteenth century. Some exceptions to this broad definition of human capital in historical research for the pre-modern period come from economic historians which were more oriented towards quantitative measurement (Sandberg 1979; Rosés 1998; Reis 2005). For example Van Zanden (2004) measures the price of human capital as the relative wage of skilled labourers such as carpenters and brick-layers compared with unskilled labour.

In this context, an individual's level of education and experience determines his or her (labor) income. In the words of Harbison (1973), "Human resources constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production; human beings are the active agents who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development. Clearly, a country which is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to develop anything else".

Rosen (1999) states human capital as 'an investment that people make in themselves to increase their productivity'. The concept of human capital has also been defined by Frank and Bernanke (2007) as 'an amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness, and initiative that affect

the value of a worker's marginal product'. OECD (1998) has defined it as "the knowledge, skills, competencies and other attributes embodied in individuals that are relevant to economic activity".

In its most recent form, human capital has been considered as a vital component for measuring global wealth. According to Lange et.al. (2018), human capital, measured as the value of earnings over a person's lifetime, is the most vital component of global wealth. It accounts for two thirds of the total global wealth. Similarly, a recent Goalkeepers Data Report (2018)[13]of Bill and Melinda Gates foundation, has presented the concept of human capital as the sum total of health, knowledge and skills of population of a country.

2.1. Measurement of Human Capital in Economic Growth: Existing Growth Models

The models of economic growth measure the direct and indirect impact of changes in human capital stock on the pace of growth. The direct effects are related to labor productivity, and the indirect – to changes in total factor productivity resulting from increase or decrease of human capital.

2.1.1. Exogenous Growth Models

2.1.1.1. Neoclassical Growth Model

The standard neoclassical growth model introduced by Solow (1956) describes the relationship between growth and two factor inputs - physical capital and labor. The aggregate production function under this model is described in the form $Y_t = F(K_t, L_t . A_t)$, where Y is output, K is capital, L is labor and A is an index of technology or efficiency. Solow emphasizes that F has the usual neoclassical properties - in particular, it is characterized by constant returns to scale, decreasing returns to each input, and a positive and constant elasticity of substitution. The fundamental equation of the model relates the evolution of the capital stock to a constant rate of saving and a constant rate of depreciation. Labor and the level of technology grow at exogenous

[13]The report is available on the internet, URL:https://www.gatesfoundation.org/goalkeepers/report

exponential rates. The basic underlying assumption is that if there was no technological progress, growth in this model would eventually come to a halt.

The model has been formulated in a manner to allow for increases in efficiency which offset the diminishing returns to physical capital. The economy therefore converges to a steady state in which output and capital per worker grow at exogenous rate of technological progress. Accordingly, in the long run, economic growth is unaffected by changes in the rate of saving or population growth. In other words, changes in these factors only alter the level of long-run growth path, but not its slope.

Therefore, the traditional theory of economic growth does not explicitly determine the role of human capital. Vinod and Kaushik (2007) have analyzed Solow's findings and quoted, "Solow found out that the increased use of capital explained 12.5 percent of the change in gross output per man-hour while the concept of technical change explained the residual 87.5 percent". Gradually, it was realized that much of this residual might be due to human capital. Hence, augmented Solow models were developed, which contain human capital as a regressor in explaining GDP growth.

2.1.1.2. The Human Capital Augmented Solow model

Mankiw et.al (1992) developed an extension of the Solow model by introducing human capital as a separate factor input besides physical capital and labor, into a standard Cobb-Douglas production function with Harrod-neutral (i.e. labor-augmenting) technological progress.The production function in this model, which has come to be known as the human - capital augmented Solow model, thus takes the form:

$$Y_t=K_t^{\propto}H_t^{\beta}(A_tL_t)^{1-\alpha-\beta}$$

where Y is output, K is physical capital, H is the stock of human capital, A is the level of technology and L is the labor input. The exponents α, β and $1-\alpha-\beta$ measure the elasticity of output with respect to the factor inputs respectively. Mankiw et.al. assume $\alpha + \beta < 1$, so that the function exhibits constant returns to scale but diminishing returns to reproducible factors. Just like in the Solow model, population and the level of technology grow at exogenous rates while capital (in this model, both - human and physical) depreciate over a period of time.

The three underlying assumptions of this model are that:

a) people invest in human capital just as they invest in physical capital; that is, by sacrificing consumption and devoting a fractionof their income to the accumulation of human capital (analogous to the fractioninvested in physical capital),

b) human capital depreciates at the same constant rate as physical capital, and

c) output (which is considered the homogeneous good produced in the economy) can be either used for consumption or for investment in (physical or human) capital.

Due to the assumption of diminishing returns to capital (human and physical) and just like in the traditional Solow model, all quantities are constant in the steady state so that output per worker and capital per worker grow at exogenous rate of technological progress. This implies that an increase in the rate of investment in human capital has no effect on long run rate of growth of the economy, but it does lead to an increase in the level of income per capita.

In other words, the human-capital augmented Solow model predicts that, ceteris paribus, a country would have a higher level of per capita income if it has a higher amount of human capital. However, the rate of economic growth does not directly get impacted from investment in human capital but indirectly through changes in income levels. According to the model, growth, in the steady state, only depends on the rate of exogenous technological progress. Thus, if all countries happen to be in their steady state, differences in growth rates could arise only because of different rates of technological advancement across countries.

The transitional dynamics of this human capital augmented model is similar to that of the original Solow model i.e. the model predicts conditional convergence to long run steady growth path. In particular, an upward shift of steady state due to an increase in rate of investment in physical or human capital leads to a temporarily higher growth rate while the economy converges to its new steady state. As the economy approaches its higher growth path, the rate of growth gradually returns to its initial level.

However, an important difference in comparison to the original model is that the elasticity of income with respect to the rate of investment is higher. This is because a higher saving rate raises the steady state of income level, thereby raising human capital accumulation inspite of the rate of investment in human capital remaining unchanged. As a result, the level effect due to a change in the investment rate in more pronounced in the augmented Solow model compared to the original model without human capital.

In a nutshell, the human-capital augmented Solow model treats human capital as an additional factor input in production. Human capital is factored in exactly the same way as physical capital. It is accumulated by investing a fraction of income in its production, depreciates at the same rate as physical capital, and is produced with the same technology. However, growth in the long run is exogenous, like in the original Solow model, its rate equaling to the pace of technological progress.

However, there lies a serious drawback of neoclassical models pertaining to their inherent assumptions on which the models are based. Wilson and Briscoe (2004) have argued that neoclassical models remain restricted by their underlying assumption of constant returns of scale. A critical property in the two models is that there are diminishing returns on accumulation of capital. This implies that in the absence of any technological progress, diminishing returns would eventually obstruct economic growth. They have also pointed out that while the inclusion of human capital accumulation in augmented Solow model increases the impact of physical investment on the steady state of output but ultimately it is the exogenous technological change which impacts economic growth. As Romer (1994) pointed out, "In models with exogenous technical change and exogenous population growth, it never really mattered what the government did." Therefore, he among others have stressed the need to make technological advances explainable within the framework of Solow model.

2.1.2.Endogenous Growth Models

As against neoclassical models, endogenous growth models attempt to 'endogenize' the sources of growth, so that the rate of growth gets determined within the model. Moreover, such models also underline that economic growth can continue indefinitely because the returns on investment in a broad class of both physical and human capital do not necessarily diminish through time. These models explicitly recognize that technological changes in the economy depend on economic decisions in the same way as capital accumulation. In particular, technological change is most commonly related to the stock of human capital. Spill-over of knowledge across producers and external benefits from improvements in human capital are part of this process because they offset various tendencies to diminishing returns. In contrast, the inclusion of technological change and knowledge dissemination into the neoclassical framework was rendered difficult because of the underlying competitive assumptions which do not allow for any possibility of increasing returns to scale.

The role of human capital in the endogenous growth literature has been examined through two distinct approaches - Lucas (1988) which regards accumulation of human capital as an engine of growth; Romer (1990) who emphasizes on the role of human capital stock in the process of innovation, research and development, adoption of new technologies and imperfect competition.

2.1.2.1. Growth Driven by Human Capital Accumulation

In Lucas (1988)'s endogenous growth model, human capital enters into the production function in the same way as technology does in the Solow model, that is, in the labor-augmenting form. The economy comprises of individuals or consumers (representative agents termed by Lucas) maximizing life-time utility. These agents have control over two variables: the level of consumption, and the allocation of time between work and skill acquisition. The former determines the accumulation of physical capital, while the latter affects an agent's productivity in future. Lucas proposes the following growth production function:

$$Y_t = AK_t^{\beta} h_{a,t}^{\gamma} (u_t h_t L_t)^{1-\beta}$$

where Y, A, K and L are, output, technology, capital and labor, respectively while u is the fraction of an individual's time allocated to work, h is the skill level or human capital of the representative agent, and h_a is the average human capital in the economy. The level of technology, A, is assumed to be constant. Growth in the existing level of population of the economy is assumed as exogenous to the model. The most important assumption of the model concerns the law of motion according to which the variable human capital evolves over time. Lucas (1988) writes:

> *"To complete the model, the effort 1-ut devoted to the accumulation of human capital must be linked to the rate of change in its level, ht. Everything hinges on exactly how this is done."*

Specifically, Lucas assumes that the function which relates to the fraction of time allocated to skill acquisition ($1-u_t$) with the growth rate of human capital is linear in nature. The linearity assumption implies that irrespective of the level of accumulation, efforts contributed towards skill development would always lead to a proportionate increase in human capital. A plausible explanation has been offered by Romer (2001): The acquisition of skills may in fact facilitate or prepare an individual for future learning or improvements in productivity. He provides an example in support of his claim. In primary school, children are taught basic knowledge which may not improve their ability to contribute to production. Instead, it may be a pre-requisite for the acquisition of productivity enhancing skills throughout the rest of their education and employment cycle. Considering that there are no diminishing returns to the acquisition of skills, human capital increases without any restriction, thereby generating growth in the Lucas model.

Moreover, the properties of steady state depend on whether there are any external effects to human capital. In case there are, $\gamma \neq 0$, the term h which reflects the skill level or human capital, is different from 1 and therefore affects output. The externality arises from the fact that the impact on h from individual decisions with respect to the acquisition of human capital is too small to be perceived by individual agents. In other words, the benefits of higher average human capital are being spread over the whole population and cannot be appropriated by an individual.

On the other hand, in the steady state when $\gamma = 0$, output, physical and human capital per capita grow at the same rate. Since the ratio of human to physical capital is constant in the steady state, there would be an imbalance effect, that is, any exogenous shock to increase the level of human capital would trigger an equi-proportional rise in physical capital to restore the steady state. For instance, a positive external effect ($\gamma > 0$) would lead to physical capital per worker growing faster than h.

Although the existence of spillovers from human capital is not a necessary condition for sustained growth in this model, the existence of externalities surrounding the average level of skills in the workforce is of significance. Lucas presents some general observations that support the existence of positive externalities. He points out that in creative professions such as arts and sciences, the interaction among colleagues for instance will often prove stimulating for their intellectual output.

Moreover, he argues that the 'economic life is creative in much the same way'. In this respect, he states two relevant facts in support of his argument - first, in the absence of externalities to human capital, the latter would offer highest returns in those countries where it is in scarce supply. Therefore, one would expect migration of skilled workers from developed to developing or least developed countries rather the reverse. Second, without external effects, cities won't exist. Factor inputs such as capital and labor would just migrate to the countryside where the rental price of land is much lower. Therefore, there lies all evidence to confirm the existence of externalities to human capital externalities which could impact growth.

In a nutshell, the assumptions made by Lucas, that differentiates the model from the neoclassical augmented Solow growth model, are:

a) Lucas assumes that individuals invest in human capital by spending part of their time acquiring skills, instead of investing a fraction of their income and expecting returns, as explained by Mankiw, et.al (1992) under the human capital augmented Solow model.

b) Besides, Lucas ignores the depreciation of human capital.

c) Contrary to Mankiw, et.al (1992), in the Lucas model, there are two sectors of production - one for consumption goods and physical capital, and another for

human capital. The only input in the production of human capital is education. This takes into consideration the fact that human capital relies heavily on educated people as an input.

d) Finally, the model is characterized by self-sustained growth, which is driven by the accumulation of human capital. Therefore, a country's rate of economic growth would be expected to rise with the growth rate of human capital, but it should be unrelated to the initial level of skills of the population.

If, for some reason, the equilibrium value of 1-u (which is the time spent is acquiring skills) was to rise, this would lead to a permanent increase of growth. Therefore, additional efforts undertaken in acquiring skills has an effect on the rate of growth in the model, as against the augmented Solow model, where higher proportion of human capital accumulation only causes a level effect.

2.1.2.2. Human Capital and Technological Change

By contrast, in Romer's endogenous growth model, economic growth is driven by technological change that arises from intentional investment decisions made by profit-maximizing agents. The distinguishing feature of the technology as an input is that it is neither a conventional good nor a public good; it is a non-rival, partially excludable good. Because of the non-convexity introduced by a non-rival good, price-taking competition cannot be supported. Instead, the equilibrium is one with monopolistic competition.

Moreover, it is the stock of human capital which determines the rate of growth in this model. As Romer (1990) puts it, "the most interesting positive implication of the model is that an economy with a larger total stock of human capital will experience faster growth". Moreover, according to him, a country possessing a large population will not generate growth on its own; rather its integration into world markets will increase the growth rates, This finding suggests that free international trade can contribute towards speeding up growth. The model also suggests that low levels of human capital may help explain why growth is not observed in underdeveloped economies that are closed and why a less developed economy with a very large population can still benefit from economic integration with the rest of the world.

The model is therefore based on the assumptions that: economic growth is generated through technological change which is endogenous, market incentives play a significant role in technological advancement of a particular country, the aggregate supply of human capital is fixed and while knowledge and ideas are rival and excludable in nature, technology is a non-rival input.

In a nutshell, it is the level of human capital which influences the rate of productivity growth, not its rate of accumulation as specified by Romer (1990). This result is due to the fact that in this model, human capital is an input in production of new ideas and therefore an important determinant of the pace of innovations. Consequently, economic growth should tend to accelerate as more human capital is employed in research and development practices.

From the various growth models explained above, it is quite evident that the endogenous growth models which conclude permanent effects in growth rates have the same empirical implications as the Solow model predicting only transitory changes through the convergence mechanism. Moreover, the endogenous growth models clearly highlight theoretically the assertion that skills and competency could have a significant impact on productivity and technical change. In addition, this may feed into economic growth one way or the other. It remains to be seen whether there is robust empirical evidence to corroborate the theoretical propositions.

2.2. Country Case Studies: Global Evidence

Harbinson (1973) has explained the importance of human capital in the growth of an economy. According to him, human resources constitute the ultimate basis for generation of national wealth in the economy. He explains his claim by emphasizing that human beings are active agents who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development. Therefore, a country which is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to grow and develop in a real sense.

One of the central critiques of early ideas on human capital was that it was inherently considered an elusive concept that lacked any satisfactory measurement for a long time. However, the influential work of Schultz (1961), Mincer (1970, 1974) , among

others, spawned a rapid growth in the theoretical and empirical application of human capital to a wide range of issues.

Starting with the work of Schultz (1961), provision of good quality education services has been viewed as an investment in human capital and hence the primary indicator of human capital development rather than a consumption good which was considered under Keynes' influence.

Denison (1962 and 1965)'s pioneering research in this field is based on the predictions of the Solow (1956) model. According to him, if the returns from physical capital approximate as its contribution to output, then any variations in this form of capital accumulation do not account for change in the growth process - either across time or space. Denison (1965) uses a growth accounting framework to clearly distinguish between the growth in output resulting from contributions of physical capital per worker and the residual denoted by technological advancement, efficient allocation of resources, and an educated labour force. In his study to examine the observed differences in rates of growth for nine countries of Europe, he concludes that growth resulted from primarily two changes - one in the factor input and second those that affect output per unit of input.

With respect to the impact of human capital (through the residual factor) on economic growth, Denison wrote," Educational background is a crucial determinant of the quality of labour force. It conditions both the types of work an individual is able to do and his efficiency in doing them". According to him, a work force with appreciable level of education is more capable of learning and utilizing the most efficient production practices known. Hence, it can produce higher level of output per unit of input used in the production process, and thereby impact the economic growth of a country.

Mincer (1974) argued that it made sense to measure human capital by the amount of schooling completed by individuals. According to him, the primary motivation for schooling was the development of general skills of individuals and which form the basis for the differences in wage earnings within the labor force. Mincer concluded of a log linear relationship between wage increments and additional years of schooling.

Romer et.al (1989), who were among the first in undertaking cross country regression analysis, in their analysis of a sample set of 112 countries, ran a regression of average rate of growth on the initial level of income, rate of investment, government expenditure and human capital, for the period from 1960 to 1985. The study observes that the initial stock of capital has a positive and significant impact on growth. However, a change in the levels of human capital is insignificant in explaining subsequent growth pattern. This conclusion reinforces its endogenous growth theory of 1990 which assumes human capital as a stock, rather than a flow.

Though there is large number of studies showing a positive impact of human capital on economic growth, they have used different variables as proxy to human capital in determining growth. Rauch (1988), for instance, used the Euler's Equation approach and found that those countries which achieved an adult literacy rate of nearly 95 percent in 1960 witnessed a convergence of their the income per capita over the period 1950 - 1985. Adult literacy rate was used as a proxy for human capital in the study.

Barro (1991) argued that literacy rates are inconsistently measured across countries and "are particularly inaccurate for developing countries". Accordingly, he suggested of using school enrolment rates as better proxy to human capital. His argument is "… school enrolment rates are likely to be more accurate and consistent across sections". For a sample of 98 countries covering the period 1960-1985, he is able to conclude that for a given initial level of GDP per capita, a country's subsequent growth rate is positively related to human capital. He also finds that for a given level of human capital, subsequent growth rates are negatively related to the initial level of per capita GDP. This finding lends support to the hypothesis of conditional convergence implied by the Solow growth model.

Another well known study that examines Solow's growth model predictions was conducted by Mankiw, Romer and Weil. Mankiw et.al (1992) analyze the consistency of predictions under Solow model with the standard of living across countries. Using the Penn World Table for 98 countries, they conclude through their regression analysis that a country's savings and growth in population explain nearly 59 percent of international variation in per capita income. They also found out that while such variables affect the per capita income in a manner as proposed under the Solow

Neoclassical Growth model, the magnitude of impact of these variables is not correctly predicted under the model. Mankiw et.al assert that the exclusion of human capital from the model could explain the reason for such an incorrect prediction.

On the other hand, when they use the Augmented Human Capital Solow Growth Model in their analysis, the results reflect that 78 percent of cross-country variations in income could be explained by differences in savings, growth in population and accumulation in human capital. Mankiw et.al therefore conclude that "the Augmented Solow Model provides an almost complete result of why some countries are rich and other countries are poor".

The early international modeling efforts, nonetheless, were confronted with several data issues. Moreover, the drawback of cross section analysis undertaken by Romer et.al (1989), Barro (1991) and Mankiw et.al (1992) is that they fail to allow for the observed heterogeneity in the production function across economies. Their empirical research relied on traditional models of growth and development, which ignore some of the crucial aspects of new growth models that take into account the dynamic effect of growth accounting variables. For instance, Benhabib and Spiegel (1994) use a cross section approach to study the role of human capital on economic growth. They find out that the growth of human capital, measured as average years of schooling, has a negative and insignificant impact on growth between 1965 and 1985. On the other hand, human capital determining technology diffusion and innovation, has a positive impact on the economic growth. They therefore, conclude that human capital probably affects growth through the channels other than those usually permissible under growth accounting framework.

Islam (1995) compared empirical estimates of a neoclassical and an endogenous econometric model with the help of panel regressions. The main critique pointed out by Islam towards the static regression models was that they are based on the assumption of identical production functions in the countries studied. By introducing an approach on panel regression, he allowed for differences in the production functions of the countries and could in a way evaluate unobserved individual country effects. He modified the specification of Mankiw et.al (1992) and used the ideas of Benhabib and Spiegel for an endogenous model. Both models were transformed into dynamic ones with panel data including country effects. In the empirical estimation of

the neoclassical model using panel growth regressions, unlike the case of the static models, educational attainment as a measure of human capital came out to be statistically insignificant. In the empirical estimation of the endogenous model however, Islam established a positive influence of educational attainment on total factor productivity. Therefore, educational attainment was considered as a proxy for human capital in his study.

Also, it has also been observed that school enrolment was primarily considered as the only proxy or measure of human capital in the initial studies. Fundamentally, using school attainment as the only measure of human capital in an international setting leads to huge difficulties. In that case, while comparing human capital across countries, it is necessary to assume that the schools across diverse countries are imparting the same amount of education and learning each year in the countries under consideration. This, in general, is implausible.

Asteriou and Agiomirgianakis (2001) test for causality between human capital and economic growth in a bi-variate framework. They use cointegration regressions analysis to explore the long-term relationship between formal education and GDP in the Greek economy. The study finds a significant relationship among enrolments in primary, secondary and higher education enrolments and GDP per capita. The main direction of causality was observed from the education variables to economic growth, except in the case of higher education, there exists reverse causality. Therefore, they used enrolments in primary and secondary schools and higher education as proxies of human capital, in their study.

Sala-i-Martin et.al (2003) estimated cross-sectional growth regressions analyzing the robustness of empirical estimates on the basis of Bayesian Averaging of Classical Estimates[14]. In their study, they used enrolment in primary, secondary and tertiary education as primary measures of human capital. It was concluded that among the variables positively influencing growth were the primary-school enrollment rates. Therefore, they emphasized on the quality of education of the initial years of schooling to be a significant measure of human capital development.

[14]Bayesian Averaging of Classical Estimates (BACE), which constructs estimates as a weighted average of Ordinary Least Squares (OLS) estimates for every possible combination of included variables.

Dauda (2010) used the human capital model of endogenous growth developed by Mankiw, et.al. (1992) and examined its role in the economic development of Nigeria. He used a combination of co-integration test and Error Correction Mechanism (ECM). Empirical results have indicated the existence of a strong long-run relationship between human capital formation (proxied by enrollment in educational institutions at primary, secondary and tertiary levels) with economic growth in Nigeria. Dauda generated several policy implications from the findings, most vital being that there exists a feedback mechanism[15] between human capital and economic growth and therefore the government and law makers of Nigeria should place a high priority on human capital development.

Another study on Nigeria was undertaken by Sulaiman and others (2015) who examined the impact of human capital on the economic growth of the country with the help of time series data for a period of 35 years (1975-2010) and by applying autoregressive distributed lag approach to the co-integration techniques. Secondary and tertiary school enrollments were used as proxies for human capital. Results of the cointegration reflected a significant positive impact of human capital proxies on economic growth. On the basis of the results, the authors emphasized the need for significant improvements in the education sector and more funding for Research and Development (R&D) to facilitate sustained economic growth in Nigeria.

A problem in using such proxies of human capital is that the results are drawn using quite few variables measuring human capital. For instance, the studies presume that schooling is the only source of human capital and its development. This renders a restrictive evaluation of the impact of human capital on economic growth. However, a number of studies have also emphasized on the need to focus on alternative measures of human capital - such as focusing on the quality of education measured by cognitive or brain-based skills, improving non cognitive or behavioral skills and standards of health and nutrition, enhancing the investment in overall skills development of individuals, enabling policy advocacy and a framework that encourages an all round development of human capital, qualitatively and quantitatively.

[15]Feedback mechanism refers to the return generated to the input of a part of the output. In this case, the input is the proxies used for human capital and output refers to economic growth

For instance, Pritchett (1996) in his empirical analysis of cross national data on economic growth rates concludes that increases in educated human capital resulting from improvements in educational attainment of the labor force have had no positive impact on the growth rate of output per worker. He used various education related proxies of human capital in the regression framework used by Mincer and found out that neither the increase in enrollment rates, nor the increase in educational attainment had a statistically significant impact on growth.

Pritchett justified this contradiction by proposing three possible explanations for the lack of effects on growth from increasing the level of education.In his opinion these explanations were not mutually exclusive and could be due to imperfections of the educational system, labor market, and of the existing institutional environment. First, the quality of education could be so low that it would not lead to increasing workers' skills and productivity. In other words, not only quantity, but quality also matters. Second, the increase in the supply of skilled labor under anunchanged demand might lead to a sharp slump in the returns to education. Third, the existence of a specific institutional environment can engage human capital into economically inefficient activities which do not contribute to economic growth. Thus, Pritchett explained the lack of influence of education on economic growth in many countries and the absence of any significant impact of public investment in education. He, however, did not deny the role of human capital but showed through his analysis that its positive influence could manifest only when there is a favorable economic and institutional environment.

The interpretation of Pritchett was also corroborated by Hall and Jones (1999) in their growth accounting analysis, to some extent. They observed that differences in physical capital and educational attainment could only partially explain the variation in output per worker and therefore concluded of a large amount of variation in the level of Solow residual across countries. Further, they underline the differences in capital accumulation, productivity and output per worker as largely driven by differences in institutions and government policies which Hall and Jones particularly termed as 'social infrastructure'. They treat social infrastructure as endogenous within the model.

Literature in the millennium period compares educational quality using internationally comparable test scores at the primary and secondary levels such as the Third International Mathematics and Science Study and the Programme for International Student Assessment (PISA). Studies have found out that the measures such as test scores are more significantly linked to economic growth than average years of schooling in cross country regressions (such as Hanushek and Kimko, 2000 and Hanushek and Woessman, 2012).

Hanushek and Kimko (2000) in their study used qualitative measures or as they termed it as 'alternative measures' of human capital to study its impact on economic growth. They constructed measures of workforce quality based on the results of comparative tests of mathematical and scientific skills. In other words, they used the data from the international student achievement tests through 1991 to build a measure of educational quality. With the help of various analytical specifications, the authors find a statistically and economically significant positive effect of the quality of education on economic growth during 1960-1990. Therefore, ignoring quality differences significantly misses the actual importance of education (as a measure of human capital) for economic growth. The estimates undertaken by Hanushek and Kimko (2000) suggest that one standard deviation of higher test performance at the country level would yield higher annual growth rate of around one percentage point - an enormous impact by any standard.

Hanushek and Woessman (2012a), have used such alternative measures of human capital in analyzing the growth pattern in the long run for a set of 50 countries over the period 1960-2000. They described schooling as just one component of the skills achieved by individuals in different countries. The ability of the individuals to perform activities which closely associated with learning and problem solving (which they described as cognitive skills) is considered as the major component of skills development or skills achievement in their study. Their basic model explains one-quarter of the international variation in growth rates owing to school attainment and three quarters of the variance due to alternative measure of human capital.

Moreover the estimated impact of cognitive skills on growth is quite large in their study. The cognitive skills measure is scaled as standard deviation of achievement. Therefore, a difference in standard deviation of one percent in performance equates to

two percent average annual growth of GDP per capita per year. Therefore, they concluded that the importance of skills has a direct bearing on human capital policies especially for developing countries.

Similarly, Mulligan (1999),by Murnane et al. (2000) and by Lazear (2003) obtain estimates of the value of cognitive skills from different nationally representative data-sets for the United States that study students after they leave school and enter the labor force. They suggest that an improvement in performance of students in a subject like mathematics (at the end of high school session) of one standard deviation translates into higher annual earnings of nearly 12 percent.

However, most countries in South Asia do not participate in international student assessments. As a result, the data to compare learning outcomes within the region with those in other regions is not available.

Levin (2012) underscored the importance of non - cognitive skills of individuals and their inter-linkages to economic growth. According to him, human capital comprises of cognitive as well as non-cognitive elements and any estimation model which misses the latter, is restrictive and presents a narrow assessment of individual's skills and its impact on economic growth.

Infact, skilled human capital has also been examined as a significant contributor to export led growth. Johanson (2004) argues that it is not possible to disentangle the interlinked factors which lead to changes in skill demands and at least three main forces are responsible in increasing the demand for skills worldwide— technological change, changes in work organization and trade openness. An open economy considers export (service) as a variable augmenting output, which is determined endogenously through labor productivity. In connection with this argument, Romer (1990) develops 'endogenous technical change' through research and development, as a human capital externality enabling the communication of knowledge inputs as well as facilitating the adaptation of new designs.

Wood (1994) claimed that the development of skills through the means of education proxied for human capital development is a key determinant of comparative advantage and manufacturing export performance. Chuang (2000) found a positive relationship between human capital accumulation and exports from Taiwan between

1952 and 1995. Bouquet et.al (2004) found out that manufacturing and retail trade involved lower average levels of human capital intensity than in wholesale trade and financial services.

Contractor and Mudambi (2008) analyzed the effect of human capital investment on the export of services and goods from 25 countries between 1989 to 223 and concluded that such investments proxied by public spending on education did infact have a significant effect on exports.

Earlier, Barro and Sala-i-Martin (1995) applied the panel data framework to growth model in which they used quantitative and qualitative measures of human capital beside the traditional social and economic factors. The measures included the test results of knowledge skills of pupils. The regression approach could deduce the influence of quality of education on growth to be greater and significant than that of the quantity. Their analysis reaffirmed the positive influence of education on growth. Another conclusion which they drew in their analysis was that public expenditure on education have a positive effect on growth. This is a vital inference when it comes to deciding the regulatory framework governing human capital.

The need for an enabling policy framework supporting adequate investment in skills development to realize a sizeable demographic dividend has also been reflected in the studies of David Bloom.

Bloom and Williamson (1998) have studied the impact of increasing inverse dependency ratios on economic growth in East Asia. Demographic changes played an important role in the success of East Asia's 'tiger' economies. Estimates suggest that one-third of the economic growth of East Asia during the period of 'East Asian Miracle' (1960 to 1990) could be attributed to the positive effects of growing working age population and to the programmes on primary education which were extensively run by their respective governments during that period. This phenomenon was reinforced by in the reports of World Bank (1993), as well.

Leeuwen (2007) highlighted the case of Japan where the growth in its working-age was highest during the 1960s. GDP growth rates were also high in the country during the same period, averaging 9 percent in the 1960s and 4.5 percent in the 1970s. Moreover, it has also been witnessed, according to Leeuwen, that as the increase in

Japan's working-age population slowed, so did the growth in GDP. A similar phenomenon occurred in the case of Republic of Korea.

Ireland is another example where a precipitous decline in fertility rates as a result of the national policies on population control led to an increase in working age population in the 1990s. According to Bloom and Canning (2003), an increased share of working age people in the population was a key element underlying Ireland's subsequent rapid economic growth.

Similarly, a well-educated labor force, higher saving and investment ratios and well directed export oriented development strategies contributed towards sustaining economic growth in the Republic of Korea. As early as 1960, the Republic of Korea had accumulated a substantial stock of human capital. According to Asian Development Bank (ADB, 2017), nearly 56 percent of its population had received some primary education, and 20 percent had some secondary education, surpassing the attainment of most developing countries. Over the next three decades since then, the country experienced an unprecedented rate of educational growth - adding almost 6 years in its school attainment - as demand for higher education also increased with income, while public investment in education remained high. Better income allowed the population of Korea to fulfill their desire for a better social status.

An explanation of such a behavioral change in the economic growth pattern has been provided by Khan (2007). According to Khan (2007), the countries were able to achieve higher growth rates due to the large base of human capital which was appropriately capitalized. At the outset, only a large fraction of unskilled workforce and a minuscule stock of physical capital were the available resources at hand. With an accumulation of human capital stock, these countries eventually invited multinationals and trans-nationals in great numbers, which contributed to growth productivity and output, thereby leading to faster economic growth.

In the case of Korea, an abundant supply of well-educated labor force enabled the country to enhance its labor productivity and promote competitiveness of its labor intensive manufacturing industry in the 1960s and 1970s. Moreover, a highly educated labor force coupled with an export-oriented development strategy helped Korea to absorb and further adapt advanced foreign technology, allowing it to invest

in research and development and upgrade the level of sophistication of its industrial technologies.

Amassoma and Nwosa (2011) study the causal nexus between human capital investment and economic growth in Nigeria during the period between 1970 and 2009, using a Vector Error Correction (VEC) model and pair-wise granger causality methodologies. The findings of Vector Auto Regression (VAR) model and pair-wise estimate reveal no causality between human capital development and economic growth. The study, however, recommends the need to increase budgetary allocation on education and health sectors as well as the establishment of sound and well-functioning vocational institute which can bring about the needed development of human capital that could in-turn stimulate economic growth.

Studies have also been conducted to analyze the impact of health as a component of human capital, on economic growth. Through nutrition, health as measured by life expectancy responds to increases in income (Fogel, 1997). He carried out a study on Western Economies over the past two centuries, from 1780 to 1979.

The long-term relationship between income and health is also examined by Arora (1999), taking into consideration the data from developed countries. He concluded that health of individuals influences economic growth and hence should be an integral component of the productivity of economies. He further added that this component should be included in endogenous growth models just like physical capital, labour and human capital. A similar study undertaken by Arora (2001) underlines that in the co-integrated relation between health and income; innovations in health lead to economic growth and not vice versa. Arora's findings are found to be similar to those reported by Fogel (1994; 1997).

In analyzing cross-country data over the past 25 years, Bloom and Sachs (1998) obtained empirical evidence that health (indicated as coefficient of life expectancy at birth) and demographic variables play a vital role in determining rates of economic growth. Moreover, they also expand the determining variables of economic growth to include measures of human capital (indicated by status of health of a population set in their study), abundance of natural resources and economic policy.

Various studies have examined the positive effects of life expectancy on economic growth operating through rates of investment in physical capital or demographic profiles of the population (Barro, 1997; Sachs and Warner, 1997; Bloom and Williamson, 1998). Bhargava et al. (2001) have assessed the effects of initial health status of the population on growth over a short period of 5 years and likewise found significant effects in low-income countries.

2.3. Evidence in South Asian Context

The South Asia region as a whole has been undergoing a demographic transition with India and Bangladesh witnessing the earliest signs of rising inverse dependency ratios and a youth bulge. According to Bloom (2011), a rising working age to non working age ratio not only generates an opportunity to reap a demographic dividend but also augurs well for regional economic growth. Therefore, there lies a potential and possibility of realizing demographic dividend in this region. However, literature does not provide a clear understanding of whether such a reserve of human capital has been contributing to the economic growth of South Asia region. The evidence is mixed.

Abbas (2000) empirically examined the effect of human capital on economic growth in India and Pakistan with the help of a standard human capital augmented production function. OLS regression technique was applied on the annual data from 1970 to 1994. Enrolment ratio at primary, secondary and higher secondary levels were taken as proxies for human capital in the study. The regression results deduced that human capital plays a crucial role in the growth of these economies with enrolments rates of students in primary and secondary school education in India and secondary and higher secondary in Pakistan having positive impacts on their respective economic growth rates.

A similar comparative study was undertaken by Abbas in 2001 for the same period taking into consideration Pakistan and Sri Lanka for comparative purposes. He deduced a positive impact of human capital on the economic growth of these economies at all levels of enrolment in school (which were considered as proxies for human capital).

Pradhan (2002) finds an interesting paradox in the growth process of the Indian economy using an applied general equilibrium model. Human capital is proxied with

the attainment of education and the data is collected from 1988 to 1997. He concludes of almost negligible changes in income during the referred period on account of human capital development even with increasing levels of education.

Duma (2007) studies the sources of economic growth in Sri Lanka using annual data from 1980 to 2006 with the help of a growth accounting framework. A standard human capital augmented Cobb-Douglas production function was used in the study. Human capital is measured through average years of schooling of the working population. However, this variable was not readily available and had to be estimated by taking into consideration data on the maximum education level attained by the employed population multiplied by the number of years of schooling in each grade and the number of people employed in the country during the referred time period. As a residual in the growth accounting framework, TFP captures those components of real growth in GDP which are not explained by factor inputs - labour, physical and human capital.

The empirical results reflected a low contribution of human capital in the economic growth process of Sri Lanka. From 1980 to 2006, human capital contributed only around 10 percent of growth in national output while physical capital and labor contributed 17 percent and 27 percent, respectively. The author justified the results on the ground that in the period after 1980's there was a slowdown in the labor intensive product line along with a rapid growth in the output of capital intensive industries with higher productivity level. Duma recommended in his paper that a higher growth path over the medium term will depend on securing a stable political and macroeconomic environment; implementing structural reforms necessary to improve productivity and efficiency of investment; attaining fiscal consolidation; and creating enough opportunity for the private sector to thrive in the country.

Abbas and Foreman-Peck (2007) use the co-integration technique for estimating the effect of human capital on economic growth of Pakistan during the period 1961 - 2003. In their study, human capital stock was used as a proxy for human capital which was calculated through the perpetual inventory method by using the data on enrolment rates at secondary level of education. Another proxy for human capital used in the study was health expenditures as a percentage of GDP. They found an increasing return to physical and human capital specially in the case of investing in health sector.

Vinod and Kaushik (2007) use time series and panel regression on data pertaining to a group of 18 large developing countries including India for the period 1982-2001 to study the impact of human capital on economic growth of these countries. Human capital is not subject to diminishing returns to scale; therefore they made use of the endogenous production function as prescribed by Benhabib and Spiegel. It was deduced from the study that human capital (as measured by the percentage of literate adults in the study) has a statistically significant impact on economic growth in large developing countries. As a policy implication the study recommended the need for increasing human capital from savings, bilateral and multilateral sources of aid and loans as well as funding from private capital markets.

Madsen et al. (2008) use a sample data set of 590 companies for the period from 1950 to 2005 to study the evidence of human capital augmented endogenous growth pattern in India. The attainment of education at various levels was considered as the closest proxy for human capital. The results of the co-integration methodology reflect that human development induced growth pattern for much of the period under consideration. They drew the conclusion that an improvement in education framework and policy governance surrounding it is a necessary condition to ensure growth and development in India.

Qadri and Waheed (2011) evaluated the relationship between human capital and economic growth using time series data from 1978 to 2007 of Pakistan. Health adjusted education indicator (represented by EH – enrolment rates at the primary level multiplied by the expenditure on health as a percentage of GDP) was used as a proxy for human capital and incorporated in the standard Cobb Douglas production function. On the basis of the linear regression results, the authors deduce a positive relationship between human capital and economic growth in Pakistan, especially in the long run.

In order to confirm the robustness of the findings about the direction and significance of the impact, sensitivity analysis was conducted which reinforced the authenticity of the estimation results. The health adjusted education indicator was found to be a highly significant determinant of economic growth, which indicated that improvement in health and education services should be given adequate attention in Pakistan's development economic growth.

Pradhan (2009) also investigates the causal relationship between education and economic growth in India in a bi-variate causality and cointegration framework using vector error correction model. The study takes in consideration public expenditure on education as a proxy of human capital and per capita GDP as an indicator of economic growth. The regression results deduce that public expenditure on education has no effect on economic growth, though the reverse is true.

One of the drawbacks of this study is that the author restricts the measure of human capital to the public expenditure on education only. Therefore the results are biased. Moreover, Ghatak and Jha (2012) point out that public expenditure on education cannot be a true proxy of human capital stock in a country, as it can only represent the political willingness to expand education. Therefore, such a measure should be supplemented with other relevant indicators of human capital.

Haldar and Mallik (2010) in their case study of India examine the behavior of public and private investment in physical capital, investment in human capital (proxied by investments in education and health) on economic growth in an endogenous growth model using multivariate cointegration framework. The period under consideration is 1960 to 2005. Economic growth is measured through per capita GNP. The stock of human capital is divided into education stock measured by enrolments rates at upper primary level of education and expenditure on education as a percentage of GDP. The health stock is measured by infant survival rate and expenditure on health as a percentage of GDP. The structural adjustment programme of 1991 (termed as 'openness' by the authors) is taken as a dummy variable in the model

The results of Johansen's cointegration technique suggest that physical capital investment has neither a long-run nor a short-run effect on economic growth. However, investment in human capital measured through the indicators of education and health have a significant positive long run effect on the growth of per capita GNP. Moreover, expenditure on education and health have a long run impact on growth pattern of the country. They concluded that public expenditure on education and health is an important policy instrument for realizing social sector development.

The drawback to their study is that the authors have based their empirical framework on the assumption of planned economy wherein the growth rate of population remains equal to the rate of growth of employment. This does not exist in the real world.

According to ADB (2010), among the sources of economic growth between 1960 and 2003 in India and Bangladesh, human capital, proxied by enrollment rates at the secondary level of school education, contributed 7.4 and 7 percent to the domestic growth levels, respectively. However, this was exorbitantly low compared to the percentage contribution of physical capital to economic growth in the two countries at 25 and 15 percent, respectively.

In a simulation exercise undertaken jointly by Pradhan and Ojha (2012) wherein a multi-sectoral neo-classical Computable General Equilibrium (CGE) model is taken into consideration to determine the impact of human capital on economic growth in India, the results suggest that higher investment in human capital could lead to faster economic growth and a better income distribution. In their study, public expenditure on education augments the supply of educated and skilled labour besides levels of secondary and higher education which are used as proxies of human capital.

Gopalakrishna and Rao (2012) examine the causal links between economic growth and human capital based on the empirical evidence of 15 states of India during two time periods - pre and post liberalization (1970-71 to 1979-80, 1980-81 to 1989-90 and 1990-91 to 1999-2000 and 2000-01 to 2010-11). Data on human development indices and expenditures on education and health at the states level were taken into consideration as suitable proxies of human capital. The study indicated a positive relationship between economic growth and human development, inspite of inter-state disparities on human development. Drawing inferences from their empirical results, the researchers underlined the need for appropriate accumulation of human capital through investments in education and skills formation, health and nutrition and R&D. The results of the empirical exercise also reflected the significant influence of expenditure on education for human development and economic growth.

Estimates by Park (2012) based on a panel of cross-country data from South Asia over the period 1970 - 2007 indicate that an increase in average years of schooling (proxy of human capital) by 1 year leads to a growth in total factor productivity by about 0.3

percentage points per year. He therefore emphasized over the need to improve the quality and quantity of education in South Asia to promote technological progress and innovation, which, according to him, would eventually lead to growth and development.

Islam (2014) in his research paper has examined the short run and long run causal relationship between human capital, proxied with expenditures on education, and economic growth using annual time series data covering the period from 1973 to 2010 in Bangladesh. Various components of expenditures used in the study are total expenditure, total revenue expenditure and total development expenditure on education. Econometric methodologies - Unit Root and Cointegration Test, Granger Causality test and Error Correction Modeling approaches are applied.

Results from the Augmented Dickey-Fuller (ADF) test show that both economic growth and components of educational expenditure are integrated of order two. Johansen's maximum likelihood method is applied for testing long run relationship of the data. Results of eigen values, trace and Granger Causality tests show that there is unidirectional causality from GDP to education in the short run but in the long run education impacts economic growth. Therefore, its implied that spending on education as a proxy for human capital can act as an independent stimulus in improving the economic growth of Bangladesh.

Another study by Sharif, et.al. (2013) empirically verifies the contributions of Human Resource Development (HRD) in the growth of Bangladesh from 1991 to 2010. In order to conduct the empirical analysis, a hypothetical growth model is constructed on the lines of that of Lucas (1988) and Romer (1986, 1990). Engle-Granger co-integration approach has been applied using data on total yearly investments in education and spending on R&D as proxies of human resource development. The cointegration tests suggest a positive correlation between HRD and the economic growth process of Bangladesh during the period under consideration. Among the proxies, education investments is concluded to play a stimulating role in the economic growth of the country compared to expenditure in R&D which though contributes positively, has a weak impact on growth.

Various studies have also underscored the importance of quality of human capital - in terms of skills development, education and health - as a strong determinant for higher productivity in the context of South Asian countries and the region as a whole. For instance, Mitra et.al (2002) noted that in most of the two-digit industry groups of the manufacturing sector, education, health and other indicators of social infrastructure impacted the growth of total factor productivity much more than the physical or the financial infrastructure. Tilak (2003) observed significant effect of higher education on development of India. Mehrotra et al. (2013) used NSS data and educational indicators (general, technical and vocational) to understand the skills levels of the existing workforce. They estimate the sector-wise skilling requirements and find that the skills development challenge - both in quantitative and qualitative terms is enormous and requires a careful and proactive policy stance.

Hajela (2012) argues that skills shortage is leading to unemployment in India. She further argues that India lacks sufficient skilled workers as its existing vocational training system does not target the casual or informal workforce which constitutes a sizeable percentage of the country's working age population.

Mitra (2013) in the research paper examining the role of industry in fostering pro-poor growth in India, has emphasized that skills shortages in India has forced many to get residually absorbed in low productivity activities. According to him, skill formation is an indispensable prerequisite for labour productivity as well as total factor productivity growth.

According to FICCI (2015), skills development is critical for the economic growth and the social development of India. The study emphasizes the need of mitigating the mismatch between demand and supply of skills through enhancement of formal education services and improvement in the scope and quality of the programs on vocational training offered to the trainees.

This should be supplemented by a favourable policy framework governing human capital development that could impel economic growth in South Asia. For instance, Bloom et.al. (2011) in their study argue that existing skills levels are far from adequate in South Asia. "If the governments are to capitalize on the high share of working-age people in the population, they will have to ensure that those people are

healthy, well educated, and well trained in the skills demanded by the labour market". They further add, "the demographic dividend has not been enjoyed to an appreciable extent, because it has been choked off by a non-enabling policy environment. Therefore a set of enabling policies and circumstances must be in place if a country or region is to receive an economic boost from a change in the age structure of its population".

In a study undertaken by ADB (2013), it has been observed that South Asia is witnessing a paradigm shift in its demographic structure with growing inverse dependency ratio without any significant benefits to the region's economic growth. ADB therefore suggests through the study of an all round transformation in the existing pattern of education and TVET structure of the regional countries of South Asia to ensure the formation of skilled manpower which could lead the growth and development of such economies.

UNDP has examined the progress on human development in South Asia and has made some noteworthy observations. For instance, UNDP (2015) has reported that South Asia had the highest percentage of children suffering from malnutrition under the age of 5 in 2014 in comparison to other regions. UNDP (2016) reported instances of acute poverty in the region. According to the report, nearly 61 percent earns less than USD 2 a day. In countries like Afghanistan, Bangladesh, Nepal, and Pakistan, over 80 percent of the working people earn less than USD 4 daily. While the size of middle class earning between USD 4 and $13 a day is rising in India, Bhutan, Maldives, and Sri Lanka, it is still small in other parts of the region.

In its latest report, UNDP has also drawn attention to the quality of human capital development which is equally vital for development, besides its quantity. According to UNDP (2018) for instance, achievements in human development should not only be expressed in terms of quantity (such as life expectancy, mean and expected years of schooling and gross national income), but also in terms of quality of investment in education and health.

An accurate measurement of human capital is through an assessment of the progress achieved in the provision of quality education, health and skills development services. Infact, UNDP in 2018, for the first time, has introduced skills development of school

teachers and lost health expectancy as essential input indicators for education and health respectively, besides gross national income, mean years of schooling, expected years of schooling and life expectancy at birth, which are the primary quantitative indicators measuring human development.

In a comparative data analysis viz-a-viz other global regions (extracting data from UNDP 2018), the study has observed that lost health expectancy (an output indicator measuring quality of healthcare of the population) as the highest in South Asia (at 13.7 percent in the year 2016) compared to other regions, owing to lowest number of physicians (7.8 per 10,000 people between 2007-2017) and lowest number of hospital beds (8 per 10,000 people between 2007-2014).

Similarly, the percentage of school teachers trained to teach between 2009 - 2017 is the lowest (at 71 percent according to UNDP, 2018) in the South Asia region, as compared to some of the other emerging and developing regions. As a result, the percentage of skilled teachers available to teach in school, is quite low in the region and the pupils per skilled teacher are three times higher than in other regions. Moreover, this also results in enrolled students dropping out of schools early, even before they complete their schooling. As a result, the region is also witnessing growing instances of school dropout rates.

This study has also observed that the highest percentage of vulnerable employment[16] is in South Asia (at nearly 72 percent in 2017 from 80 percent in 1991 according to UNDP, 2018) compared to other global regions of the world, owing to increasing skills mismatches, inadequate education opportunities, growing school drop rates, large informal sector and falling health standards. Therefore UNDP (2018) underlined the need for focused investments in education and health sectors, especially in the highest populated countries of the region - India, Bangladesh and Pakistan, have been emphasized.

World Bank (2015) has also made similar policy recommendations to enable human capital development in the region by emphasizing on enhancing investments in formal

[16]percentage of employed people engaged as unpaid family workers and own account workers. In other words, those employed people that have a lower likelihood of having formal work arrangements.

and vocational education practices and developing the standards of health and nutrition in countries of South Asia.

Thus, the existing literature pertaining to human capital and its interlinkages with economic growth presents mixed empirical inferences, largely on account of the use of different proxies to human capital and research methodologies. As Judson (2002) pointed out, "despite the conventional wisdom that output growth and human capital should be positively correlated, statistically significant results have been mixed, and strong and positive correlations between growth and human capital accumulation have been the exception rather than rule". In other words, inherent biasness in the use of proxies of human capital has contributed towards mixed empirical results in the existing studies examining the relationship between human capital and economic growth, in the South Asian context.

In the background of the existing shortcomings and limitations, this research study tries to fill in the existing gaps in the measurement of human capital and empirically examine the causal relationship between human capital and economic growth in South Asian countries, taking into consideration quantitative as well as qualitative indicators of human capital. Against a regional overview on human capital development, this thesis is focused examining the role of human capital on economic growth in India and Bangladesh.

The reference time period for the empirical analysis which has been taken into consideration is 1991 to 2015 since the beginning of the 90s' witnessed a shift in economic regimes when South Asia as a region really opened up to the outside world with an accelerated pace of global trade integration and 2015 has been selected as the end point since the year was recognized by United Nations as the target deadline to achieve the Millennium Development Goals (MDGs), that were initiated at the start of the Millennium around a common 15-year agenda to tackle the indignity of poverty; therefore MDGs are an important benchmark to measure the progress of a country's socio-economic development. It was also the year when Sustainable Development Goals (SDGs) or Global Goals were introduced by the United Nations, build on the successes of MDGs. With the same objective as that of the MDGs, SDGs are an extension to the millennium goals, and also include new issues surrounding

economic inequality, innovation, sustained consumption, among others, under their agenda for action.

In order to achieve robust empirical results in the research study, quantitative as well as qualitative indicators have been taken into consideration. Measures such as gross enrolment ratio, adult literacy rate, mean years of schooling and life expectancy at birth have been taken into consideration as variables following UNDP's global definition of HDI which measures the average achievement in three dimensions of human capital development, which are long and healthy life, knowledge and a decent standard of living. Moreover a number of qualitative indicators of human capital development have also been taken into consideration such as percentage of formal and non formal vocational training received by the population, percentage of students enrolled in vocational programmes at various levels of education, and percentage of skilled teachers enroled in vocational programmes at various levels of education.

As mentioned before, various studies in literature have also emphasized the significant impact of the human capital expenditure on growth and development. For instance, Barro and Sala-i-Martin (1995) concluded in their analysis that public expenditure on education have a positive impact on growth. Similarly, Parida and Sahoo (2007) in their study to investigate the impact of human capital on GDP of four large South Asian countries conclude that public expenditure on education and health (among others) have statistically significant coefficients when measured in the context of GDP and are therefore equally important for generating high economic growth. Sharif et.al (2013) empirically verified the contributions of HRD efforts proxied by the total yearly investments in education and accumulation of knowledge proxied as R&D expenditure in share of GDP in the growth process of Bangladesh. UNDP (2015) has underlined the need for greater public expenditure on a country's research and development activity as a pertinent composition of national income. Therefore, data pertaining to budget allocation on education, health and research and development services has also been taken into consideration for empirical analysis, as one of the vital qualitative indicators of human capital.

In a nutshell, taking cue from the existing theoretical underpinnings on the subject, this thesis makes an attempt to examine a comprehensive role of human capital on economic growth of India and Bangladesh.

2.4. Conclusion

This chapter has examined the studies which have spelt out the linkage or relation between human capital, its proxies and economic growth. A number of theoretical approaches have been presented ranging from exogenous and augmented Solow models to the endogenous growth approaches introduced by Lucas (1988) and Romer (1990). In each of these models, the results reflect that human capital is an essential factor input to impact growth or output, either directly through increases in factor productivity or indirectly due to externalities such as technological advancement or research and development activities.

The endogenous or new growth theory in fact generated enthusiasm to undertake empirical studies drawing data from different countries and examining the role of human capital, measured by its proxies, on economic growth patterns. The first round of empirical growth literature by Barro and Mankiw et.al.deduced a positive role for human capital in explaining differences in growth rates across countries. These were subsequently followed by a set of studies led by researchers like Benhabib and Spiegel and Pritchett who found out that changes in human capital measured by education attainment were largely uncorrelated with economic growth. In some cases it even reported of a negative impact on growth, especially studies undertaking a panel data approach. While researchers like Krueger and Lindahl attributed the negative or inverse impact to measurement error in education, Levin, Bloom and Williamson, Hanushek and Woessmann, Arora, Fogel and many others emphasized on the inadequate measures for human capital used as proxies in studies on economic growth.

In this respect, extensive literature has emphasized on the need for taking into consideration the quality of human capital besides the quantity as measured by education attainment. Quality has been referred in terms of investment in human capital through development of skills, on-the-job training, improvements in health standards and a supportive policy environment. Failure to adjust for such measures might lead to biased estimates.

According to UNDP (2016) demographic change influences growth and human development through six channels. The first is an increased number of people in the

workforce. Second involves improved human capabilities, built through investing more resources in education and health as well as the effective use of the knowledge and expertise of a more experienced population. as the rate of fertility declines, there is a greater potential to invest in the health and education of children, leading to improvements in human development. The third and fourth channels are higher productivity and enhanced savings respectively, when the workforce is better educated, and people earn higher wages, thereby making greater profits. The fifth is increasing domestic demand, as greater earnings and spending feed into economic growth with urbanization being the last medium.

In South Asia, the demographic transition of growing working -age population offer a window of opportunity in the form of a demographic dividend. On the basis of literature review on this subject, it may be inferred that the existing research studies and theories present mixed empirical results pertaining to the role of human capital on economic growth. This may be largely due to the approach that has been followed of only restricting the measurement or proxies of human capital to quantitative indicators. While there has been considerable acknowledgement to qualitative indicators, they have not been adequately used in human capital studies. As a result, most of the empirical results and inferences drawn in the existing literature on human capital, is biased and may not be examining the impact of human capital on economic growth, accurately. In other words, inherent bias in the use of proxies of human capital has contributed towards mixed empirical results in the existing studies which examine the relationship between human capital and economic growth in South Asia.

In the background of the existing shortcomings and limitations, this research thesis makes an attempt to fill in the gaps in measurement of human capital and empirically examine the causal relationship between human capital and economic growth in South Asian countries, taking into consideration quantitative as well as qualitative indicators of human capital. While underlining a regional overview on human capital in South Asia, this thesis presents a comparative analysis of India and Bangladesh, examining the impact of human capital on economic growth of these countries during the period from 1991 to 2015.

The two countries are large economies of South Asia accounting for bulk of the population in the region. India, which is the largest economy in South Asia in terms of

GDP and PPP, accounts for over 80 percent of the region's GDP and constitutes 74 percent of the region's total population[17]. Moreover, the country is also credited for having the largest share of young population, besides contributing to the economic growth of the region. In comparison, Bangladesh is the third largest country and accounts for an abundant labour force as compared to other regional countries. According to World Bank (2013), Bangladesh's labour force participation rate has remained consistently the highest[18] in South Asia during the period 2000-2010.

Both the countries have experienced similar phases of demographic transition. They have witnessed a youth bulge since 1970s that has led to rising working age population, thereby generating a potential for demographic dividend. While India maintains an edge in the human development index ranking every year – ahead of all the countries in the region, Bangladesh is the only country in South Asia region which has demonstrated extraordinary progress in achieving a higher HDI value.

Nevertheless, India and Bangladesh have immense potential to realize a demographic dividend in the background of their growing working age population, inverse dependency ratios, active contribution to the regional work force and improving human development indices, over the years. Therefore, an attempt has been made in this thesis to undertake a comparative analysis of India and Bangladesh with respect to the institutional framework, policy structure governing human capital and the relevance of its quantitative and qualitative indicators on economic growth, in these countries.

The next chapter is dedicated to a comparison between India and Bangladesh with respect to their demographic patterns, human capital development and their contribution to the regional growth. While delineating the stages of economic growth witnessed in South Asia, the chapter focuses on underlining the profile and stages of demographic transition in India and Bangladesh, comparing their performance with respect to the institutional framework and policy structure on human capital development, primarily focusing on skills development and technical and vocational training. This would be useful in not only understanding the nature of human resource developments which have unfolded over the years but also the challenges which have hindered progress in these economies.

[17]The data source for this information is World Development Indicators (2015)
[18]The labour force participation rate of Bangladesh has remained between 60 - 70 percent during 2000-2010.

CHAPTER 3
ROLE OF HUMAN CAPITAL IN THE ECONOMIC GROWTH: INSTITUTIONAL AND POLICY FRAMEWORKS IN INDIA AND BANGLADESH

The last chapter underlined the theoretical framework governing human capital and its contribution to growth processes. It was primarily the 'new growth accounting theory' which underlined the role of human capital clearly as a distinguishing factor input besides labour and physical capital, influencing economic growth in the long run. Moreover, extensive literature has been produced on different versions of human capital and its components. Economists and researchers have each defined this factor input differently and have therefore limited their scope of research on human capital to their self proclaimed versions.

However, on the basis of literature review undertaken in the last chapter, it can be comprehended that human capital is related to the knowledge and skills embodied in humans that can be acquired and improved through better education, good training practices and practical or real life experiences of the job market. All this is useful in production and value addition of goods and services in the economy. Perhaps education is a key component of human capital which is also supplemented by a decent standard of living, a healthy lifestyle and good working conditions which could improve factor productivity. Also, it seems quite plausible that skilled workers will be more productive in an economy under given level of technology and would therefore be an instrumental factor in technology advancement by means of greater productivity and innovation.

In the context of South Asia, human capital is a vital feature considering that the region contributes nearly 24 percent of the world population and is going through a demographic change during the last few decades. Accounting for two-thirds of the global wealth, human capital in South Asia accounts for the highest proportion (51 percent) of the regional wealth, according to World Bank (2018). Moreover, the region has also witnessed the highest rate of growth of human capital per capita worldwide at 4 percent between 1995 and 2014, which could be attributed to falling mortality rates and rising life expectancy.

Taking into account the latest data from UNDP (2018), this study could infer that the South Asia region witnessed a rapid fall in IMR from about 160 per 1000 live births in the 1950s to about 42 in the year 2015 and 38 per 1000 live births in 2016. In response to falling IMR, the region's TFR has fallen from nearly 6.1 births per woman in the 1950s to about 2.4 births per woman in 2015. In response to falling fertility - mortality trends, the region is also witnessing an increase in the Life Expectancy at Birth (LEB).LEB in South Asia has risen from only 40 years during the early 1950s, to nearly 69 years by 2015. According to UNDP (2016), it is projected that by the year 2050, the life expectancy is expected to reach 75 years in South Asia which would be almost equal to the world average.

Therefore the countries in South Asia region are experiencing an age structure transition by which high mortality and fertility rates are replaced by low ones. Moreover, this has contributed to rising inverse dependency ratios in the region. It is projected that South Asia will have more working-age people than any other sub-region, with the largest surge by 2055 to a projected 1.6 billion, largely contributed by India. In comparison, East Asia has already reached its peak share of maximum working age at 73 percent in 2010 when South Asia was only at 64 percent while South East Asia is peaking shortly at 69 percent by 2020 (UNDP, 2016). This has created the potential for realizing a dividend. According to Bloom (2011), changes in the age structure of the population or rising proportions of working age population create a potential for faster economic growth - a phenomenon referred to as the demographic dividend.

Within the contours of the South Asian region, India and Bangladesh are the only two countries in the region which share similar patterns of demographic transition and are also reported by the World Bank (2012) as potentially demographic dividend realizing economies. Being large economies, they comprise bulk of the South Asian population, with the relative share of working age people increasing since 1980s in both the countries. Infact, Navaneetham and Dharmalingam (2012) have emphasized that they are the only two South Asian economies experiencing a similar youth bulge of around 20 percent from1970s-1980s and which is expected to last until the year 2020.

In India, demographic changes in the population could be witnessed since 1971 when the working age accounted for nearly 53 percent of the total population. This

percentage has increased gradually and according to the latest Census (2011), the working age account for over 60 percent of the total population. UN (2015) has reported that with more than 62 percent of its population in the working age group and over 54 percent of the population below 25 years, the population pyramid of India is expected to bulge across 15-59 years of age over the next decade. As per NitiAyog (2015)'s projections, nearly 66 percent of India's population would be in the working age group by the year 2022.

In Bangladesh, there has been a phenomenal rise in the people aged 15 - 64 as a percentage of total population in Bangladesh. According to World Bank (2015), people aged 15–64 made up only 53.2 percent of Bangladesh's population in 1985. By 2015, this share was around 66 percent. As per United Nations' (2015) forecast, the population would continue to rise to 69 percent in 2022 through 2044 in Bangladesh.As a result of such demographic window of opportunity, World Bank (2012) has classified the two countries as 'potential demographic dividend realizing' economies.

While the share of working -age in the population determines a country's potential to reap a demographic dividend, a pro-active and development friendly policy framework enables the country to reap benefits from such a dividend. According to UN (2015), countries with a relatively high ratio of working to dependent population have the possibility of benefitting from a "demographic dividend," provided appropriate labour market and other policies allow productive absorption of the growing working-age population and increased investments in human capital of children and youth.

Therefore, it becomes imperative to examine the legal and policy framework governing human capital development in India and Bangladesh in order to identify its role in the economic growth processes of the two countries. Skills development and training was underlined as a significant measure of human capital apart from education and health, in the last chapter. In this respect, the focus of this chapter is to delineate the evolution, policy and institutional arrangements on skills development and training in India and Bangladesh between 1991 and 2015. Before the chapter delves into legal and policy aspects of human capital development, it briefly touches

on the economic growth patterns witnessed by the two countries over the years and the progress on their respective human development indicators, since 1991.

3.1. Economic Growth since 1991

South Asia region has witnessed an acceleration of growth over the three decades since the 1980s'as depicted below. During the five year periods between 1981 - 1985 and 1986 - 1990, the annual average per capita growth rates in the region were second highest in the world following East Asia & Pacific. Subsequently, economic growth in South Asia surpassed that of all other regions of the world.

Table 3.1: Five Yearly Annual Average Growth Rates Per Capita of the Regions (in %)

REGIONS	YEARS						
	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010	2011 - 2015
East Asia & Pacific	3.3	4	2.8	2.2	3.3	4.1	3.7
Europe & Central Asia	1.1	2.6	0.1	2.7	2.1	1	0.8
Latin America & Caribbean	-1.2	0.2	1.6	1.3	1.3	2.5	1
Middle East & North Africa	-2.3	-0.1	0.9	2.4	2.6	2.7	1.2
South Asia	2.8	3.3	2.8	3.6	4.5	5.9	5
Sub Saharan Africa	-2.2	-0.9	-2	0.8	3	2.7	1.3

Source: World Bank Databank (2017)

While the levels of per capita income were similar across all South Asian countries until 1980s and 1990s, growth experiences within these countries have always been varied. For instance, Bhutan saw a high growth starting in the 1980s, albeit with some fluctuations. Maldives also enjoyed high growth, although it experienced a deceleration between 1990s and the first decade of the twenty first century. In Pakistan, per capita growth has been marked by volatility around a broadly declining trend since the 1990s. Sri Lanka has witnessed an acceleration of growth over the last

five decades, except for a dip in the 1980s, avoiding the slowdown and stagnation of 1970s that affected rest of the region.

Table 3.2: Five Yearly Annual Average Growth RatesPer Capita of South Asian Countries (%)

COUNTRIES	YEARS						
	1981-1985	**1986-1990**	**1991-1995**	**1996-2000**	**2001 - 2005**	**2006 - 2010**	**2011 - 2015**
Afghanistan	-	-	-	-	1.5	7.5	1.8
Bangladesh	1.5	1.1	2.2	2.7	3.3	4.8	5.1
Bhutan	4.7	9.8	4.7	4.2	4.9	7.4	3.9
India	2.8	3.7	3.1	4.2	5	6.5	5.4
Maldives	-	-	-	-	3	5.9	2.7
Nepal	2.6	2.2	2.5	2.6	1.9	3.4	3
Pakistan	3.3	2.6	1.9	0.8	2.9	1.3	1.8
Sri Lanka	3.5	1.9	4.2	4.4	3.2	5.6	5.3

Source: World Bank Databank (2017)

The millennium period witnessed the highest growth in per capita annual average GDP of South Asia, surpassing the growth rates of the advanced and emerging economies of the world including that of East Asia. From 3.6 percent during the period 1996-2000, the annual average per capita growth rate of South Asia increased to an average of 4.5 percent between 2001-2005, peaking to an average of 5.9 percent in the next 5 years and 5 percent between the period 2011-2015. According to International Monetary Fund (IMF, 2015), India's strong economic growth, which accounts for 80 percent of the regional GDP on a purchasing power parity basis, has helped buoy the South Asian average.

In the case of India and Bangladesh, growth in per capita GDP has accelerated,particularly since the 1980s. The initiation of economic reforms in the 1990s' saw India gradually breaking free of the low growth trap which was indirectly called the “Hindu growth rate” of 3.5 per cent per annum. Real GDP growth averaged 5.7 per cent per annum in the 1990s, rising from 3.1 percent on an average during

1991-1995 to 4.4 percent during the subsequent five year period on an average. A feature of the growth acceleration during this period was that while the growth rate of industry and services increased that of agriculture fell. This was because there was no notable technological breakthrough after the "green revolution" of the mid-1960s which saw sharp increase in yields of cereal production particularly in northern part of India.

Bangladesh's economy was characterized by volatility and weak growth prior to 1989, with annual changes in real GDP per capita averaging (negative) 0.7 percent in the 1970s and 0.5 percent in the 1980s. However, economic reforms to strengthen market deregulation and privatization measures combined with movements towards political democratization led Bangladesh to experience an average GDP per capita growth of 2.6 percent in the nineties, rising from an average of 2.2 percent during 1991-1995 to 2.7 percent during 1996-2000.

The millennium period witnessed accelerating rates of economic growth for both the economies. India's economic growth accelerated further to 7.3 per cent per annum during this period. Infact, the five year period 2004-08 encompassed the inflexion point in India's growth trajectory with annual average GDP growth rising to 9 percent. Growth in all the sub-sectors of the economy, including agriculture, accelerated during this period. Positive economic growth was maintained throughout this period even in Bangladeshwith the annual average per capita GDP growth rate rising from 3.3 percent between the period from 2001 to 2005 to 4.8 percent and 5.1 percent between 2006-2010 and 2011-2015, respectively.

The growth process was interrupted by the global financial crisis of 2007. India's annual average per capita growth took a hit, declining from 6.5 percent during 2006-2010 to 5.4 percent in 2011-2015. The overall average growth slowed down to 7.8 per cent during 2009-11with a noticeable slowdown in both agriculture and industry. In other words, the growth dynamics altered the structure of the Indian economy with a decline in the share of agriculture from 28.4 per cent in the 1990s' to about 15 per cent in 2009-11. There was corresponding gain in the share of services and it can be said that India's growth has largely been dominated by the services sector.

After bottoming down to 4.1 percent in 2012, economic growth in India rose steadily, reaching 5.9 percent in 2014 with a revival of business and consumer sentiment. Since late 2014, a halving of global oil prices boosted economic activity in India and underpinned a sharp decline in inflation. According to IMF (2015), Consumer Price Index inflation declinedto about 4 percent in August 2015, reflecting the tightmonetary policy stance, lower global commodityprices, government efforts to contain food inflationand remaining economic slack.As a result, by the year 2015, the country witnessed an economic growth of 6.6 percent, the highest in South Asia during that year.

On the other hand, in Bangladesh, internal unrest and political uncertainty have had a negative impact on economic growth, which declined from 5.2 percent in 2011 to 4.7 percent in 2013. Growth in the services sector fell to 6.06 percent in fiscal year 2013 from 6.3 percent in fiscal year 2012 as safety concerns caused markets to close and limited customer movement. According to World Bank (2013), insufficient improvements to power and gas supplies and general infrastructure also contributed to declining economic growth in fiscal year 2013. However, by 2015, domestic demand recovered, headline inflation eased on the back of a decline in food prices and monetary policy also remained prudent helping to keep the inflation in check. As a result, the growth rate recovered and fell back in track to 5.2 percent by the year 2015.

It is also essential to mention that unlike other emerging economies of South Asia, Bangladesh did not experience substantial slowdowns in growth due to external shocks as compared to domestic or internal unrest within the country. For instance, according to IMF (2015), global economic downturns in 2002 and 2008 had limited impact on Bangladeshi per capita income growth, as opposed to the slowdowns witnessed in many emerging markets. However, it is also important to note that while the Bangladeshi economy has substantially grown, its per capita income has not been quite close to Indian levels yet. While India's GNI per capita stood at USD 1600 in 2015 from USD 380 in 1990 - an increase of about 223 percent between the 25 year period, Bangladesh's GNI per capita increased to USD 1190 from USD 310 during the same periods - an increase of just nearly 160 percent[19]. Post the economic reforms of the 1990s, while the latter's growth overtook that of Pakistan's rates of economic

[19]The data on GNI has been taken from World Bank dataset.

growth in the mid-1990s (as reflected by the table above), it has remained well below India.

3.2. Human Capital Development since 1991

Growth accounting literature provides insights into the derivation of growth rates from capital stock, labor, human capital per worker, and TFP. According to UNDP (2016) demographic patterns affect almost all of the priorities in the goals of a country, including economic growth, labour markets, income distribution, poverty, social protection, pensions, health, education, gender equality, food security, energy, environmental protection, and climate change mitigation and adaptation.

South Asian region as a whole has made considerable progress as far as human resource development is concerned. According to UNDP (2016), among developing regions in the last quarter century, South Asia has made fastest improvement globally. The region has recorded an average annual growth rate in HDI score of 1.4 percent between 1990 and 2015 compared to 0.7 percent for the world as a whole, largely contributed by India and Bangladesh.

The demographic transition in the two countries has been accompanied by significant improvement in their human development indicators. For instance, between 1990 and 2015, India’s HDI value increased from 0.428 to 0.624, an increase of 45.7 percent. At the same time, Bangladesh witnessed an even higher progress. The country's HDI value increased from 0.386 to 0.579, an increase of 50 percent during the 25 year period (table below), though both the countries have been maintaining an improving trend since the 1990s. According to UNDP (2016),such an improvement in the country's HDI value has shifted Bangladesh from low to the medium human development category positioning the country at 139 in 2015 (out of 188 countries) from 142 in 2014. India's ranking on the other hand has improved by five notches from 135th in 2014 to 130th position in 2015.

Table 3.3: Human Development Index Values

COUNTRIES / REGION	1990	2000	2010	2011	2012	2013	2014	2015
India	0.428	0.494	0.580	0.590	0.599	0.607	0.615	0.624
Bangladesh	0.386	0.468	0.545	0.557	0.565	0.570	0.575	0.579
South Asia	0.438	0.502	0.583	0.592	0.601	0.607	0.614	0.621

Source: United Nations Development Programme (2017)

However, as against the HDI values, the inequality adjusted HDI (IHDI)[20] values stood at 0.412 for Bangladesh and 0.454 for India in 2015. This implied that the resultant overall loss in the distribution of HDI dimension indices was higher (close to 30 percent) in case of former compared to the latter (which was nearly 27 percent). In other words, the loss to human development in Bangladesh is higher due to greater levels of inequality compared to that of India.

UNDP specified measures of HDI such as adult literacy rate, life expectancy at birth, mean years of schooling, expected years of schooling and GNI per capita have also reflected marked improvement in India and Bangladesh, with the latter surpassing the former in life expectancy and Expected Years of Schooling (EYS). Bangladesh's LEB increased by 13.6 years and its EYS by 4.5 years between 1990 and 2015; while India's life expectancy and EYS increased by 10.4 years and 4.1 years, respectively, during the same period.

However, Bangladesh has lagged behind India with respect to Adult Literacy Rate (ALR), Mean Years of Schooling (MYS) and GNI per capita, over the years. While the ALR increased from 48 percent in 1991 to a little over 72 percent in 2015 in India, it only increased to nearly 62 percent from a little over 35 percent in Bangladesh during the two referred time periods. Similarly MYS in India increased by 3.3 years, the mean years in Bangladesh increased by only 2.4 years during the 25 year period. Moreover, India reported an increase of over 223 percent in its GNI per capita between 1990 to 2015, Bangladesh's GNI per capita increased by only 160 percent

[20]UNDP has defined Inequality Adjusted Human Development Index (IHDI) as the loss to human development due to inequality. The IHDI combines a country's average achievements in health, education and income with how those achievements are distributed among country's population by discounting each dimension's average value according to its level of inequality.

during this period.According to UNDP (2015), massive improvement in India's per capita national income could be attributed to the adoption of market reforms on account of liberalization, attracting foreign investments and devoting greater resources to social development during this period.

Besides, the two countries have recorded remarkable progress in decreasing fertility and mortality rates. According to Ministry of Finance, Government of Bangladesh, TFR has declined from 6.4 births per woman in 1980 to 2.1 births per woman in 2015. In India, on the other hand, TFR has declined from 4.8 births per woman in 1980 to 2.4 births per woman in 2015. Similarly, infant mortality rate has declined from 114 per thousand live births in 1980 to 38 per thousand live births in 2015 in India compared to 134 per thousand live births in 1980 to 31 per thousand live births in 2015 in Bangladesh - a marked improvement in the case of latter country.

Such an impressive growth of human resource development in the two countries cannot occur without an enabling policy environment. Therefore, the following section will spell out the nature of policy and legal frameworks as well as the broad structure governing human capital - in terms of skills development and training services being run in India and Bangladesh since 1991.

3.2.1. Skills Development and Vocational Training: Institutional and Policy Framework[21]

3.2.1.1. Operational Structure

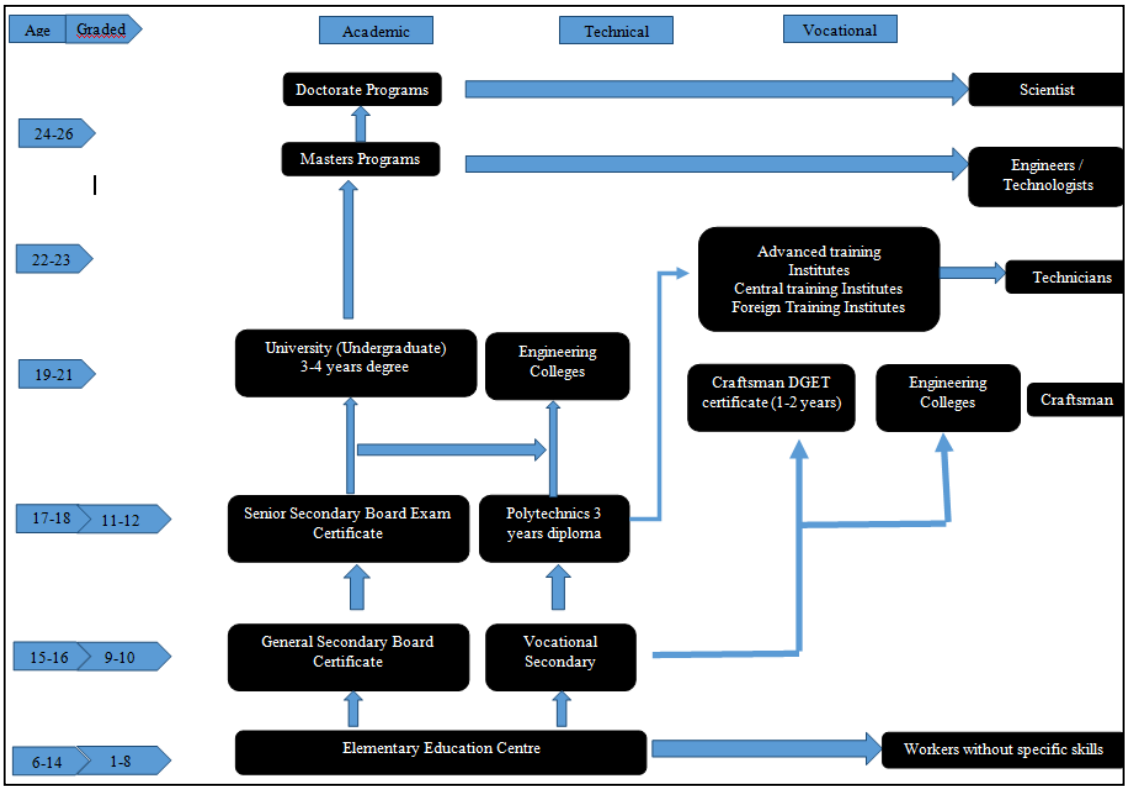
Skills development in India and Bangladesh can be segmented into academic knowledge and vocational training. While academic education is largely driven through schools and universities, technical and vocational training is imparted through formal and non-formal channels.

In India, there is a lack of inter-connection between the academic knowledge offered at schools (atleast till secondary education) and technical and vocational training offered at specialized institutes and centres. It is only from the stage of tertiary level of education (received in Universities) that the students can enroll for TVET courses

[21]Based on interviews and interactions with regional experts on the subject from India and Bangladesh (ANNEXURE III).

and programmes. The operational structure on skills development and training, carried out in India, is depicted below:

Figure 3.1: India's Education and Skills Development Institutional Structure



Source: FICCI's Report on Skills Development in India (2015)

Elementary, secondary and higher education is governed by the Ministry of Human Resource Development. Universities and higher education institutes caters to the generation offormal means of education offered through different colleges specializingin various streams - arts, science and commerce, while engineering and polytechnics fall under the purview of technical education. The latter is offered through advanced, central and foreign training institutes.

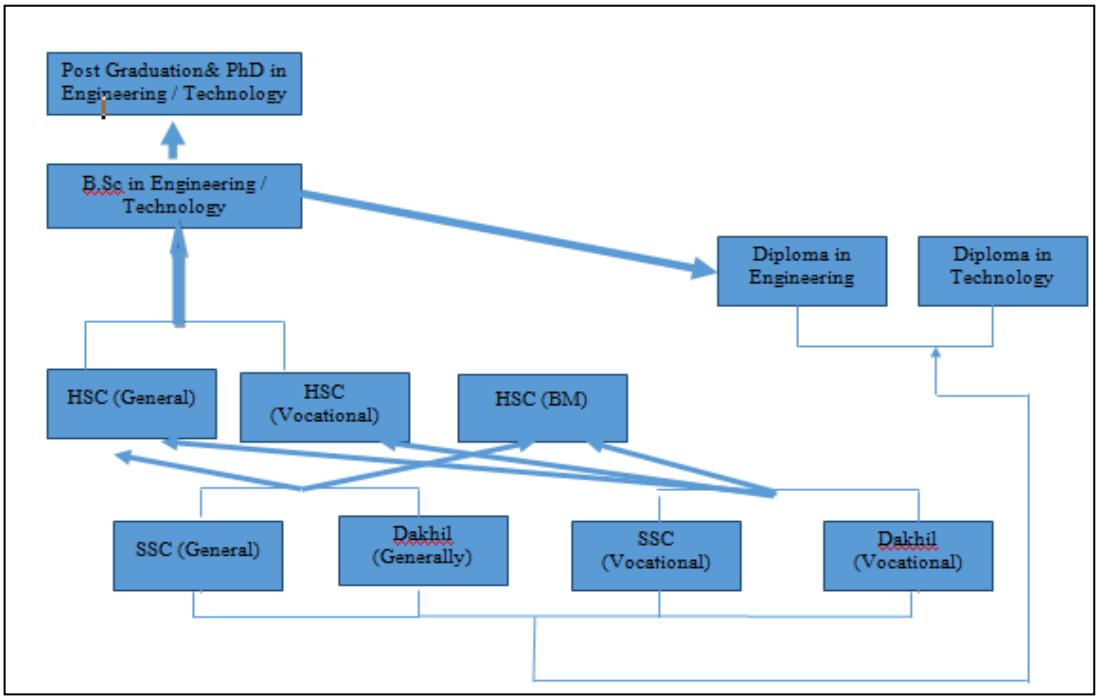
National Council of Educational Research and Training (NCERT) is the apex national body governing school education, Central Advisory Board of Education (CABE) maintains the coordination between the central and state governments.University Grants Commission (UGC) sets the standards for university education and All India Council for Technical Education (AICTE) regulates technical education in India. UGC also governs the structure of funding and grants for higher education.

As far as vocational training is concerned, it is imparted through public and private institutions in India. These include Industrial Training Institutes (ITIs) run by the government, Industrial Training Centers (ITCs), vocational schools, specialized institutes for technical training, Sector Skills Councils (SSCs) and apprenticeship training offered by the industry and private sector.FICCI (2015) has observed that India's skills development ecosystem is complex, large and diverse, offering different levels of skills across an extremely heterogeneous population groups.

In Bangladesh, on the other hand, the system of TVET is simplistic, structured and better organised, compared to that of India. TVET system in the country comprises of short courses (of nearly a duration of 360 hours) and three levels of programs on skills development under formal TVET - two years for a Secondary School Certificate in Vocational Studies (SSC Voc), two years for a Higher Secondary Certificate in Vocational Studies (HSC Voc) and 4 years for a diploma. Students canenter the diploma level in mono-technics and polytechnics after completing a general orvocational SSC or its equivalent. The minimum educational requirement for entry to HSC Voc is SSC Voc, and that for entrance to SSC Voc is completion of grade 8 of school.

The structure of technical education in Bangladesh is explained in the figure below

Figure 3.2: Technical and Vocational Education and Training (TVET) in Bangladesh Institutional Framework



Source: Asian Development Bank's Report on TVET in Bangladesh (2011)

The various types of TVET institutions include public and private polytechnic and mono-technic institutes which offer a four year diploma in post-secondary engineering, accredited by Bangladesh Technical Education Board (BTEB), technical school and colleges operating certificate programs through Directorate of Technical Education (DTE) and also offering short courses and Technical Training Centers (TTC) which offer SSC Voc and short training courses. These institutions are either funded and operated by the government of Bangladesh or managed by NGOs or private entities.

The main public provider of formal TVET is DTE under the Ministry of Education. DTE is the nodal body for administering the functioning of technical and vocational institutions of the government including the programs run by them. The Bureau of Manpower, Education and Training (BMET) comes under the Ministry of Expatriate Welfare and Overseas Employment; and the Ministry of Youth and Sports. In total, nearly twenty ministries and departments offer various formal skills and training programsthrough government-operated technical schools, colleges, and polytechnic and monotechnic institutes. Located in the Ministry of Education, BTEB is the apex body responsible for quality assurancethrough accreditation of training providers, curriculum development, examinations, andcertification. National Skills Development Council (NSDC) under the government of Bangladesh - set up in 2011- is the main coordinating and policy making body for addressing all issues on skills development such as its structure, policy and procedures, delivery, finance and programs. NSDC is headed by the Prime Minister of Bangladesh.

In India, Director General of Employment & Training (DGET) is the nodal institution under the Ministry of Labour and Employment for vocational training. DGET is responsible for formulating policies, establishing standards, granting affiliation, trade testing and certification, and matters connected to vocational training and providing employment services. Moreover, a Ministry of Skills Development and Entrepreneurship has also been set up in mid-2014, entrusted with the responsibility of evolving an appropriate skills development framework in India in consultation with relevant stakeholders from public and private sectors, ensuring skills upgradation, and monitoring overall progress on skills and training scenario in the country. Similarly, at the state level, National Skills Development Agency - established in 2013, has been

working with State Governments of India to rejuvenate and synergize the skilling efforts in the Indian States.

Moreover, the participation of private sector in skills development has largely been driven through National Skills Development Corporation (NSDC) which is under the Ministry of Skills Development and Entrepreneurship since 2015. NSDC was set up in 2009 under the Ministry of Finance to promote viability gap funding, generate innovative funding models and enable private sector driven skills initiatives, industry participation through SSCs and need based training programmes.

At the same time, as against the non-formal trainings in India which largely comprise of the experiential skills acquired on-the-job and are relatively unstructured and unaccounted, non-formal trainings in Bangladesh are more structured, the only difference being that they are not affiliated or accredited by BTEB. These programs offer flexibility and cater to the capacity building needs of target groups, have organized objectives for learning and are conducted with a set time duration lasting for one to twelve months. One example of a short course is housekeeping, which lasts for 21 days and requires aminimum entry qualification of completion of grade five.Institutes offering diploma courses and TTCs also offer crash courses for a duration of 360 hours for those students who wish to start their careers either within the country or abroad.

The training providers in Bangladesh are diverse, ranging from private institutions, government institutions operated byvarious ministries, as well as local and international non-government organizations (NGOs). BBS has listed out the various training institutions in Bangladesh and the percentage share of population trained by them, respectively. For instance,in the year 2014-15 (as reflected in the table),about 59.3 percent of population received trainingfrom private institutions, 22.4 percent fromgovernment institutions and 11 percent by NGOs. Other typesof institutions accounted for about 7 percent of the population trained.

Table 3.4: Sources of Training Received in Previous 12 Months of 2014-15 (in %)

Source	Overall Trained (in percentage)	Females Trained (in percentage)	Males Trained (in percentage)
Government Institutions	22.4	23.9	21.7
Private Institutions	59.3	51.6	62.5
Nongovernment Organisations	11.0	16.8	8.6
Foreign Institutes	0.5	0.5	0.5
Joint Ventures	3.5	4.0	3.3
Other Institutes	3.2	3.2	3.2

Source: Bangladesh Bureau of Statistics (2015)

The proportion of trained population gender wise differ substantially with NGOs accounting for almost 19 percent of female trainees, providing them technical skills largely and only 7 percent of male trainees. However, in case of private institutions, over 62 percent of male trainees were accounted for compared to 52 percent of female trainees. BBS reported that the proportion of females trained by the various institutions were more in 2014-15 compared to males, reflecting a convergence towards gender parity in skills development.

Such institutions develop their own curricula and training methodologies by maintaining linkages with the prospective employers in order to ensure that their programs are responsive to the needs of job market. Comyn (2009) observed that private providers constituted 95 percent of institutions offering training in Bangladesh and about 75 percent of the total enrollment in the country.However, the activities of these private institutions and NGOs are closely monitored and scrutinized by the Government of Bangladesh. Therefore, theentire process of skills development and training is primarily driven by the respective governments of both countries.

3.2.1.2. Policy Framework

The policy framework governing skills development in India and Bangladesh is a natural derivative and extension of the reform strategies in systems of education being undertaken in emerging economies of South Asia.

In India the underlying need of a reform of the education system in the country was noticed as early as 1940s. The report of University Education Commission under Dr. S. Radhakrishnan Commission (1948-49) spelt out the need for reform in the system of education in India: "the most important and urgent reform needed in education is to transform it, to endeavour to relate it to the life, needs and aspirations of the people and thereby make it the powerful instrument of social, economic and cultural transformation necessary for the realization of the national goals. For this purpose, education should be developed so as to increase productivity, achieve social and national integration, accelerate the process of modernization and cultivate social, moral and spiritual values"**.**

However, India witnessed a complete revamp of its education system following the National Policy on Education (NPE) which was formulated in 1968, the National Policy Resolution of 1986 which led to the adoption of National Policy on Education in 1986 and it was subsequently revised in 1992.

The policieson skill development in India are largely governed by the Apprentices Act of 1961, Scheme of Vocationalisation of Secondary Education of 1988, National Skills Development Mission of 2007, National Skill Policy of 2009, National Skills Qualification Framework of 2013 and the National Policy on Skills Development and Entrepreneurship of 2015. These are explained below:

a) **The Apprenticeship Act of 1961:** Apprenticeship programmes in India are governed by Apprentice Act of 1961 and Apprenticeship Rules of 1992. The Act regulates training programmes of apprentices, making it obligatory for employing establishments in both public and private sector to maintain adequate and quality infrastructure for undertaking training practices, as specified by the Act. The primary objective of introducing such an Act was to enable employment generation through the job market by ensuring that the employing organisations own a skilled workforce which has adequate

exposure to on-the-job trainings and an optimum access to a practical working environment.

The Apprentice Training Scheme is implemented by the Ministry ofLabour and Employment and the Ministry of Human Resource Development. While the Ministry of Labour and Employment oversees 'trade apprentices' through its regional offices, the Ministry of Human Resource Development oversees 'graduate, technician, and technician (vocational) apprentices' through different agencies located in various Indian cities. FICCI (2015) has reported that nearly 254 industrial groups are covered under the Act and around 27000 establishments have engaged apprentices. The Act was amended in 2014 in accordance with the skills need of the industry. Moreover, an Apprentice Protsahan Yojanawas also launched to support small and medium enterprises specializing in the manufacturing sector for engaging apprentices.

b) **Scheme of Vocationalisation of Secondary Education:** The Scheme was launched in 1988 with the main objectives of providing skill oriented educational opportunities in order to reduce the mismatch between demand and supply of skilled manpower and generate employment opportunities in the country. Vocational education was introduced as a distinct stream intended to train students enrolled in secondary education, for different occupations, and activities.

   The scheme of vocationalisation of education was revised in 2011 to increase access and outreach of students enrolled in secondary school education to vocational education and employable skills.

c) **National Skill Development Mission**: In 2007 Government of India introduced a Skills Development Mission on a national scale with an aim of creating a pool of sufficiently skilled personnel in 20 emerging and employment generating sectors of the economy. It had envisioned to train 500 personnel by the year 2022.

The Mission pertains to offering skills development and training programmes through large scale of public sector generated various infrastructure facilities, private sector participation, public-private partnership models and a National Skills Qualification Framework. It encompasses the efforts of several ministries of the Central Government, State Governments and the private sector. The Mission has also aimed at enhancing training needs of new entrants to the country's emerging labour force.

d) **The National Skill Policy**: The National Policy on Skill Development has been formulated to address the growing skills development challenges in the country with prompt actions, standard and sustainability as well as empower the workforce with the desired level of skills and knowledge to make it globally competitive.

It was first devised in 2009 and then subsequently revised in 2015 to provide an umbrella framework for all skill development activities undertaken in the country, align them with common standards of qualification and appropriately link them to the skill demanding centers or employment generating organisations. Besides laying down the expected outcomes, the revised policy also identifies the institutional back up and key stakeholders (viz. government, corporates, community based organisations, industry and trade organisations, etc) that will serve as suitable means to achieve the desired results. Moreover, the skill strategy is complemented by specific efforts to promote entrepreneurship in order to create ample opportunities for a skilled workforce.

On the whole, the policy links skills development to improved employability and productivity in paving the way for inclusive growth in the country.

e) **National Skills Qualification Framework:** Notified in 2013, the National Skills Qualifications Framework (NSQF), is a competency-based skills framework that categorizes qualifications according to defined levels of knowledge, skills and aptitude. It comprises of a five year implementation schedule.

Under this initiative, the learner can acquire the certification of competency at any level of vocational program or activity through formal or informal learning. It enables flexible entry and exit points for the candidates thatenables them to acquire skills at different intervals, time duration and age.

As per the guidelines under NSQF, it is mandatory for all training, educational programmes and courses to be NSQF-compliant. Moreover, all training and educational institutions are required to define eligibility criteria for admission to various courses according to the levels defined by NSQF.

Enrolment under NSQF could enable easier mobility between vocational and general education by harmonization of degrees with NSQF; Recognition of Prior Learning (RPL), allowing transition from non-formal to an organized job market; standardised, consistent, nationally acceptable training methods through a national quality assurance framework; mobility of skilled workforce from India, globally, through international equivalence of NSQF; mapping of progression pathways within sectors and cross-sector; approval of National Occupational Standards (NOS)/ Qualification Packs (QPs) as national standards for skill training.

Such a form of qualification framework is particularly beneficial for relatively poor class, since it enables such students to continue with their vocational education at secondary levels or through ITIs, rather than dropping out from the educational or vocational training space, altogether. NSQF is anchored at the National Skill Development Agency (NSDA) and is implemented through the National Skills Qualifications Committee (NSQC) that comprises of all key stakeholders from the government and industry.

While the proportion of government expenditure spent on the social sectors of the economy such as education and health have remained more or less within the bracket of 3 to 4 percent, the nature of policy initiatives in these spheres, since independence have been quite noteworthy.

Since the beginning of the millennium period, the educational scenario of India has witnessed a transformation. The initiativeswhich have been undertaken by the national government include- universalisation of elementary education through

- Sarva Shiksha Abhiyan (2001),
- National Youth Policy (2003) to provide youth with appropriate education and training opportunities including entrepreneurial guidance and access to financial credit,
- a satellite named EDUSAT (2004) that is exclusively dedicated to harness modern technology for delivery of effective education services,
- Rashtriya Madhyamik Shikhsha Abhiyan or Program for Universalization of Secondary Education (2009) pursued by the Central Government to achieve universal enrollment and retention at the primary level by 2010 and at the lower secondary level by 2018.
- free and compulsory education for all children between the age groups of six and fourteen years through the Right of Children to Free and Compulsory Education Act (2009 and 2010)
- Vocationalisation of higher secondary education (2011) that introduced different facets of vocational training at higher education levels.
- Twelfth Five Year Plan (2012-2017) that accorded highest priority to the expansion of education, ensuring that educational opportunities are available to all segments of the society, and making sure that the quality of education imparted is significantly improved.

  The Plan also identified key growth sectors for skills such as automobile / auto components, electronics hardware, textiles and garments, leather and leather goods, chemicals and pharmaceuticals, gems and jewellery, building and construction, food processing, handlooms and handicrafts, building hardware and home furnishings, IT or software, Business Process Outsourcing (BPO) and Information Technology Enabled Services (ITES), tourism, hospitality and travel, transportation/ logistics/ warehousing and packaging, organised

retail, real estate, media, entertainment, broadcasting, content creation, animation, healthcare, banking, insurance and finance.

- National Youth Policy (2014) which sought to empower youth in priority areas such as education, employment and skill development, entrepreneurship, health and healthy lifestyles, sports, promotion of social values, community engagement, participation in politics and governance, youth engagement, inclusion and social justice.

As a result of such policies and programmes in the education domain, India has witnessed an improvement in the enrollments at various levels of education and vocational training over a period of time. For instance the gross enrollment ratio at secondary level of education has increased from 37 percent in 1991 to nearly 74 percent by 2015. Similarly the enrollment ratio at tertiary levels of education has increased from 6 percent to almost 27 percent by 2015. At the same time, the percentage of students (in secondary and upper secondary levels of education) enrolled in vocational programmes have increased from little over 3 percent in 1991 to close to 5 percent in 2015.

India's health systems and policies have evolved following the report of the Bhore Committee: Report on the Health Survey and Development Committee (1946). The recommendation for three-tiered health-care system to provide preventive and curative health care in rural and urban areas became the principles on which the current public health-care systems were founded. This was done to ensure that access to primary care is independent of the individual's socioeconomic conditions.

Although the first national population program was announced in 1951, the first National Health Policy of India (NHP) got formulated only in 1983 with its main focus onthe provision of primary health care to all by the millennium. It prioritized the setting up of a network of primary health-care services, establishing well-functioning referral systems and an integrated network of specialized facilities.

NHP 2002 further built on NHP 1983, was formulated with an objective of provision of health services to the general public through decentralization, involving private sector and increasing public expenditure on the overall health care sector.

The National Rural Health Mission (NRHM), launched in 2005, was a turning point for the future of the healthcare sector in India as it led to significant strengthening of public health systems. It was intended to strengthen the health systems of Indian States to cover all health needs. With its core objective on reducing maternal and child mortality, NRHM aimed at increasing public expenditure on health care, reducing inequity in access to healthcare services, decentralization and community participation in operationalization of health-care facilities.

All services available under such national programmes have been free of any change and universally accessible with fairly good rates of coverage. For instance, India has one of the largest programmes of publicly financed antiretroviral therapy (ART) drugs for HIV affected persons. In addition, 8 all drugs and diagnostics in vector borne disease control programmes, Tuberculosis, Leprosy, immunization programmes and much of the maternity, newborn and infant care are free.

As a result of such initiatives, the healthcare industry of India has expanded extensively in its outreach and market share. According to the Ministry of Health and Family Welfare (2016), the overall Indian healthcare market is worth around US$ 100 billion and is expected to grow to US$ 280 billion by 2020, a Compound Annual Growth Rate (CAGR) of 22.9 per cent. Healthcare delivery, which includes hospitals, nursing homes and diagnostics centres, and pharmaceuticals, constitutes 65 per cent of the overall market.

At the same time, a new impetus has been given to skills development in India through the policy advocacy measures and education initiatives undertaken in recent times. According to FICCI (2015), ITIs and Polytechnic institutions have increased rapidly from 3200 to nearly 12000 by the 2015. Since the establishment of NSDC in 2009, it has tied up with over 250 training providers which offer short duration training programs. The training providers are registered, recognised, scrutinized and can be held for non-performance on account of poor placement record of their trainees. NSDC has also incubated over 40 Sector Skills Councils (SSCs) that are intended to facilitate participation of the industry into need-based skills training programs.

As a result of such efforts the number of annual trainings fulfilled on an average has outperformed the yearly targets set by the Government of India. The Ministry of Skills Development and Training has compiled the year wise break-up of trainings completed against the set targets and the annual placements, since 2010-11 (table below).

Table 3.5 : Year wise break-up of annual skilling targets and trainings completed since 2010-11

Financial Year	Trainings Target	Trainings Completed	Placements
2010-11	20,000	20,484	14,399
2011-12	1,62,000	181,691	1,44,238
2012-13	4,00,000	402,506	2,16,741
2013-14	1,000,000	1,005,074	6,46,394
2014-15	3,300,000	3442,422	1,226,639
2015-16	3,660,000	1,355,473 (until September 2015)	635,156 (until September 2015)

Source: Ministry of Skills Development and Entrepreneurship, Government of India (2016)

As reflected in the table, the trainings completed in all the years from 2010 to 2015 have met their respective annual targets which have been also increasing at a significant pace. Moreover, the rise in the number of placements reflects the fact that adequate employment opportunities have been created to absorb the trained workforce.

Moreover, the proportion of medium sized and large companies that have been formally conducting on the job or in-firm training in India has more than doubled over the years. According to ADB (2017), thepercentage of such organisations have increased from 15.9 percent to 35.9 percent between 2006 and 2014.

In Bangladesh[22] on the other hand, the striking feature of skills development in the country has been the TVET Reform Project which was initiated by the Government

[22]Based on interviews and interactions with regional experts on the subject from India and Bangladesh (ANNEXURE III).

of Bangladesh assisted by the International Labour Organisation (ILO) and funded by the European Union (EU). It was implemented for a period of 8 years from 2007 to 2015 with the objective to ensure Bangladesh's competitiveness in the global market and reduce poverty by improving the quality of vocational education and training. Under the aegis of the project, a National Skills Development Policy (NSDP, 2011) was formulated which provided the foundation for development of skills in the country.

While the TVET section of NEP focus on its massive expansion to enable vertical mobility of vocational training and outreach to underprivileged segments of the population, NSDP spells out the role and importance of industries, private sector and on-the-job training for demand oriented skills development. It also proposes the imposition of specific standards and structures for skills development through a qualifications framework and competency based training.

There are broadly five plans and policies with specific directives and implications for TVET in Bangladesh. They are the following:

a) **Vision 2021**: In an effort to mitigate poverty and join the ranks of middle-income countries; universalize primary and secondary education; enable equality, equity and standards in education; eliminate illiteracy and generate a pool of skilled labor force, Vision 2021 envisages formulation of an education policy which is suitable for the contemporary youth.

   Recognizing an increasing demand for skilled manpower in the domestic labour market as well as overseas, the vision statement emphasizes production of skilled manpower largely through formal training channels. It envisions that such training could enhance knowledge, skills and creativity of new entrants to the workforce, enabling Bangladesh to achieve near to full employment by 2021. The Government of Bangladesh, in addition, has also envisaged that public and private sectors would expand the network of standardized vocational training institutes which would ensure the delivery of vocational training with appropriate practical exposure of job market.

A Perspective Plan (2010-2021) that underlines the strategies to achieve Vision 2021 and two five year plans, Sixth (2011-2015) and Seventh (2016-2020), have been formulated in line with the objectives mentioned in the vision document.

b) **Poverty Reduction Strategy Program (PRSP)**: At the end of Fifth Five Year Plan in 2002, the Government of Bangladesh adopted PRSP in an attempt to reduce poverty by achieving higher economic growth. In line with its vision of a 'Poverty free Bangladesh' the Government initiated second round of program (PRSP-II) in 2009, under the overarching theme of 'Steps Towards Change: National Strategy for Accelerated Poverty Reduction (FY 2009-11)'. The revised NSAPR II has outlined comprehensive strategies for effective poverty reduction during the fiscal year period - 2009 to 2011. Some of those include implementation of human resource development strategy programs reaching out to the poor and vulnerable population, formulation and execution of pro-poor macroeconomic policies, etc.

The poverty reduction strategy document emphasizes the need of an expansion and outreach of TVET services to the poor, young adults and students enrolled in grades six or seven. In this regard, two main objectives have been specified in the strategy document. They are:

- Increasing the overall enrollment of students in TVET by 50 percent with the enrollment of female population raised by 60 percent.
- Raising the enrollment of students in secondary education, into TVET from 3 percent to 20 percent.

PRSP II also underlines the need of arevision in the curriculum of TVET programs in terms of time duration, greater flexibility, and enhanced market orientation.

c) **National Education Policy (NEP) 2010:** The NEP was approved by the Government of Bangladesh in December, 2010. It provided a framework for streamlining the role of education in the country's human resource development. Some of its recommendations include provision of pre-primary education for all children, extension of compulsory education to grade 8,

provision of adequate facilities for teachers' training, professional development and remuneration as well as generate an adequate resource pool of qualified and experienced persons from the industry to facilitate training programs. Moreover, the Third Primary Education Development Program was also launched in 2011 under the Policy in order to improve the enrolment levels in schools, especially at the primary level.

With respect to TVET, the Education Policy recognizes that higher education cannot be universal in nature and therefore it seek to provide due emphasis on technical and vocational education to increase employment prospects. It specifically emphasizes on strengthening and scaling up the TVET programs. In this respect, NEP underlines nearly 25 strategies for expansion, access and vertical mobility of TVET programs. These include the following:

- adding the component of pre-vocational and vocational education in general and secondary education,
- establishing new technical and vocational training institutions in each sub-district, capacity building of trainers and teachers,
- establishing a technical education university,
- introducing apprenticeship schemes.

Moreover, recommendations pertaining to improving the quality of delivery and content of TVET programs are also listed out under NEP. Some of these include:

- Recruitment of teachers or trainers in proportion to students enrolled for TVET programs should be balanced so that the desired ratio of 12:1 students - teacher or trainer, is achieved. In this regard, an establishment of a separate public service commission to facilitate such recruitments of teachers was recommended.
- Mandatory use of ICT in programs.

- The teachers recruited for delivery of TVET services should be qualified and possess suitable work experience.
- Adequate published resource material in the national language of country should be provided to the students.
- Encourage active participation of private sector in the provision and delivery of TVET programs.

To a considerable extent, the strategies laid out under NEP reinforce the underlying need to maintain socio-economic equity in Bangladesh by facilitating:

- access for under-privileged students or students with disabilities
- proportional budget allocations for students enrolled in technical and vocational education and training.
- opportunities for the under-privileged in privately owned or privately operated institutions.
- access for adults and drop-outs to participate in such training programs at flexible time durations.
- financial assistance for enrollment in technical and vocational education, especially to those sections of the population who are unable to pursue studies after grade 8 due to monetary constraints.

According to ADB (2015), the strategies highlight Bangladesh's intention to make its people competitive by improving access to TVET, harnessing the potential of ICT, and maximizing the contribution of the private sector,among others.

A consolidated education law has been proposed under NEP as a legal framework for management of overall education system of Bangladesh, in line with the Policy.

d) **National Skills Development Policy:** A National Skill Development Policy (NSDP) was drafted in 2009 under the auspices ofNSDC and as a part of the five year TVET Reform Project in Bangladesh, implemented by ILO. It was designed by taking into consideration suggestions and feedback from different stakeholders specializing in different fields of industry to formulate a holistic policy on skills development. The draft policy was endorsed by the National Skills Policy Consultative Committee and submitted to Ministry of Education in December 2009. NSDC approved and endorsed the draft in September 2011. Subsequently it was approved by the Cabinet of Bangladesh in January 2012.

The objectives with which NSDP was introduced are:

- provide a clear reform agenda on skills development underlining its relevance and suggesting ways to improve the quality of training services extended by the institutions and employers.
- address the issues related to TVET framework in the country especially with respect to the involvement of private sector and training at the workplace.
- establish a responsible delivery mechanism that address the needs of the labour markets, individuals and the community at large.
- enable a system of effective planning, coordination and monitoring of activities on skills development, undertaken by various government and non-government agencies.

The focus of NSDP has been to enable active participation of the industry and private sector for skills development in the country. In this respect, the Policy has encouraged demand-driven, flexible and responsive training; demand driven training requires the government and non governmental agencies to possess the inherent capacity to clearly identify and share the skill requirements to the training providers; flexibility to ensure that such providers have sufficient resources and capacity to understand the needs and appropriately respond to the growing demand of skilled workforce of the job market.

In order to achieve this, NSDP has proposed to implement various structural reforms which clearly assess the skills need of industry, address them and thereby ensure employability, increased productivity and higher standard of living. One of such reform measures underlined in the Policy document is the need to establish the National Technical and Vocational Qualifications Framework to enable quality assurance and better institutional management in delivering training. Under the prescribed Framework, the Policy envisioned of introducing competency based training and assessment system in each industry whereby the performance of the employees (from basic to middle level managerial positions) is measured against certain job oriented competency and skills standards, irrespective of the time spent on training. Moreover, the Policy also prescribed a revision of the secondary vocational curricula to ensure better delivery of senior secondary or higher secondary vocational education in areas of greatest need.

In order to ensure the quality assurance of training providers, NSDP called for a 'Skills Quality Assurance System' under the aegis of BTEB. It prescribed for the public and private training providers to be registered under the multi-tiered registration process for recognition of excellence, certification of trainers, learning and assessment programs to be accredited and auditing training providers for compliance against certain quality standards. This, as laid out by the Policy, would enable better institutional management of skills development in the country.

NSDP has also taken into consideration the objectives laid out under PSRP II, as key performance indicators for its strategic structural plan. For instance, ensuring an increase in the proportion of trained students through TVET from 3 percent to 20 percent overtime, a rise in enrolment in TVET by 50 percent and boosting enrolment of females in TVET to 60 percent. In this regard, the Policy has specifically pointed for the Government of Bangladesh and its partners in the social sector to develop and introduce a skills development investment plan that links the structural reforms with budget allocations. The investment plan is envisaged to consider the availability of infrastructure, upgradation of training facilities and equipment across public and private training providers, development of centers of excellence and allocate resources according to needs and capability.

In a nutshell, some of significant recommendations of NSDP include:

- standardization of national qualifications framework and introduction of competency based training;
- decentralization of institutional administration (which refers to recruitment of trainers or teachers and financial, administrative and academic autonomy), accountability measures, monitoring of performance and institutional management
- address quality and relevance of skills development in response to demands of the industry and requirements for instructor training and licensing, and
- establish a performance or result oriented financing scheme.

e) **Sixth Five-Year Plan, 2011–2015:** The Plan (2011-2015) was formulated with the prime objective to remove poverty, taking into account progress of the last three decades, recent economic developments which have a bearing on the growth prospects of the economy in the medium term as well as a vision for the future in the long term.

The outreach of TVET services to the rural sector has been given special emphasis in the Sixth Plan. The Government's policies and goals have focused on substantially increasing the proportion of students' enrolment in TVET after primary education. Three strategies have been underlined in the Plan for an expansion in enrolment in TVET programs. They are:

- extending the programs to address disadvantaged and marginalized sections of the society;
- implementing effective training programs that impart marketable skills; and
- increasing employment opportunities especially for the poor, therebyensuring a regular source of income generation.

In order to fulfill such strategies and objectives, the Government of Bangladesh established NSDC as the apex body for formulation of policies on skills development, with suitable representation from the government, private, public sectors, civil society and the labour force.

The primary objectives of NSDC have been laid out by the Government. They are:

- revise the role of public sector of Bangladesh in provision of skills and training to its population.
- Expand and modernize TVET programs to improve the linkages between the supply of training and demands of the job market to meet the growing skill demands. Also extend greater benefits to the poor sections of the society.
- Ensure gender parity in vocational education.
- Improve efficiency and quality of TVET programs to ensure focused reduction in poverty and increase in employment levels.
- Establish greater number of skills development and training centers for the youth, especially in the rural districts of Bangladesh.

Besides, the SFYP has identified key sectors of growth for skills. They are information technology, agro-food processing, manufacturing (leather and leather goods, ship building, ready-made garments), tourism and hospitality and light engineering construction.

According to BBS (2015), computing was the most popular training course pursued by the local population of Bangladesh in the last twelve months of 2014-15. Nearly 2 million people or 42 percent of the total trainees pursued IT or computing as a course in that year. This was followed by training in agriculture, namely agro- food processing and manufacturing of ready-made garments accounting for nearly 11 percent and 9 percent of the total trained in 2014-15, respectively.

The SFYP also list out several strategies to increase the number of skilled workforce in such sectors such as ICT by introducing pre-vocational IT education in schools, establish an equivalency between formal vocational education especially after grade 8 and national skills standards, allow technical education at tertiary level for all graduates enrolled in formal vocational courses and those who are able achieve certain skills standards, encourage apprenticeship programs by necessary revision of laws and acts in this sphere, create a Technical Education Teacher Recruitment and Development Commission to ensure effective recruitment and development of the trainers, encourage public private partnerships in provision of TVET services, adopt a National Vocational Qualification Framework (NVQF) and transform DTE into an autonomous IT, Technical and Vocational Education Council by bringing all TVET institutions under its jurisdiction.

Besides, the Government of Bangladesh has also implemented Skills for Employment Investment Program (SEIP) in 2014, in partnership with ADB. The investment program supports the reforms in skills development anchored in NSDP and promotes the involvement of private sector and public private partnerships in this field that is crucial to meet existing and future labor market needs as well as reduce the skills gap. In addition, the program helps the national government scale up skilling of new entrants in the labor market and up-skilling of existing workers in order to contribute towards higher growth of priority sectors. Six priority sectors have been identified by the Government in consultation with Industry Skills Councils (ISCs), employers and their associations in Bangladesh.They are readymade garments and textile, construction, information technology, light engineering and manufacturing, leather and footwear, and ship-building.

As a result of such policies, reform initiatives and developmental plans, the outreach of TVET has expanded rapidly in Bangladesh over the years. According to BANBEIS (2015), the number of enrolments in formal TVET programs scaled up remarkably from 110,000 people enrolled in 2000 to 448,000 by 2010 and to 690,000 by the year 2014 in such programs. Moreover, a number of new training courses have been introduced by private sector since the introduction of SEIP to promote skilling and training of workers, especially in the export promoting

industry. For instance, Intertek, a leading quality assurance provider to industries and firms, in partnership with Bangladesh Manufacturers and Exporters Association has introduced a number of training courses under the aegis of SEIP for the apparel and textile sector which is the country's largest export industry.

The Government of Bangladesh has also pursued a series of interventionist projects of short term nature in partnership with multilateral agencies which have been directed towards improving access to and quality of secondary education since 2005. For instance -

a) Teaching Quality Improvement in Secondary Education Project funded by ADB. It was initiated in 2002 for a short term duration to review and analyze policies and strategies pertinent to teacher training, identify gaps in the existing policies and programs on career development of teachers, analyze issues related to quality management at national and regional levels, assess the need for pre and on the job teacher training through various channels and finally provide recommendations to the government on improving the quality of teaching at the secondary level.

b) The Primary Education Stipend Project (PESP) funded by the World Bank funded by the World Bank. It was initiated in 2002 with an aim to increase the participation of primary school-age children from poor households of Bangladesh in formal education - in terms of higher enrollment, greater attendance or low absenteeism, continued persistence and better performance of children in school. The idea was to incentivize such households to send their children to school by supporting them financially in the form of cash disbursements. Eventually the scope of the project was detailed out focusing on encouraging female participation in primary, secondary and higher secondary education. The project was carried out for the period 2002-2010.

Notable improvements were witnessed, as a result, in the enrollments at various levels of education.For instance the gross enrollment ratio at secondary level of education has increased from 20 percent in 1991 to nearly 64 percent by 2015 which is a marked improvement. Similarly the enrollment ratio at tertiary levels of education has increased from 4 percent to over 13 percent by 2015. According to Dundar et.al

(2014), private enrolments at the primary, lower and higher secondary levels doubled in Bangladesh between 2004 and 2010.

At the same time, the percentage of students (in secondary and upper secondary levels of education) enrolled in vocational programmes have increased from 4 percent in 1991 to 14 percent in 2015. Moreover, the percentage of students (in post secondary level of education) enrolled in vocational training have also increased from 63 percent to 95 percent during the given period.

Similarly hepopulation health outcomes of Bangladesh have shown marked improvement, with falls in maternal, infant and under-five mortality rates, and significant reductions in TFR.

The health reforms in the country commenced with the Health and Population Sector Strategy (HPSS), developed by the government of Bangladesh and donors in 1997.The HPSS primarily fed into two consecutive policy documents – the Fifth Five Year Plan (1997–2002) and the National Health Policy approved in 2000. These documents advocated for a common set of institutional reform strategies, including the provision of primary health services, introduction of the Sector Wide Approach (SWAp), one-stop services through community clinics at the village level, unification of the Health and Family Planning Directorates, administrative decentralization, and the creation of static clinics (community clinics). Accordingly, in 1998 the first five year operational programme called Health and Population Sector Programme (HPSP) of 1998–2003 was designed and implemented.

With the termination of HPSP, the Health, Population and Nutrition Sector Development Programme (HNPSDP) for 2003-2010 was launched with similar strategies but an added emphasis on nutrition. Other key reforms includethe establishment of community clinics; unification of the DGHS and DGFP in 2000, attempts at decentralization of health services to the district level, although with limited delegated authority; and the maternal health voucher scheme.

The National Health Policy of 2011 was directed towards:

a) strengthening primary health and emergency care for all,

b) expanding the availability of client-centred, equity-focused and high quality health care services, and

c) motivating people to seek care based health services.

In addition, a Health Care Financing Strategy (2012–2032) has also been developed in Bangladesh to provide financial directions to healthcare spending in order to achieve universal health coverage. Over its twenty year implementation period, the strategy aims at reduction of out-of-pocket payments from 64 percent to 32 percent of total health expenditure, increase in government expenditure from 26 percent to 30 percent, increase in social protection from less than 1 percent to 32 percent and reduced dependence on external funds from 8 percent to 5 percent. As a result of such policy programmes and initiatives, Bangladesh has witnessed immense improvements in its health indicators over a period of time. According to WHO (2016),

Bangladesh has set an extraordinary example of gaining good health at a very low cost and has been proposed as a role model for other developing countries in the region. While the gains in health have been credited to the Ministry of Health and Family Welfare, the progress of other ministries relevant to public health catalyzed the success of the overall health agenda of the Government.

3.3. Conclusion

According to UN (2015), South Asia is projected to add an average of 18 million people to its working-age population every year for the next two decades – and the result will be a very high ratio of working-age to non-working-age individuals, which will peak in 2040 at 2.2:1. This ratio augurs well for future economic growth. While the region can be credited for maintaining high economic growth rates over the years and considerable progress with respect to the human resource development, there have been associated challenges as well pointed out in literature.

For instance, while South Asia has displayed impressive improvement in the HDI values over the period 1990 to 2017, it has a lower value, when adjusted for inequality. Losses due to inequality are highest in the field of education and longevity in the region. Infact, off the various indicators of IHDI, inequality in life expectancy

(at 21.4 percent) and inequality in education (at 37.7 percent) are among the highest in the region viz-a-viz globally.

Additionally, the gender disparities are miserably large. The Gender Development Index (GDI), which captures gender inequalities in human development reveals that the gender gap is the widest in South Asia. In 2017, the GDI value of South Asia stood at its lowest (0.837) compared to other regions world-wide. As a result, Gender Inequality Index (GII) is the highest in the region, compared to other global regions. In 2014, South Asia scored 19.3 percenthigher than the global average, indicating widespread discrimination.

Moreover, the region also contributes heavily to global poverty. Based on the Multidimensional Poverty Index (MPI), the largest share of people are suffering from multidimensional poverty - i.e. people struggling with overlapping deprivations such as in health, education, living standards, etc, live in South Asia. According to OPHI (2018), nearly 41 percent of the world's poor lives in the region.

Country wise comparisons reflect that the largest countries in the region need to undertake effective policy reforms to improve the health standards of their citizens. For instance, India has only 0.8 physicians per 1,000 people - which is one of the lowest ratios in the world. Moreover, the country has the highest burden of tuberculosis. Though the incidence of tuberculosis has declined over the years (to 211 per 100,000 population in 2016 from 274 a decade earlier), WHO has estimated that India had nearly 2.79 million tuberculosis cases in 2016 and around 420,000 deaths due to the disease. Moreover, life expectancy in India was nearly 69 years in 2016, compared with 76 in China, 75 in Sri Lanka, 72 in Bangladesh, and 70 years in Nepal[23].

Also, it has been found out that in 2015, over 39 percent of Indians were at a risk of catastrophic expenditure for surgery since 65 percent of the population had no medical insurance coverage and had to resort to spending out of pocket for medical care. The Institute for Health Metrics and Evaluation (2017) has estimated that India's annual per person health expenditure is expected to rise to United States dollars 820 by 2040 from United States dollars 236 in 2015. However, the out of pocket is expected to dip only slightly to 60 percent from 64.4 percent over the 25 year period.

[23]The data and figures supporting the argument have been collected from World Bank Data Bank.

This study has also found out that at the regional level, South Asia's public expenditure on health at 1.6 percent (as a percentage of GDP) is the lowest in the world.World Economic Forum (2015-16) has reported education, health and infrastructure in South Asia as the weakest pillars of the region according to the Global Competitiveness Index (GCI). Therefore, investments in higher education, training and health have been recommended as vital ingredients to unlock the economic growth of the region completely.

As Bloom et.al (2011) emphasize that this can only be achieved if the countries in region focus on skills development and enhancement of education. According to them, existing skill levels in the region are thought to be far from adequate for what future economies will require. They have therefore emphasized that if the governments are to capitalize on the high share of working-age people in the population, they will have to ensure that those people are healthy, well educated, and well trained in the skills demanded by the labour market. Pursuing such an agenda fits very well with what many governments seek to do, even in the absence of a potential demographic dividend. However, the dividend, which is a time-bound opportunity, may give policymakers incentive to redouble their efforts to promote the skills of the working-age cohorts so that it has the ability to contribute productively to the economy.

In the case of India and Bangladesh, which contribute heavily in the regional GDP, in the demographic patterns and also to the macro economic growth environment of South Asia, the policy frameworks surrounding human capital development in the two countries has been evolving over the years. Therefore it is imperative to understand the impact of such human capital formation on the economic growth of the two countries.

While both the countries are poised to experience a demographic dividend with increasing inverse dependency ratios, it remains to be observed that how far the working - age human capital can contribute in the economic growth and development of the two countries. This shall be examined in some of the subsequent chapters of this research study. The analysis will not only help in understanding ways and means to generate a demographic dividend but also be useful in determining methods to capitalize such dividend in the best interest of South Asia region.

CHAPTER 4
HUMAN CAPITAL - ECONOMIC GROWTH NEXUS: A CAUSALITY ANALYSIS OF INDIA AND BANGLADESH

The last chapter examined the existing institutional frameworks as well as policies, plans and strategies on human capital development in India and Bangladesh. The focus was on examining ongoing policy and operational architecture governing the qualitative dimension of human capital, primarily, skills development and training, education and healthcare.

The role of human capital in economic growth process has been acknowledged unambiguously in theory. On the basis of our literature review, it can be stated that human capital affects growth performance of a country in different ways: as a factor input in production function, besides physical capital and labour as described by Mankiw et.al. (1992); its accumulation generates positive externalities causing higher productivity and hence leading to endogenous growth, as advocated by Lucas (1988), also ensuring greater innovation and research and development, as highlighted by Romer (1990) and creating a second order effect on growth performance by affecting physical capital investment, as emphasized by Benhabib and Spiegel (1994).

Studies have also emphasized the need of a skilled workforce as a policy advocacy measure to reduce unemployment and under-development, specifically in the context of South Asia. For instance Bloom et.al. (2011) argue that the existing skills levels in the region are far from adequate. "If the governments are to capitalize on the high share of working-age people in the population, they will have to ensure that those people are healthy, well educated, and well trained in the skills demanded by the labour market", they said.

Similarly, a Report on 'Skills Development in South Asia' (2013) has underlined the need for skills development in the region to realize a demographic dividend. This study has noted that one of biggest challenges in the region is to unlock the potential of growing young people entering the work force. While the demographic transition of South Asia in favour of increasing working age population has the potential to generate a demographic dividend, on one hand, the region is also witnessing growing

instances of youth unemployment and rising poverty levels. In this background, skills development as a driver of socio-economic development is vital.

ADB (2017) has also reiterated the importance of education and skills of labour force in promoting the rates of technological progress and innovation in South Asian economies. According to its report on Human Capital Development in South Asia: Achievements, Prospects and Policy Challenges', it could be inferred that the countries in the region are experiencing shortage of skilled workers as they are undergone early stage of economic transformation. Therefore, the region needs to keep up with the evolving skills requirement of its rapidly growing youth workforce. In other words, a trained workforce is crucial to adequately support the economies in South Asia and their transformation processes.

Yet, the literature does not clearly establish any formal relationship between skills development as a measure of human capital and economic growth, empirically. Therefore, this chapter shall examine the causal relationship between human capital and economic growth. While taking into consideration various indicators of training, education and health as proxies to human capital, it shall analytically evaluate the relationship between human capital and economic growth in India and Bangladesh for the time period - 1991 to 2015.

4.1. Causality Analysis: Framework, Methodology and Limitations

The objective of the study is to estimate the role of human capital in economic growth, in a comparative analysis of India and Bangladesh. For this purpose, the estimation methodology used, is explained below:

The empirical modeling exercise in this study is based on the endogenous growth accounting framework proposed by Lucas (1988), as the basis. In his model, Lucas reinforces the demand of 'skilled' human capital that can contribute towards increasing total factor productivity of labour and hence affecting economic growth. In other words, the model suggests positive externalities related to the accumulation of human capital viz. knowledge.

Lucas endogenous growth model (1988) has been mathematically defined as:

$$\text{Yi} = A.F(\mu hLi, Ki).H_a^{\gamma} \qquad (1)$$

where, A is the total factor productivity, Yi is the output of the i^{th} firm in a particular country, Li is the number of workers used by firm i, μ is the proportion of time that each worker devotes to production, h is the human capital or skill level of worker employed by the firm i, Ki is the physical capital used by firm i. H_a^{γ} is the average human capital in the particular economy and γ is a positive coefficient. Here, effective labor input μhLi replaces the simple labor input L, specified in the standard Solow (1956) growth model. H_a^{γ} term is the externality effect of human capital, which raises economy-wide labor productivity.

On similar lines, this research study considers the standard growth accounting model[24] with human capital augmented aggregate production function in which GDP Y_t is the dependant variable, three input factors i.e. physical capital K_t, labour L_t employed by the firm and human capital H_t.

Transforming the function (Equation 1) into an econometric model, the estimation equation becomes:

$$Y_t = A_t K_t^{\propto} L_t^{\beta} H_t^{\gamma} e_t$$

or

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma log\, H_t + e_t \qquad (2)$$

where

a = $\log A_t$ and $e_t = \log e_t$; Y= Output level or economic growth; K=Stock of physical capital; H = human capital of the worker employed in firm; L= employment; A=Level of TFP; t = time period taken into consideration which is from 1991 to 2015, e = error term.

The study uses OLS regression approach to deduce the empirical relationship between human capital and economic growth.

[24]This is the human capital augmented Cobb Douglas production function.

The primary assumptions underlining the analysis are:

a) The rates of return on investment in human capital rises rather than decline as stock of human capital increases, at least until the stock becomes large.

b) There is constant returns to scale in three reproducible stocks of factors of production (physical, labor and human) i.e. $\alpha+\beta+\gamma = 1$. In other words, the model generates perpetual growth.

c) Considering that the study uses OLS regression technique, the all the assumptions underlining it (which are linear regression model is linear in parameters, there is a random sampling of observations, the conditional mean should be zero, there is no multicollinearity (or perfect collinearity), there is homoscedasticity and no autocorrelation, error terms should be normally distributed) have also been subsumed automatically.

The literature uses proxy variables to measure the factor inputs - labour, physical and human capital which are independent variables in this study. Following Lucas (1988), Barro (1991) and Mankiw et.al. (1992), Parida and Sahoo (2007), it has been argued that although physical capital is necessary to estimate the growth accounting equations, the literature has usually used GFCF[25] as a proxy variable for physical capital due to non availability of data and difficulties in measuring this stock of capital. Moreover, physical capital needs two sets of information, namely the initial base year for the capital stock and the rate of depreciation, which are difficult to obtain. Therefore, this study has also made use of GFCF as a proxy for physical capital as it is directly observable.

Similarly, LFPR[26] has been proxied for labour factor input. Annual percentage growth rate in GDP has been used as an indicator of economic growth in the study.

Human capital in the present study is measured by both quantitative as well as qualitative indicators. Following Barro and Sala-i-Martin (1995), Schultz (1997),

[25]According to World Bank (2017) definition, gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.

[26]Labor force participation rate is the proportion of the population ages 15 and older that is economically active: all people who supply labor for the production of goods and services during a specified period.

Becker (1993), Bloom et.al.(2003), Parida and Sahoo (2007), Sharif et.al (2013), Eigbirmolen and Anaduaka (2014) and various international studies by such as those of OECD-World Bank (2013), UNDP (2015), UNDP (2018), it has been emphasized that skills development, education achievement as well as health outcomes are all contributors to improved factor productivity. Therefore, they are vital input and output indicators of human capital and its development.

The various proxies for human capital are as follows:

i. Adult literacy rate;

ii. Gross enrolment ratios - upper secondary, secondary, and tertiary;

iii. Percentage of students enrolled in vocational programmes (at upper secondary, secondary, post-secondary non tertiary levels) in comparison to the percentage of students enrolled in general programmes (at upper secondary, secondary, post secondary non tertiary levels);

iv. Teachers in secondary vocational education as a percentage of total number of teachers in secondary (vocational and general) education;

v. Mean years of schooling;

vi. Students in tertiary education enrolled in various fields of study- as defined by ILO (2009) which are ICT programmes, engineering, manufacturing and construction programmes and agriculture, forestry, fisheries and veterinaries programmes;

vii. Percentage of formal and non formal vocational training received (for the economically active age group as defined by the World Bank, of 15-29 years);

viii. Life expectancy at birth, which is the closest measurable proxy of the health component of human capital, and

ix. Financial indicators -government expenditure on education as a percentage of GDP, expenditure on education as a percentage of total government expenditure, expenditure on health as a percentage of total government expenditure, expenditure on health as a percentage of GDP and research and development expenditure as a percentage of GDP.

In this study, each component of human capital are slotted into the same model to assess their impact on economic growth. This makes it easier to see the impact of each component of human capital on growth in the presence of physical capital and labour. This kind of approach is uncommon in most of the existing literature reviewed on the subject. Therefore, equation 2 has been used in the study for estimating the impact of human capital proxies on economic growth (slotting them separately) in the presence of GFCF and LFPR.

It has also observed that the empirical analysis which has been conducted in the study is subject to certain limitations. Firstly, a restriction over the direct usage of factor inputs. Limited data availability on physical capital, labor and human capital restrict their direct use in the study. As a result, various proxies of labor, physical capital and human capital have been used for the analysis, which are relevant to growth accounting model and are directly observable.

Secondly, the usage of select indicators of human capital as proxies, for the analysis. Human capital has been measured in terms of only those indicators for which adequate data is available for the period 1991 to 2015. In other words, the proxies for human capital, used in the study to examine its impact on economic growth, have been chosen out of several input and output indicators measuring quality and quantity of human capital in terms of health, education and skills development. Some of the indicators, especially those reflecting quality, had to be omitted from this analysis on account of inconsistency and non availability of data, for the time period under consideration.

For instance, quality of health in a particular country could also be measured by the number of physicians (medical doctors) and hospital beds expressed per 10,000 people. However, data on such indicators is not available for India and Bangladesh, for most part of the period (1991 to 2015) under consideration. Similarly, quality of education has been measured by the 'number of teachers in secondary vocational education as a percentage of total number of teachers in secondary education' due to the non availability of data on other measuring parameters.

4.2. Data Sources and Hypothesis

Literature defines human capital as skills, abilities, knowledge and other cognitive and non cognitiveattributes embedded in an individual that are relevant to economic activity.These are achievable with the help of education (formal, non formal, vocational), on the job training or apprenticeships and learning by doing. It also encompasses investment in the nutritional and health status of the individual. Like physical capital, the depreciation in the human capital is quite possible over the years due to illness, age and unemployment. However, unlike technological knowledge, which is non-rival and may not be excludable depending on its nature and institutional settings, human capital is an individual specific good and its usage in one activity effectively prevents its simultaneous use in another (Romer, 2001).

Annual data has been collected by this study on all the variables indicated in the previous section, for the time period 1991-2015. The major sources are United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nation Asia - Pacific Yearbooks and database for different years. Besides, the World Tables and the World Development Reports published by the World Bank for different years have also been used. Furthermore, the Statistical Yearbooks and Labour Force Surveys of the relevant countries have also been sorted out. The data on formal and non-formal vocational training has been collected from various National Sample Survey Organisation (NSSO) survey rounds. Economic growth has been measured by annual percentage growth rates of Gross Domestic Product (GDP) at market prices in constant prices.

The hypothesis which has been tested in our analysis examining the causal relationship between human capital and economic growth is:

The qualitative dimension of human capital, indicated by skills development, vocational training, research and development as well as funding to support provision of education and healthcare services, has a positive impact on the economic growth rates of India and Bangladesh during 1991 to 2015. In other words, the empirical analysis tests whether qualitative development of human capital is vital for economic growth in India and Bangladesh.

4.3. Principal Component Analysis (PCA) and Unit Root Tests.

The variables have been tested for multicollinearity[27] and it has been found out that they are widely correlated with each other. In other words, there exists multicollinearity among the variables[28] being used for the analysis. OLS regression cannot be run on the model when there exist multicollinearity as it has a tendency to overinflate the standard errors and make some variables statistically insignificant even if their coefficients are Therefore, this problem could lead to unreliable empirical results.

PCA has been used by the study to avert the problem of multicollinearity. It helps to reduce the large set of variables into a smaller set, namely the principal components. Each principal component is a linear combination of the original variables and account for the maximum proportion of the variations in the data set. The results from the scatter plots for India and Bangladesh are presented below along with the Total Variance Explained Outputs for the two countries.

[27]The test for multicollinearity has been conducted by calculating their Variance Inflation Factors (VIF). The test results are at ANNEXURE I. VIF assesses the extent of increase in variance of an estimated regression coefficient if the predictors are correlated. In the absence of correlation, VIFs will be 1.

[28]According to the results, the VIFs of the variables are not equal or even closer to 1.

Figure 4.1: Principal Component Analysis: Scatter Plot (India)

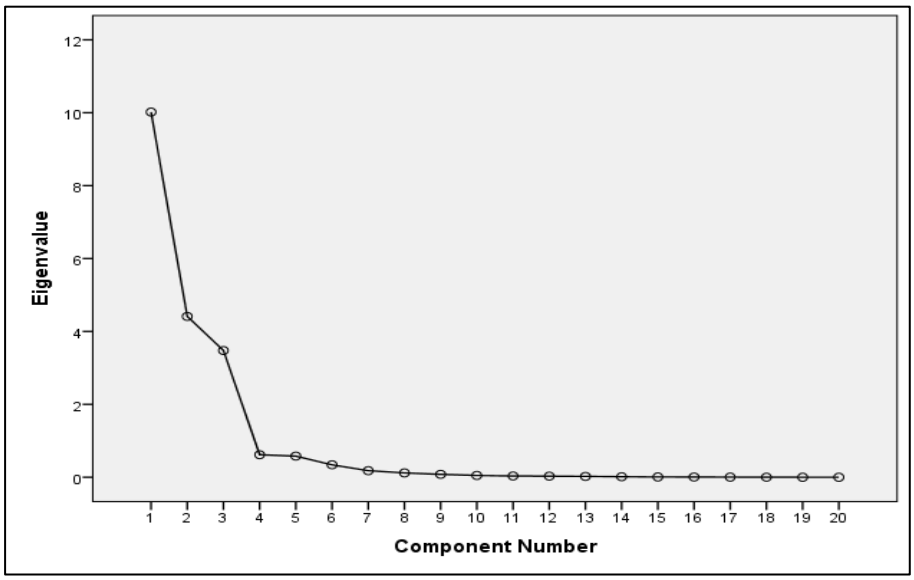


Table 4.1: Total Variance Explained Output (India)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.018	50.090	50.090	9.733	48.663	48.663
2	4.412	22.059	72.149	4.241	21.203	69.866
3	3.477	17.384	89.533	3.933	19.667	89.533
4	.618	3.089	92.622			
5	.580	2.902	95.524			
6	.341	1.706	97.229			
7	.180	.902	98.132			
8	.119	.596	98.728			
9	.081	.405	99.134			
10	.049	.246	99.379			
11	.035	.175	99.554			
12	.030	.149	99.704			
13	.024	.119	99.823			
14	.014	.071	99.894			
15	.008	.042	99.935			
16	.007	.033	99.969			
17	.005	.023	99.992			
18	.001	.005	99.997			
19	.001	.003	100.000			
20	2.061E-16	1.031E-15	100.000			

Figure 4.2: Principal Component Analysis: Scatter Plot (Bangladesh)

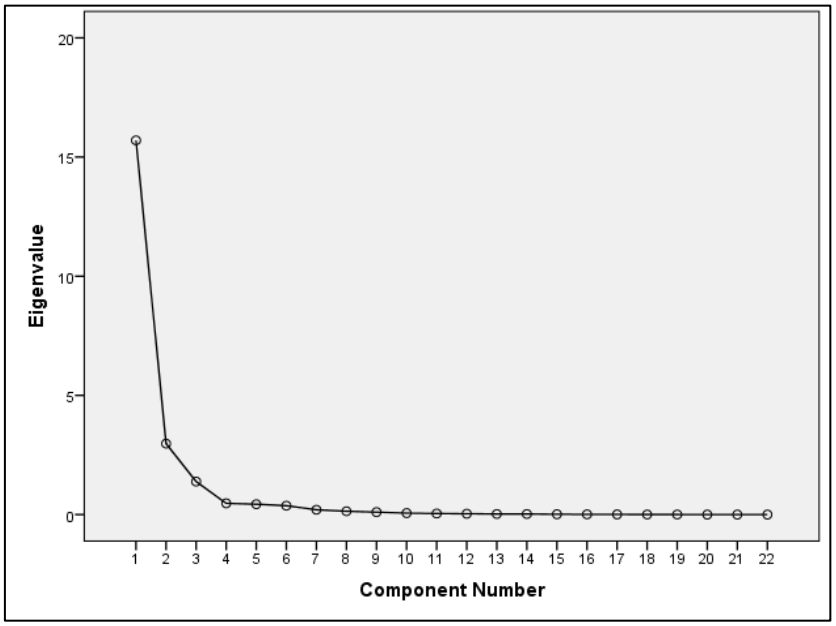


Table 4.2: Total Variance Explained Output (Bangladesh)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.698	71.356	71.356	9.725	44.205	44.205
2	2.976	13.529	84.885	6.737	30.621	74.826
3	1.383	6.286	91.171	3.596	16.346	91.171
4	.471	2.142	93.313			
5	.435	1.977	95.291			
6	.372	1.690	96.981			
7	.202	.919	97.900			
8	.139	.633	98.533			
9	.102	.462	98.995			
10	.062	.284	99.279			
11	.043	.197	99.476			
12	.034	.157	99.633			
13	.025	.112	99.745			
14	.023	.105	99.850			
15	.014	.063	99.913			
16	.008	.036	99.949			
17	.007	.030	99.979			
18	.003	.012	99.991			
19	.001	.005	99.996			
20	.001	.003	100.000			

From PCA, the study concluded that:

1. In the case of India and Bangladesh, 3 components contain 89.5 percent and 91 percent approximately of the variation in the variables, respectively. The cut - off point as reflected by the scatter plots is before the 4th component where they level off.

2. The total variance explained outputs as depicted by the Rotated Component Matrices with the highest component loadings for the two countries are:

Table 4.3: PCA Results - Rotated Component Matrix (India)

COMPONENT 1	COMPONENT 2	COMPONENT 3
▪ Percentage of non formal vocational training received (15+)	▪ ALR (percentage)	▪ Percentage of students in secondary education enrolled in general programmes
▪ Percentage of students in upper secondary education enrolled in vocational programmes	▪ MYS (years)	▪ Percentage of students in upper secondary education enrolled in general programmes
▪ Teachers in secondary vocational as a percentage of total teachers in vocational and general programmes	▪ Public expenditure on health as a percentage of total government expenditure	
▪ GER (secondary) - percentage	▪ Public expenditure on education as a percentage of total government expenditure	
▪ Percentage of students in secondary education enrolled in vocational programmes		
▪ GER (upper secondary) - percentage		
▪ GER (tertiary) - percentage		
▪ Expenditure on R&D as a percentage of GDP		
▪ Expenditure on total health as a percentage of GDP		
▪ GFCF as a percentage of GDP		
▪ Expenditure on education as a percentage of GDP		
▪ LFPR		
▪ LEB (percentage)		

Table 4.4: PCA Results - Rotated Component Matrix (Bangladesh)

COMPONENT 1	COMPONENT 2	COMPONENT 3
▪ GER (secondary) - percentage	▪ MYS (years)	▪ Percentage of students in tertiary education enrolled in agriculture programmes
▪ Percentage of students in post secondarynon tertiary education enrolled in vocational programmes	▪ ALR (percentage)	▪ Percentage of students in tertiary education enrolled in manufacturing and construction programmes
▪ GER (tertiary) - percentage	▪ Expenditure on total health as a percentage of GDP	▪ Percentage of students in tertiary education enrolled in ICT programmes
▪ Teachers in secondary vocational as a percentage of total teachers in vocational and general programmes	▪ Public expenditure on health as a percentage of total government expenditure	▪ Percentage of students in secondary education enrolled in general programmes
▪ Percentage of students in secondary education enrolled in vocational programmes	▪ Public expenditure on education as a percentage of total government expenditure	▪ Percentage of students in upper secondary education enrolled in general programmes
▪ Percentage of students in upper secondary education enrolled in vocational programmes	▪ Expenditure on education as a percentage of GDP	
▪ GER (upper secondary) - percentage		
▪ GFCF as a percentage of GDP		
▪ LFPR		
▪ LEB - (percentage)		

Finally, this study has also tested the variables for stationarity before proceeding with the regression analysis. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, which were introduced by Dickey and Fuller (1981) and Phillips-Perron (1988), have been conducted on the variables. Therefore, it is ensured that the variables are stationary as running a model with non-stationary time series could result in a spurious regression considering that the resulting coefficients and estimated p values will be biased. The inferences from the tests are presented in the table below and critical values are listed at ANNEXURE II.

Table 4.5: Unit Root Tests - Results of ADF and PP Tests for India and Bangladesh		
VARIABLES	**Augmented Dickey-Fuller test for unit root**	**Phillips-Perron test for unit root**
	Inferences	
Growth Rate (Bangladesh)	stationary at level	stationary at level
Growth Rate (India)		
Adult Literacy Rate (Bangladesh)	stationary at first difference	stationary at first difference
Adult Literacy Rate (India)		
Gross Enrolment Ratio at secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Gross Enrolment Ratio at secondary level of education (India)		
Enrolment Ratio in vocational training programmes at secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio in vocational training programmes at secondary level of education (India)		
Enrolment Ratio in general training programmes at secondary level of education (Bangladesh)	stationary at first difference*	stationary at first difference*
Enrolment Ratio in general training programmes at secondary level of education (India)	stationary at first difference*	stationary at first difference*
Enrolment Ratio of females in vocational training programmes at secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio of females in vocational training programmes at secondary level of education (India)	stationary at level	stationary at level
Enrolment Ratio of males in vocational training programmes at secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio of males in vocational training programmes at secondary level of education (India)		
Gross Enrolment Ratio at upper secondary level of education	stationary at first	stationary at first

(Bangladesh)	difference*	difference*
Gross Enrolment Ratio at upper secondary level of education (India)	stationary at first difference	stationary at first difference
Enrolment Ratio in vocational training programmes at upper secondary level of education (Bangladesh)	stationary at first difference*	stationary at first difference*
Enrolment Ratio in vocational training programmes at upper secondary level of education (India)	stationary at first difference	stationary at first difference
Enrolment Ratio in general training programmes at upper secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio in general training programmes at upper secondary level of education (India)		
Enrolment Ratio of females in vocational training programmes at upper secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio of females in vocational training programmes at upper secondary level of education (India)		
Enrolment Ratio of males in vocational training programmes at secondary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio of males in vocational training programmes at secondary level of education (India)		
Gross Enrolment Ratio at tertiary level of education (Bangladesh)	stationary at first difference*	stationary at first difference*
Gross Enrolment Ratio at tertiary level of education (India)		
Enrolment Ratio in manufacturing and construction at tertiary level of education (Bangladesh)	stationary at first difference**	stationary at first difference**
Enrolment Ratio in ICT at tertiary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio in agriculture at	stationary at first	stationary at first

tertiary level of education (Bangladesh)	difference	difference
Formal Vocational Training received (India)	stationary since the values are constant	stationary since the values are constant
Non Formal Vocational Training Received (India)	stationary at first difference	stationary at first difference
Enrolment Ratio in vocational training programmes at post secondary non tertiary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio in general training programmes at post secondary non tertiary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio of females in vocational training programmes at post secondary non tertiary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Enrolment Ratio of males in vocational training programmes at post secondary non tertiary level of education (Bangladesh)	stationary at first difference	stationary at first difference
Mean Years of Schooling (Bangladesh)	stationary at first difference	stationary at first difference
Mean Years of Schooling (India)		
Teachers Enrolment in vocational training programmes (Bangladesh)	stationary at first difference*	stationary at first difference*
Teachers Enrolment in vocational training programmes (India)	stationary at first difference	stationary at first difference
Gross Fixed Capital Formation (Bangladesh)	stationary at first difference*	stationary at first difference*
Gross Fixed Capital Formation (India)	stationary at first difference	stationary at first difference
Labor Force Participation Rate (Bangladesh)	stationary at first difference	stationary at first difference
Labor Force Participation Rate (India)		
Life Expectancy at Birth (Bangladesh)	stationary at first difference	stationary at first difference
Life Expectancy at Birth (India)	stationary at level	stationary at level

Expenditure on Education as a percentage of GDP (Bangladesh)	stationary at first difference	stationary at first difference
Expenditure on Education as a percentage of GDP (India)	stationary at first difference*	stationary at first difference*
Public Expenditure on Education as a percentage of government expenditure (Bangladesh)	stationary at first difference	stationary at first difference
Public Expenditure on Education as a percentage of government expenditure (India)	stationary at first difference*	stationary at first difference*
Expenditure on Health as a percentage of GDP (Bangladesh)	stationary at first difference*	stationary at first difference*
Expenditure on Health as a percentage of GDP (India)	stationary at first difference	stationary at first difference
Public Expenditure on Health as a percentage of government expenditure (Bangladesh)	stationary at first difference	stationary at first difference
Public Expenditure on Health as a percentage of government expenditure (India)	stationary at first difference*	stationary at first difference*
Expenditure on R&D as a percentage of GDP (India)	stationary at first difference	stationary at first difference

* stationary at 5 percent, non stationary at 1 percent; ** stationary only at 10 percent

The results from the unit root tests confirm non stationary data set for the variables at its level form except the data on dependent variable growth rate for both the countries, and independent variables - life expectancy at birth, females' enrolment ratio in vocational training programmes at secondary level of education, formal vocational training received, for India. All other independent variables are integrated of order one i.e. (I(1)).

4.4. Results of the Regression Analysis

Subsequent to PCA and unit root tests, OLS regression is run to examine the impact of human capital, indicated through its proxies, on economic growth rates of India and Bangladesh during the period from 1991 to 2015. The results of the regression are presented below:

4.4.1. Impact of Technical and Vocational Education and Training on Economic Growth

Vocational education and training aims at imparting training in specialized fields through provision of significant 'hands-on' experience in acquiring necessary skills in a specific vocation or trade, which make them employable or creates opportunities of self-employment. Various indicators of vocational education and training have been used in the study. They are - percentage of students enrolled in vocational programmes at different levels of education and percentage of formal vocational and non formal vocational training received.

In this section, the following equation has been estimated to examine the role of skilled or vocationally trained human capital on economic growth.

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma VT_t + e_t$$

Where

$VT_t$is students / graduates at different levels of education enrolled in vocational programmes in different years, used as a proxy for human capital. This factor input is embedded in base model equation (2) using physical capital (measured by GFCF) and labor (measured by LFPR).

For India, data on formal and non-formal vocational training received for the age group of 15 plus was available and has been collected from various NSSO rounds - primarily 68^{th}, 61^{th} and 60^{th} rounds of survey. NSSO (2015) has defined formal vocational training as the training that took place in educational and training institutions which followed a structured training programme and led to certificates, diplomas or degrees, recognized by state/central Government, public sector and other reputed concerns. Structured training has been further defined as the training programme which has a definite title with prescribed syllabus, curriculum and a specified duration of

the training. Moreover, it also has some entry level eligibility in terms of education and age.

4.4.1.1. Formal and Non-Formal Vocational Training:

According to the survey results of NSSO in 2015 in its 68th round, formal vocational training has barely changed over the reported years. It has remained constant at 2.4 percent for the age group between 15-29 during and post 2004-05 until the latest results were published in 2015 (in rural areas 1.6 per cent in 2011-12 compared to 1.4 per cent in 2004-05 and in urban areas, 4.3 per cent in 2011-12 compared to 4.9 per cent in 2004-05). According to Government of India (2012), some 33 percent of workers with vocational training were in the services sector, 31 percent in manufacturing, 27 percent in agriculture, and the rest in non-manufacturing and allied activities.

The most demanding and preferred fields of training[29] under 'services' were found out to be 'computer trades' followed by 'textile related trades', 'electrical and electronic engineering trades', 'driving and motor mechanic work' and 'mechanical engineering trades' in the rural areas; and 'computer trades', 'electrical and electronic' and 'mechanical engineering' in the urban areas. For the persons of ages between 15-59[30] years, about 2.2 percent received formal vocational training in 2011-12.

On the other hand, the percentage of persons which have received non-formal vocational training was comparatively higher. NSSO (2015) has classified non formal vocational training received by an individual into four categories: hereditary, self-learning, learning on the job and other. They are explained as follows:

a. *Hereditary*: The expertise in a vocation or trade is sometimes acquired by the succeeding generations from other members of the households, generally the ancestors, through gradual exposures to such works as are involved in carrying out the profession by their ancestors. The expertise gained through significant 'hands-on' experience enables the individual to take up activities in self-employment capacity or makes him employable.

[29]Field of training signifies the specific area of the training that a person has obtained in the past and tallies broadly with the specific trade. In the survey ,data in respect of 21 specific areas of trade were collected.

[30] The information in respect of formal and non formal vocational training received by persons was collected for the first time, under this age bracket.

b. *Self-learning*: The expertise in a vocation or trade when acquired by a person through his/her own effort, without any training under any person or organization.

c. *Learning on the job*: The expertise acquired by a person while in employment (current and/or past), either through informal training by the employer or organization or through the exposure to the type of job that he/she was performing.

d. Other: 'Other' sources included cases where the expertise for a vocation or trade was developed even from the household members or ancestors, provided the said vocation or trade was different from the one relating to their ancestors.

In the same age group i.e. 15-59, about 8.6 percent received non - formal vocational training during the year. Moreover, of the age group 15-29, the percentage of persons which have received non - formal vocational training has fallen from 7.7 to 7.4 percent. No data has been collected by NSSO on the front of vocational training before 2004-05 and therefore the study has assumed same figures between 1991 and 2003 as those reported for 2004-05 and onwards. The OLS regression results for formal and non formal vocational training are presented in the table below.

Table 4.6: Formal and Non Formal Vocational Training (India)

Dependent Variable: **Log GDP**	
Variables ↓/ Countries →	**Coefficients / Values**
	India
Constant	1.836
Log GFCF	2.396 (1.92)*
Log LFPR	-3.687
Log Formal	0
Log Non Formal	-2.166
R-Squared	0.196
F	1.62
S.E.	3.911

The estimation results of formal vocational training could not be deduced as the figure was constant (i.e. 2.4 percent) over the period under consideration. According to India's Eleventh Five Year Plan, this percentage is exorbitantly low compared to that of 60 to 96 percent in other industrialized countries. Moreover, the study has also observed that even among the persons who received or are receiving formal vocational training, only about 5.9 percent were employed, 58.9 percent were unemployed and 35.8 percent were not in the labour force. According to NSSO (2009-10), about a third of those trained in formal set-ups said that their training was 'not helpful'.

Considering the small percentage of people of India who have been receiving non-formal vocational training being in the age group of 15- 29 or 15 - 59 years, its effect on economic growth could not be implied accurately. The estimation results reflect that the impact of non formal vocational training on economic growth pattern is inverse as reflected in the negative coefficient and an insignificant probability value. Nearly 90 percent of the people have not received any kind of vocational training in India. This could be one of the prime reasons for a mismatch between the demand and supply of skills of the labor force as desired in the employment market.

4.4.1.2. Enrolment Ratio in Vocational Programmes at different levels of education.

The study has also examined the enrolment of students in vocational programmes at different levels of education. The study has collected the data for India and Bangladesh with respect to the percentage of students in upper secondary ($\mathbf{VT_{US}}$) and secondary levels of education ($\mathbf{VT_S}$), enrolled in vocational programmes. In the case of latter, data was also available on percentage of students in post secondary non tertiary ($\mathbf{VT_{PSNT}}$) level of education and enrolled in vocational programmes. The estimation results of all these human capital proxy variables are given in the table below.

Table 4.7: Enrolments in Vocational Programmes at different Levels of Education (in India and Bangladesh)

Dependent Variable: **Log GDP**

Variables ↓/ Countries →	Coefficients / Values				
	India		Bangladesh		
	log VT_{US}	log VT_S	log VT_{US}	log VT_S	log VT_{PSNT}
Constant	1.835	1.837	1.702	1.7	1.731
Log GFCF	2.233	2.016	-1.696	-1.582	-2.11
Log LFPR	-4.354	-4.595	0.5	0.521	0.758
Enrolment in Vocational Programmes	0.138	-0.123	0.447 (1.50)*	0.347	0.344
R-Squared	0.185	0.186	0.199	0.168	0.153
F	1.52	1.53	1.67	1.35	1.21
S.E.	0.668	0.434	0.298	0.293	0.338

*Significant at 10 percent level of significance; Figure in the parenthesis is the estimated t-value

The estimation results reflect that the coefficient of log GFCF is positive and significant[31] for India while negative and insignificant for Bangladesh. In other words, physical capital, when regressed with human capital proxies such as enrolment ratio in vocational programmes, plays a significant positive role in the economic growth in India during the period 1991 to 2015compared to that in Bangladesh. On the other hand, the coefficient of log LFPR is positive for Bangladesh and negative for India, yet insignificant for both the countries.

The coefficients of log VT_{US} is positive for both the countries and closely significant[32] for Bangladesh but not that for India. Therefore, enrolment ratio of school students in vocational programmes at upper secondary levels of education had a positive impact on economic growth in India and Bangladesh between the time period 1991 to 2015.

A similar conclusion is drawn on the basis of the regression results of enrolments ratio in vocational programmes at secondary and post secondary non tertiary levels of education in Bangladesh. The coefficients of both - log VT_S and log VT_{PSNT} are positive for the country. However, for India, the estimation results reflect that the coefficient of log VT_S is negative and insignificant. This reinforces the fact that vocational training has not been granted the much needed importance in India during the 25 year period, which it deserved, in comparison to Bangladesh. According to ADB (2017), as of 2010, only around 43 million or less than 10 percent of the labor

[31]at 10 percent level of significance
[32]at 10 percent of significance

force in India had some vocational training in 2009-2010 and only less than 2 percent of the total labor force had formal training.

Therefore, it may be inferred that skills formation through vocational training, is a vital prerequisite for growth in labour productivity and total factor productivity. This study has also made an attempt to present the skills gap index in order to measure the gap and demand and supply of skills, as suggested by subject experts during the course of the research work[33]. Following the methodology of Estevão and Tsounta (2011) the index of skills mismatch is presented with the help of the following formula:

$$\textbf{SkillsMismatchIndex} = \text{sigma } (j = 1 \ldots n)(S_{jt} - M_{jt})^2 \qquad (3)$$

Where j is the existing skill level of the population, n is the number of skill categories, S_{ij} is proportion of population with skill level j at time t and M_{ij} is proportion of employees with skill level j at time t.

Data has been collected on the percentage distribution of population and workers across different educational or skills levels. Since it[34] is readily available for various skills categories in India, the skills gap index has been calculated for the country.

Taking into consideration the data from 2011-12 round of NSSO Employment and Unemployment Survey (reflected in table 4.9 below), and using equation 3, the index representing the difference between the skill level of the population and the workers in India is estimated at 74.12 (based on table 4.9). It may be inferred from the result that the skills gap may be quite high. In other words, the difference between the skill levels of the potential labour supply and those already in employment, is sizeable.

[33]Based on interviews and interactions with regional experts on the subject from India and Bangladesh (ANNEXURE III).
[34]Data has been collated from NSSO rounds of Employment and Unemployment Surveys of 2004-05 (61st round), 2009-10 (66th round) and 2011-12 (68th round).

Table 4.8: Category Distribution across Educational Levels (India), 2011-12 (in percentage)

Category	Not literate	Up to primary*	Middle	Secondary	Higher secondary	Diploma/ certificate course	Graduate	Post Graduate	All
Workers	31.6	24.8	16.9	11.6	6.1	1.3	5.8	1.9	100
Unempl-oyed	5.4	12.5	17.4	15.3	16.2	6.1	20.5	6.6	100
Popula-tion	33.2	32	13.7	9.3	5.7	0.8	3.8	1.5	100
* combination of below primary and primary levels of education									

Source: Based on NSSO Data from employment and unemployment survey, 2011-12

The results of sector wise inter-temporal skill mismatch index are provided in table 10 below. The index has been estimated from the distribution of workers in each of the activities across various skill levels.

Table 4.9: Skills Mismatch Index Across Sectors / Activities (India) , 2004-05 to 2011-12

Activities	Manufac-turing	Electri-city	Construc-tion	Trade	Transport	Financing	Services	Total Workers
Skill Mismatch Index	50.94	72.12	20.42	53.21	20.42	46.11	46.94	88.38
Note: All workers include agriculture and mining.								

Source: Based on NSSO Data from employment and unemployment surveys, 2004-05, 2011 -12

From the estimation results, it is observed that the skill gaps in electricity generation, trade and manufacturing sectors are quite high compared to other sectors such as financing, services, construction and transport. This indicates that, with time, may be jobs in such activities are becoming more skill-based (which may have eventually led to the mismatch or the skills gap, due to the growing demand for skilled labour and shortage in supply, in such activities) compared to those in other activities such as construction and transport. Therefore, it may be inferred that skills development initiatives should be concentrated on such activities to mitigate such demand and supply skills mismatch.

This study has also observed that while the skills gaps index measures the gap between the level of skills of the unemployed viz-a-viz those already working, it is not necessary that those employed are absorbed in demand induced activities. There are several jobs which are repository of surplus labour not requiring much skill to be pursued. In those cases, those who are working are not necessarily better off compared to the unemployed or the potential labour force in terms of skill levels.

4.4.1.3. Gender-wise Enrolment Ratios in Vocational Programmes

Any discussion on human capital development is incomplete if gender parity in human capital is not examined. This study has found out that among developing regions worldwide, the gender gap is the widest in South Asia (16.3 percent as per the data released by UNDP, 2018). Gender inequalities are usually measured with the help of a Gender Inequality Index (GII), which largely captures the inequalities women face in a particular country with respect to heath, empowerment (measured as education and the labour market. The higher the GII value the greater the gender inequality. In a comparison between India and Bangladesh, the latter's GII value in 2015 was 0.547 in comparison to the former which stood at 0.534 which has further reduced over the years to 0.524 (by 2017) in India, as compared to 0.542 in Bangladesh. In other words, the inequality with respect to gender has been higher in Bangladesh as compared to India.

Specifically, one of the dimension of GII is with respect to empowerment in the field of education. In this regard, one of significant MDGs and SDGs has been to eliminate gender disparities at all levels of education. According to ADB (2017), countries in South Asia have managed to narrow gender disparities in educational access as reflected by the gender parity index[35] which is closer to 1 (i.e equal ratios for females and males) at the start of the decade 2010-2019, especially at primary and secondary levels of education.

In order to examine the gender parity in vocational training, the study has taken into consideration the data on enrolments of female and male students in vocational programmes, at various levels of education. The results of the regression are presented in the table below.

[35]According to UNESCO (2017), Gender Parity Index (GPI) has been defined as the ratio of female to male values of a given indicator.

Table 4.10: Enrolment Ratios in Vocational Programmes at different Levels of Education according to Gender (India and Bangladesh)

Dependent Variable: **Log GDP**										
	Coefficients / Values									
	India				**Bangladesh**					
Variables ↓ / Countries →	**log FVT_{US}**	**log MVT_{US}**	**log FVT_{S}**	**log MVT_{S}**	**log FVT_{US}**	**log MVT_{US}**	**log FVT_{S}**	**log MVT_{S}**	**log FVT_{PSNT}**	**log MVT_{PSNT}**
Constant	1.839	1.839	1.857	1.857	1.709	1.709	1.715	1.715	1.728	1.728
Log GFCF	2.192	2.192	1.436	1.436	-1.979	-1.979	-2.075	-2.075	-2.197	-2.197
Log LFPR	-4.47	-4.47	-4.359	-4.359	0.61	0.61	0.581	0.581	0.698	0.698
	Coefficients / Values									
	India				**Bangladesh**					
Variables ↓/ Countries →	**log FVT_{US}**	**log MVT_{US}**	**log FVT_{S}**	**log MVT_{S}**	**log FVT_{US}**	**log MVT_{US}**	**log FVT_{S}**	**log MVT_{S}**	**log FVT_{PSNT}**	**log MVT_{PSNT}**
Enrolment in Vocational Programmes according to gender	0.584	0.018	0.221	-0.379	0.322	0.121	0.321	-0.047	0.441 (1.81)*	0.072
R-Squared	0.214	0.214	0.238	0.238	0.218	0.218	0.183	0.183	0.18	0.18
F	1.3	1.3	1.49	1.49	1.33	1.33	1.07	1.07	1.05	1.05
S.E.	0.679	0.537	0.242	0.441	0.326	0.367	0.299	0.345	0.545	0.401

*Significant at 10 percent level of significance; figure in the parenthesis is estimated t-value

The estimation results reflect that the percentage of female students at secondary level enrolled in vocational programmes (FVT_S) has a positive impact on economic growth in both the countries, as compared to the enrolment of males. Therefore, the coefficients of log FVT_S are positive in India and Bangladesh, as compared to those of log MVT_S which are negative in both the countries. The coefficient of log FVT_{PSNT} is also positive in Bangladesh and closely significant[36] as compared to that of log MVT_{PSNT} which is though positive yet insignificant in the country. In other words, the female students enrolled in vocational programmes at post-secondary non tertiary level of education (FVT_{PSNT}) had a positive and significant impact on economic growth in Bangladesh during the period 1991 to 2015.

However, in India, the coefficient of log FVT_S is insignificant as the percentage of trained male population has been more than that of the female population on an average. According to ADB (2017), the proportion of males (ages 15-59 years) who were either receiving or have received any vocational training is twice as much as females during the period between 2006 and 2010.

[36]at 10 percent level of significance

4.4.1.4. Enrolment ratio in vocational viz-a-viz general programmes of education

This study has also come across several public debates concerning the comparison with respect to enrolments in vocational versus general education. For instance, in the case of Bangladesh, it has been reported in one of the studies (Newaz, et.al. 2013), that only 4 to 5 percent students took admission in the stream of vocational programmes viz-a-viz general programmes. The data drawn by this study from 1991 to 2015 for both the countries also reflects that the proportion of students enrolled in general programmes at various levels of education have been much more compared to those enrolled in vocational training programmes.

For instance, it has been observed that nearly 99 percent of the students at secondary level of education in Bangladesh, have been enrolled in general programmes compared to just 1 percent in vocational programmes in 1991. By the year 2015, this proportion was just slightly altered i.e. nearly 96 percent and 4 percent respectively. Similarly, in India, nearly 98 percent of the secondary level students were enrolled in general programmes during 1991 which further increased to almost 99 percent by the year 2015. The percentage enrolled in vocational programmes reduced from nearly 2 percent to a little over 1 percent by 2015.

However, the regression tests (as shown in the table below) reflect an interesting picture.

Table 4.11: Enrolments in Vocational and General Programmes at different Levels of Education (India and Bangladesh)

Dependent Variable: **Log GDP**										
Variables ↓/ Countries →	**Coefficients / Values**									
	India				**Bangladesh**					
	log VT_{US}	**log GT_{US}**	**log VT_{S}**	**log GT_{S}**	**log VT_{US}**	**log GT_{US}**	**log VT_{S}**	**log GT_{S}**	**log VT_{PSNT}**	**Log GT_{PSNT}**
Constant	1.875	1.875	1.845	1.845	1.704	1.704	1.701	1.701	1.715	1.715
Log GFCF	2.253	2.253	1.603	1.603	-1.773	-1.773	-1.56	-1.56	-1.789	-1.789
Log LFPR	-4.611	-4.611	-4.497	-4.497	0.507	0.507	0.621	0.621	0.675	0.675
Enrolment in Programmes	0.01	-1.358	-2.237	-201.48	0.516	1.261	0.191	-25.017	0.066	-0.112
R-Squared	0.254	0.254	0.214	0.214	0.201	0.201	0.22	0.22	0.174	0.174
F	1.62	1.62	1.3	1.3	1.2	1.2	1.34	1.34	1	1
S.E.	0.662	1.025	2.616	245.87	0.514	7.524	0.561	22.236	0.532	0.164

While they are insignificant for both the countries, the coefficients of log VT_{US} and log VT_S, as against the coefficients of $\log GT_{US}$ and $\log GT_S$ (that is, enrolment ratio of school students in general programmes at upper secondary and secondary levels of education) are positive for Bangladesh but not that for India. Moreover, the coefficient of log VT_{PSNT} is positive in comparison to the coefficient of the log GT_{PSNT} (enrolment ratio of students in general programmes at post-secondary non tertiary level of education) in Bangladesh.

In other words, vocational training at upper secondary (VT_{US}), secondary (VT_S) and post secondary levels of education (VT_{PSNT}) have a positive impact on economic growth compared to training in general programmes. Moreover, the regression results also indicate that TVET in Bangladesh has gained significant recognition and emphasis over a period of time, as a vital tool for promoting vocational training and skill development in the country.

4.4.2. Impact of Skilled Teachers' Enrolment Ratios (for Vocational Programmes) on Economic Growth

Quality of education is a very important determinant of workers' productivity and economic growth (Hanushek and Woessman 2007, 2008). In South Asia, while investment in education has led to improvements in access and reduction in the gaps in enrolment, it has not necessarily translated into better learning outcomes. ADB (2017) has reported that quality of education indicated by learning outcomes in comparison with international standards, remains poor across different levels of education and it undermines South Asia's competitiveness and economic growth.

Moreover, growing instances of drop-out rates, low levels of enrolment in school and insufficient attendance of students were reported by this study. One of the reasons behind such large scale absenteeism and drop out of students from formal education in South Asia is primarily the absence of good teaching practices since most of the teachers and trainers are untrained themselves. This has increasingly deteriorated the quality of teaching. Teachers are a critical education resource in every country. From early childhood programmes through primary and secondary school, the presence of qualified, well-motivated and supported teachers is vital for student learning and

hence development of human capital. Effective teaching strongly influences what and how much students achieve in school.

Therefore, percentage of teachers employed in offering vocational training in India and Bangladesh during 1991 to 2015 is a determining criterion for providing quality vocational training and education. The study has used the criteria of 'number of teachers in secondary vocational education as a percentage of total number of teachers in secondary (which comprises of vocation and general streams) education', for estimation purposes. This indicator has been defined by the World Bank (2017) as, "persons employed full-time or part-time in an official capacity to guide and direct the learning experience of pupils and students, irrespective of their qualifications or the delivery mechanism, i.e. face-to-face and/or at a distance. This definition excludes educational personnel who have no active teaching duties (e.g. headmasters, headmistresses or principals who do not teach) or who work occasionally or in a voluntary capacity in educational institutions".

Therefore, the OLS regression method has been applied on the following equation:

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma Teachers_t + e_t$$

where

$Teachers_t$reflect the percentage of teachers employed in full-time or part time (in an official capacity) in secondary vocational education as a percentage of total teachers employed in vocational and general programmes, in different years. These persons are employed to guide and direct the learning experience of pupils and students. Data is available for India and Bangladesh ($Teachers_{SECVT}$). The results are presented in table below.

Table 4.12: Teachers' Enrolments in Vocational Programmes at Secondary Level of Education (India and Bangladesh)

Dependent Variable: **Log GDP**		
Variables ↓/ Countries →	**Coefficients / Values**	
	India	**Bangladesh**
Constant	1.83	1.704
Log GFCF	2.285	-2.489
Log LFPR	-4.299	0.125
Log $Teachers_{SECVT}$	0.124	0.982 (2.98)*
R-Squared	0.19	0.383
F	1.57	4.14
S.E.	0.301	0.329

*Significant at 10 percent, 5 percent, 1 percent levels of significance; Figure in the parenthesis is estimated t-value

The regression results reflect that when the role of human capital (proxied by an indicator of quality of education) was examined on economic growth in the presence of physical capital and labor, physical capital (which is proxied by GFCF) had a significantly positive impact on economic growth in India and Bangladesh during period 1991 and 2015. This is reflected by the fact that the coefficients of log GFCF are positive and significant[37] for both the countries. However, the coefficient of log LFPR is positive for Bangladesh and negative for India, closely significant for the latter and insignificant for the former. In other words, the role of physical capital supersedes that of labor in the two countries during the 25 year time period.

The coefficients of log $Teachers_{SECVT}$is positive for both the countries which implies that the variable has a positive impact on the economic growth processes. Moreover, it is highly significant[38] in the case of Bangladesh but insignificant for India.

The data flow on this indicator perhaps explains the results partially. While India barely had close to 1 percent of the teachers employed for vocational programmes at the secondary level in 1991, Bangladesh was far ahead (close to 3 percent) in its allocation of teachers for vocational education. By 2015, India had barely touched a little over 2 percent in its skilled teachers' enrolment in secondary vocational education. However, Bangladesh on the other hand, had already progressed to close to 6 percent. This also reinforces the growing emphasis laid on vocational education in Bangladesh compared to India.

At the global level, quality of education (indicated under the Sustainable Development Goals of the UN) is also measured by pupil teacher ratio (PTR) which is the average number of pupils per teacher at various levels of education), primary school teachers trained to teach (which is the percentage of primary school teachers who have received the minimum organized teacher training - pre-service or in-service - required for teaching at the primary level), proportion of schools with access to the internet (which is the proportion of primary and secondary schools with access to the internet for educational purposes) and PISA score (which is the score obtained in

[37]at 10 percent level of significance
[38]at 5 percent, 1 percent and 10 percent levels of significance

testing of skills and knowledge of 15-year old students in mathematics, reading and science)[39].

In a comparison between India and Bangladesh, while the pupil teacher ratio in secondary education (on a headcount basis) was 35.2 in Bangladesh, it was 30.7 in India, in the year 2013. According to UNESCO (2015), a ratio of 30:1 is the most widely used benchmark in secondary education. Bangladesh was the only South Asian country achieving this ratio and above in the year 2012. It also met the PTR target of 40:1 in primary education during the same year. However, in the case of percentage of teachers trained to teach at the primary school level, India has fared better than Bangladesh. Between the period from 2009 to 2017, the percentage of primary school teachers trained to teach were 70 percent in India compared to 50 percent in Bangladesh (UNDP, 2018).

4.4.3. Impact of Enrolment Ratios in Education on Economic Growth

The role of human capital (measured by the rates of enrolment at different levels of education) on economic growth has been examined by the Study. World Bank (2017) has defined GER as the number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education.

Table 4.13: Gross Enrolment Ratio at Different Levels of Education (India and Bangladesh)

Dependent Variable: **Log GDP**						
Variables ↓/ Countries →	**Coefficients / Values**					
	India			**Bangladesh**		
	log GER_{US}	**log GERs**	**log GER_T**	**log GER_{US}**	**log GERs**	**log GER_T**
Constant	1.875	1.874	1.879	1.738	1.744	1.72
Log GFCF	2.244	1.8711	1.829	-2.235	-2.323	-2.178
Log LFPR	-4.618	-4.424	-4.52	0.68	0.695	0.594
School Enrolment Ratio	-1.361	-1.229	-0.634	-0.039	-0.059	0.332
R-Squared	0.254	0.218	0.219	0.11	0.113	0.143
F	2.27	1.86	1.87	0.82	0.85	1.11
S.E.	0.989	1.307	0.665	0.813	0.228	0.379

[39]Annual data on such indicators are not available for the period 1991 to 2015. As a result, they have been omitted from the regression analysis, undertaken in this study.

Schooling enrolment ratios at upper secondary level of school education (SERUS), secondary level of school education (SERS) and tertiary level of education (SERT) have been used as proxy variables for human capital.

Therefore,

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma GER_t + e_t$$

where

$GER_t$is gross enrolment ratio at upper secondary (GER_{US}), secondary (GER_S) and tertiary (GER_T) levels of education in different years, slotted in the base model equation (2) using physical capital (measured by GFCF) and labor (measured by LFPR).

The results of OLS regression analysis has been reported in the table below.

The results reveal that the coefficient of log GFCF is positive for India while negative for Bangladesh. However, for both countries, this factor is insignificant. The coefficient of log LFPR, while positive for Bangladesh and negative for India, it is also insignificant for both the countries.

The coefficients of schooling enrolment at upper secondary and secondary levels are negative and insignificant for both the countries in the sample. The reasons for such a scenario could be the low levels of enrolment in schools due to insufficient attendance rates and increasing number of dropout rates in schools, especially in rural areas of the two countries in the background of the agrarian set up of these economies. As of 2010, 30 to 50 percent of the population aged 15-64 in India and Bangladesh had some secondary education or higher, around one-third remained uneducated (ADB, 2017).

According to Annual States of Education Report Survey (2016) in India, over 25 percent of students in grades I to VIII and nearly 14 percent in the age group of 15 to 17/18 years remain absent from schools on a daily basis. The problem of absenteeism is particularly acute in the BIMARU or the less developed states of India, namely Bihar, Rajasthan, Uttar Pradesh and Madhya Pradesh, which together account for over 51 million children anda majority of India's youth population.

Though the reasons cited for higher school dropouts at secondary levels of education is primarily the 'lack of interest' among children primarily due to resource constraints in terms of money, access to the education institutions and education facilities. In Bangladesh, child labour has been reported one of the major factors for low enrolment levels in schools. Kumar and Saqib (2017) have reported the incidences of students in the age group of 7-14 years in rural areas, missing at least one day of school in a week due to their increasing participation in the labour market activities. Moreover, ADB (2017) has indicated that only 66 out of 100 students survive to the last grade of primary education.

Similarly, in India, seven in every 20 students who started school do not reach grade 10 (Sabharwal, 2013). According to ADB (2017), of the 26 million who take the grade 10 exit examinations, 10 million fail to clear them. Half of the 16 million who take the grade 12 examinations do not pass. Only 5 million of the 8 million who successfully go past grade 12 examinations go on to graduation level.

Moreover, schooling enrolment does not necessarily translate into attendance. Therefore, it cannot be cited as the most effective indicator of human capital development.

In the case of tertiary or higher education, the coefficient of enrolment at tertiary level of education is positive for Bangladesh but surprisingly negative for India, though insignificant in both the countries; reason being the lack of sufficient enrolments in higher education due to inadequate access to such education services, for instance in India. According to a report on 'Higher Education in India' (2014), access to education beyond higher secondary schooling is a mere 10 percent among university - age population due to the existence of huge disparities across gender, socio-economic religious groups and geographical regions. The report also points out to the lack of regulations in the quality of education and cost differentials, as a result of which the impoverished sections of the society are deprived of such education levels which they consider as 'privileges of the rich'.

4.4.3.1. Enrolment Ratios in Fields of Study at Tertiary Level of Education

In the case of Bangladesh, data was also available on enrolment of students / graduates in each field of education at the tertiary level, expressed as a percentage of total enrolment in tertiary education..This indicator is taken to gauge the level of development of tertiary education in terms of the range of fields offered, the capacity in each field as well as student preferences, thus reflecting both the potential demand and supply of qualified human resources in different specializations.

According to ILO (2009), the three most promising industries in Bangladesh are as follows:

a) agriculture (primarily agro processing), forestry, fisheries and veterinary,
b) engineering, construction and manufacturing (which include manufacturing of leather goods, ready - made garments, shipbuilding and bicycles, etc), and
c) ICT.

These sectors were selected by ILO and the Government of Bangladesh under the TVET Reform project of Bangladesh as they are considered to have the greatest potential for growth in terms of employment, exports, and improved protection for young workers.

The impact of these fields of study at tertiary level of education, as suitable proxies for human capital, on economic growth has been examined and the results of the estimation analysis are depicted in the table below.

Table 4.14: Enrolment in Various Fields of Study at Tertiary Level (Bangladesh)

Dependent Variable: **Log GDP**			
	Coefficients / Values		
	Bangladesh		
Variables ↓ / Countries →	**log A_T**	**log $M\&C_T$**	**log ICT_T**
Constant	1.761	1.761	1.761
Log GFCF	-3.024	-3.024	-3.024
Log LFPR	1.565	1.565	1.565
Enrolment in Various Fields of Study	0.887 (1.84)*	0.194	-0.123
R-Squared	0.254	0.218	0.219
F	2.27	1.86	1.87
S.E.	0.989	1.307	0.665

*Significant at 10 percent level of significance; Figure in the parenthesis is estimated t-value

A comparison into their significance on economic growth reflects that the coefficient of the students' enrolment in the field of agriculture at the tertiary level is not only positive but also significant compared to those enrolled in manufacturing and construction and IT. The coefficients of the latter are negative. Moreover, they are also reflected as insignificant in comparison to the agriculture sector. Therefore, the regression results also signify the dependency on agriculture in Bangladesh as the primary means of sustenance of livelihood, in the background of the agrarian set up of the economy.

4.4.4. Impact of Adult Literacy Rate on Economic Growth

Literature has stressed over the role of literacy rate as a contributing factor in the economic growth and development. One of the popular studies emphasizing the role of literacy on growth was undertaken by Azariadis and Drazen (1990). They empirically observed in a data set of 29 countries that no country with a low ratio of literacy to GDP was able to grow quickly. In other words, they showed in their study a statistically significant influence of literacy in 1960 on the per capita GDP growth for 1960-1980, using static regression analysis. They also concluded that literacy rates and per capita GDP in 1960 together accounted for 38 percent of the variation in economic performance during the 20 year period.

ALR, which is used as a proxy variable for human capital in this section has been defined by the World Bank (2017) as the percentage of population aged 15 years and over who can both read and write with understanding a short simple statement on his/her everyday life. The parameter was popularly considered a vital component in the measurement of HDI. Until the year 2010, the education or knowledge component of HDI was measured by using ALR, which was given a weightage of two-thirds, since it represented the stock variable.

Its role on economic growth of India and Bangladesh during the period from 1991-2015 has been examined with the help of regression analysis using the following equation.

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma ALR_t + e_t$$

where$ALR_t$is theAdult Literacy Rate in different years.

The estimation results are presented in the table below.

Table 4.15: Adult Literacy Rates (India and Bangladesh)

Dependent Variable: **Log GDP**		
Variables ↓ / Countries →	**Coefficients / Values**	
	India	**Bangladesh**
Constant	1.86	1.734
Log GFCF	2.514 (2.16)*	-2.287
Log LFPR	-4.142	0.658
Log ALR	-1.433	0.231
R-Squared	0.235	0.119
F	2.05	0.9
S.E.	1.236	0.504

*Significant at 10 percent, 5 percent levels of significance; Figure in the parenthesis is estimated t-value

From the regression results, it can be deduced that the coefficient of log GFCF, in the presence of ALR, is positive and significant[40] for India and negative and insignificant for Bangladesh. Therefore, physical capital has a significantly positive impact on economic growth in India during the time period under consideration - 1991 to 2015. On the contrary, the LFPR portrays a completely opposite picture. Its coefficient is positive for Bangladesh, reflecting the direct role played by labor input on economic

[40]at 0.05 and 0.10 levels of significance

growth of the country during the corresponding period. However, in the case of India, it displays an inverse relationship with respect to economic growth, experienced by the country over the years.

ALR has a positive influence on the economic growth of Bangladesh as compared to India. According to the estimation results, the coefficient of log ALR is positive and significant for Bangladesh and negative and insignificant for India. Surprisingly, while in both the countries ALR has increased over the years (i.e. in the case of Bangladesh, ALR has increased from over 35 percent to 61 percent during 1991 - 2015. In the case of India, it has increased from 48 percent to 72 percent), it has a significantly positive impact on economic growth of Bangladesh during the 25 year time period under consideration.

The reason deduced by this study is primarily the higher percentage growth in ALR over the years in Bangladesh (74 percent between 1991 and 2015) as compared to that of India (close to 50 percent between 1991 and 2015). Moreover the positive impact of physical capital on economic growth in India during the time period 1991 to 2015 has possibly offset the impact of literacy rate (reflected in the regression results) turning out to be insignificant and inversely related to economic growth.

4.4.5. Impact of Mean Years of Schooling on Economic Growth

Mean years of schooling or MYS is the average number of years of education received by people aged 25 years and older, converted from educational attainment levels using official durations of each level (World Bank, 2017). This measure was initially added by the UNDP for the measurement of HDI to cover the educational attainment in people not under the ambit of adult literacy. However, due to the ambiguities in the manner in which MYS was constructed, it was not given enough weightage in HDI's overall measurement.

Subsequently, since 2010 onwards, UNDP replaced ALR with MYS as a measure of educational attainment after undergoing significant modifications in its construction. Presently, MYS together with Expected Years of Schooling (EYS) measure the education dimension of HDI with the former having a significant weightage in the overall measurement.

Considering that it is a significant indicator of the education dimension in HDI, MYS has been taken by the study as one of the proxies of human capital to examine its impact on economic growth in India and Bangladesh during 1991 to 2015. The regression analysis has been performed on the following equation.

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma MYS_t + e_t$$

Where MYS_t is the mean years of schooling in different years.
The estimation results are presented in the table below:

Table 4.16: Mean Years of Schooling (India and Bangladesh)

Dependent Variable: **Log GDP**		
Variables ↓/ Countries →	**Coefficients / Values**	
	India	**Bangladesh**
Constant	1.847	1.736
Log GFCF	2.105 (1.83)*	-2.715
Log LFPR	-4.675	0.596
Log MYS	-0.354	0.501
R-Squared	0.188	0.135
F	1.54	1.05
S.E.	1.06	0.65

*Significant at 10 percent level of significance; Figure in the parenthesis is estimated t-value

While the role of physical capital and labor on economic growth in India and Bangladesh during 1991 to 2015 (in the presence of MYS) is same as that under ALR, the impact of human capital proxied by MYS is positive for Bangladesh and negative for India.

According to the regression results, the log MYS is positive for Bangladesh and negative for India. Therefore, MYS has a positive impact on the economic growth pattern of Bangladesh compared to that of India.

While the data collected on this parameter indicates that the progression in schooling years has been more in the case of latter (MYS has increased from 2.8 in 1991 to 5.2 in 2015 in Bangladesh) compared to that of former (MYS has progressed from 2.8 to 6.2 during the same period in India), its impact on India's economic growth is inverse in comparison to Bangladesh.

According to UNDP (2015), between 1980 and 2014, India's MYS increased by 3.5 years and EYS increased by 5.3 years. On the other hand, Bangladesh's MYS increased by 3.1 years and its EYS increased by 5.1 years during the same period. This is one of the reasons of India's HDI ranking being slightly better than that of Bangladesh in South Asia over the years, as reflected in Chapter 3.

4.4.6. Impact of Life Expectancy at Birth on Economic Growth

Long and healthy lives are considered as universally acceptable measure of societal well being, measured through relevant indices on quality of life such as the United Nations' HDI. Among the three dimensions of human development, the health component is measured by LEB. World Bank (2017) has defined LEB as the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

As a result, it has been used as a proxy to measure the health aspect of human capital by this study. The following equation has been used for the purpose of estimation:

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma LEB_t + e_t$$

where $LEB_t$is the Life Expectancy at Birth (LEB) in different years.

The results of the regression analysis are presented in the table below.

Table 4.17: Life Expectancy at Birth (India and Bangladesh)

Dependent Variable: **Log GDP**		
Variables ↓/ Countries →	**Coefficients / Values**	
	India	**Bangladesh**
Constant	2.207	1.839
Log GFCF	-3.477	-0.713
Log LFPR	-4.24	0.682
Log LEB	0.0314	-16.243 (-2.18)*
R-Squared	0.261	0.281
F	2.37	2.61
S.E.	0.0215	7.437

*Significant at 10 percent, 5 percent levels of significance; Figure in the parenthesis is estimated t-value

The results reflect that LEB shares an inverse relationship with respect to the economic growth pattern. Its coefficient is negative for both the countries during the period 1991 to 2015. While significant for Bangladesh, which can be accorded to its improving performance over the years (as shown in the original data collected by this study for the period under consideration), it is inversely related to growth. This could be a vital inference for policy advocacy by the governments and evaluation of the health dimension used to measure human development.

The performance of physical capital has also been in line with LEB that is the coefficient of log GFCF is negative for both the countries. Only labor input (as measured by LFPR) is positively related to economic growth in India and Bangladesh, in the presence of health-related human capital.

Quality of health in a particular country could also be measured by the number of physicians (medical doctors) and hospital beds expressed per 10,000 people. These are significant input indicators to assess the quality of health in any particular country[41]. According to UNDP (2018), between 2007 and 2017, number of physicians was a meager 4.7 in Bangladesh and 7.6 in India per 10,000 people. Also, number of hospital beds was 6 and 7 per 10,000 people in the two countries respectively, for the period 2007 - 2014.

Another useful indicator to measure the quality of well being and standard of living in a particular country is 'Lost Health Expectancy' which is defined by UNDP (2018) as the relative difference between the life expectancy and healthy life expectancy as a percentage of LEB[42]. UNDP (2018) has reported lost health expectancy in India and Bangladesh at 13.9 percent and 12.9 percent, respectively, in 2016. They have been ranked among some of the low performing nations globally, with respect to good health and well being.

[41]Annual data on such indicators are not available for the period 1991 to 2015. As a result, they have been omitted from the regression analysis, undertaken in this study.
[42]Annual data on life expectancy and healthy life expectancy is not available for the period 1991 to 2015. As a result, Lost Health Expectancy could not be calculated by the study.

4.4.7. Impact of Financial Support (on rendering education and health services and research and development) on Economic Growth

Provision of quality vocational training, education and health services is primarily dependent on the funding pattern i.e. the nature and source of funds to support such services. Therefore, the overall expenditure on such services by the national governments and other entities play an equally important role in growth process of any particular country. Several studies with the earlier being that of Romer in 1989, have considered various sources of funding as proxy variables of human capital impacting growth.

For instance, Romeret. al. (1989) ran a regression of average rate of growth on the level of income, investment, government expenditure and human capital. Ghatak and Jha (2007) in their cointegration analysis of the impact of human capital on economic growth in India between 1960 and 2004, use public expenditure to education as a share of total public expenditure as a proxy for human capital formation. Pradhan (2009) uses public expenditure on education as a proxy of human capital to study the causal relationship between education and economic growth in India. Johnson (2011) evaluates the role of human capital development and economic growth in Nigeria using government expenditures on education and health as proxies for human capital, besides others. Similarly, Islam (2014) in his empirical analysis of the impact of education on economic growth concluded of a uni-directional causality between expenditure on education and the GDP of Bangladesh.

Therefore, this study uses the following financial indicators as proxies for human capital. Their compositions as defined by World Bank (2017) are also given below:

a) Government expenditure on education as a percentage of GDP (Exp_E): This indicator includes total general (local, regional and central) government expenditure on education (current, capital, and transfers), expressed as a percentage of GDP. It also includes expenditure funded by transfers from international sources to government.
b) Expenditure on education ($PubExp_E$) as a percentage of total government expenditure (all sectors): which includes total general (local, regional and central) government expenditure on education (current, capital, and transfers), expressed as a percentage of total general government expenditure on all

sectors (including health, education, social services, etc.). It also includes expenditure funded by transfers from international sources to government.

c) Expenditure on health ($PubExp_H$) as a percentage of total government expenditure (all sectors): Total general (local, regional and central) government expenditure on health (current, capital, and transfers), expressed as a percentage of total general government expenditure on all sectors (including health, education, social services, etc.). It includes expenditure funded by transfers from international sources to government.

d) Expenditure on health as a percentage of GDP (Exp_H): Total health expenditure expressed as a percentage of GDP.

e) R&D expenditure as a percentage of GDP ($Exp_{R\&D}$): Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.

These variables are slotted in the base model using GFCF and LFPR.

The following equation has been used for estimation purposes:

$$\log Y_t = a + \alpha \log K_t + \beta log L_t + \gamma Financial\ Resources_t + e_t$$

Where $Financial\ Resources_t$include expenditure on education, health and research and development spent in India and Bangladesh, in various years.

Their impact on economic growth are presented through the results of the regression analysis, in the table below

Table 4.18: Spending Levels on Education, Health and R&D (India and Bangladesh)

Dependent Variable: **Log GDP**									
	Coefficients / Values								
	India					**Bangladesh**			
Variables ↓/ Countries →	**log Exp_E**	**log Exp_H**	**log $PubExp_E$**	**log $PubExp_H$**	**log $Exp_{R\&D}$**	**log Exp_E**	**log Exp_H**	**log $PubExp_E$**	**log $PubExp_H$**
Constant	1.899	1.899	1.899	1.899	1.899	1.731	1.731	1.731	1.731
Log GFCF	0.875	0.875	0.875	0.875	0.875	-2.837	-2.837	-2.837	-2.837
Log LFPR	-2.369	-2.369	-2.369	-2.369	-2.369	0.786	0.786	0.786	0.786
Financial resources / expenditure patterns	0.437	-5.132 (-3.27)*	-0.457	3.619 (3.24)**	2.712	0.797	0.656	0.098	-0.896 (-2.21)***
R-Squared	0.657	0.657	0.657	0.657	0.657	0.37	0.37	0.37	0.37
F	4.39	4.39	4.39	4.39	4.39	1.67	1.67	1.67	1.67
S.E.	1.366	1.57	1.076	1.116	1.781	0.955	0.587	0.543	0.406

*Significant at 10 percent, 5 percent, 1 percent levels of significance; **Significant at 10 percent, 5 percent, 1 percent levels of significance; ***Significant at 10 percent, 5 percent levels of significance; Figure in the parenthesis is estimated t-value

It may be inferred that physical capital is positively related to the economic growth pattern of India between 1991 and 2015 (when the financial indicators are taken as proxy variables for human capital), as compared to Bangladesh. On the other hand, labor input (measured as LFPR) has performed in an opposite direction. The coefficients of log LFPR is positive for Bangladesh and negative for India. These variables are insignificant in this case for both, India and Bangladesh.

The total expenditure patterns on education and health as a percentage of GDP have not seen any significant improvement over the years. They are positively related with the economic growth pattern of Bangladesh. Therefore the coefficients of log $Expenditure_E$ and log $Expenditure_H$ are positive, yet insignificant in Bangladesh. They are inversely related in India. While the coefficient of log $Expenditure_E$ is positive and insignificant, that of log $Expenditure_H$ is negative and significant. These results indicate that the national expenditure patterns on education and health do carry considerable weightage in the economic growth and development process of the country. Efforts should, therefore, be driven towards increasing the percentage spent on provision of education and health services in the two countries.

On the public expenditure front, estimation results of this study indicate that the coefficients of log $PubExp_E$ and log $PubExp_H$ differ in their impact on economic growth. While public expenditure on health as a percentage of government expenditure is positively related to the economic growth of India, in the case of

Bangladesh, it is negatively correlated with respect to its economic growth. However, in both the countries, it is a significant contributory factor to the economic growth process. Therefore the coefficient of log $PubExp_H$ is positive for India and negative for Bangladesh, significant for both the countries.

On the other hand, public expenditure on education as a percentage of total government expenditure shares an inverse relationship with economic growth in India and a direct positive relationship in Bangladesh. Therefore the coefficient of log $PubExp_E$ is negative for India and positive for Bangladesh, insignificant for both the countries.

In the case of India, data was also available for the expenditure on research and development undertaken as a percentage of GDP, over the years. Dating back to Romer (1986, 1990), he added 'knowledge' as the endogenous factor to the neoclassical growth production function. Griffith (2000) further showed using econometric evidence that research and development expenditure plays a role in assimilating the research discoveries of others as well as also plays the conventional role as a source of innovation.

Therefore, it may be inferred that R&D plays an equally important role in defining the nature of economic growth pattern of a country. This is also reinforced by the regression result. It indicates that the coefficient of $\log \text{Expenditure}_{R\&D}$ as a proxy for human capital is positive and a contributory factor to the economic growth process of India. Data on R&D spending for Bangladesh was not available. Also, for India, the expenditure spent on R&D has not improved over the years and remained close to 1 percent of the total GDP (from 0.63 percent in 1991 to 0.83 percent in 2015). As a result, the regression result reflects the insignificance of the variable for economic growth.

4.4.8. Impact of Human Capital Embodied Labour on Economic Growth

Human capital embodied labor or in other words the labor force that has undergone some form of training performs better in terms of productivity and output, than untrained labor. Abbas (2002) in his study on 'Growth and Human capital in Pakistan and Sri Lanka', combined the schooling enrolment ratio with the proxy used to measure labor input to generate effective labor input.

Taking cue from Abbas (2002)'s work, this study has also created an effective labor input (ELI) by combining the proxy variable used to measure labor input with various human capital indicators measuring vocational training, to estimate potential growth in output.

So aggregate production function of (1) has been modified to incorporate the ELI component and written in the following form:

$$Y_t = A_t K_t^{\propto} (L_t H_t)^{\beta} e_t \quad (3)$$

Taking log of (3),

$$\log Y_t = a + \alpha \log K_t + \beta (logL_t + log\, H_t) + e_t \quad (4)$$

where labour input (proxied as LFPR) and human capital has been proxied with percentage of formal (F_{VT}) and non-formal vocational training received (NF_{VT}), percentage of students in secondary education enrolled in vocational programmes (VT_S) in the case of India and percentage of students in secondary education enrolled in vocational programmes (VT_S), percentage of students in post secondary non tertiary enrolled in vocational programmes (VT_{PSNT}) in the case of Bangladesh.

Therefore equation (4) been estimated for both the countries - India and Bangladesh for the time period 1991 to 2015. The regression results are presented in the table below.

Table 4.19: Effective Labour Input at Different Levels of Vocational Training (India and Bangladesh)

Dependent Variable: **Log GDP**					
	Coefficients / Values				
	India			**Bangladesh**	
Variables ↓/ Countries →	**Log VT_S**	**Log F_{VT}**	**Log NF_{VT}**	**Log VT_S**	**Log VT_{PSNT}**
Constant	1.837	1.837	1.836	1.7	-6.575
Log GFCF	2.016 (1.68)****	2.117 (1.88)***	2.396 (1.92)**	-1.582	-1.339
Log LFPR	-4.471	-4.444	-1.52	0.173	-1.105
Effective Labour Input	-0.123	0	-2.166	0.347	0.976 (3.60)*
R-Squared	0.186	0.183	0.196	0.168	0.459
F	1.53	2.36	1.62	1.35	5.68
S.E.	0.434	omitted	3.911	0.293	0.271

*Significant at 10 percent, 5 percent, 1 percent levels of significance; **Significant at 10 percent level of significance; ***Significant at 10 percent level of significance; ****Significant at 10 percent level of significance; Figures in the parenthesis is estimated t-value

The regression results indicate that the coefficients of log GFCF is positive and significant for India in the presence of ELI (using F_{VT}, NF_{VT} and VT_S respectively). On the other hand, they are negative and insignificant for Bangladesh at VT_S and VT_{PSNT}. In other words, physical capital has a significantly positive impact on economic growth in India during 1991 to 2015, when ELI is taken into consideration, in comparison to Bangladesh where it has been inversely related. On the contrary, the coefficients of labour inputs proxied for LFPR are negative for all ELIs except at VT_S in the case of Bangladesh.

The coefficient of log ELI is positive for Bangladesh and negative for India, implying a direct positive impact on economic growth in the former country as compared to the latter. Moreover, it is also significant at the level of VT_{PSNT} in the case of Bangladesh. This is a useful result as far as vocational training at post secondary non tertiary level is concerned. It reinforces the fact that skilled labour input does contribute significantly to the economic growth and development process of a country by enhancing productivity. The only caveat being that the nature of training offered to individuals should be according to their age, education levels, interests and understanding.

In a nutshell, it can be inferred that by applying this measure of human capital for India and Bangladesh, not only are there important growth effects associated with human capital but also this measure out-performs some of the proxies of human capital which have been used in the literature traditionally, most popular being gross enrolment ratio at various levels of schooling.

4.5. Conclusion

In this chapter, an attempt was made to determine empirically the role of human capital in economic growth, a comparative analysis of two developing countries. The neoclassical growth theory suggests that growth would be negatively related to initial stock of capital. Thus, a convergence of the growth paths of countries was witnessed. In the recent past, economists have come with a different analysis of the growth process, where growth is an endogenous process brought by human capital accumulation.

Globally, many studies have tried to examine the impact of human capital on economic growth using different proxies of human capital. However, they suffer from drawbacks since they do not take into consideration the holistic picture of human capital accumulation which also involves a big aspect of skills development and vocational training. Moreover, proxies used for human capital in most of the studies are varying and limited ignoring one dimension or the other. As a result their policy significance might be limited.

This study has tried to examine the impact of human capital on patterns of economic growth in India and Bangladesh for the period 1991-2015. The results of empirical analysis i.e., growth accounting with human capital as a factor of production, show that human capital represented by enrolments in vocational programmes do play a positive impact on economic growth, at various levels of education.

Moreover, this study has also combined various proxies of training and skills related human capital with labor in order to create effective labor input. Human capital embodied labor performs better as compared to simple schooling enrolment ratio. So by applying this measure for human capital, this study finds that there are not only important growth effects associated with human capital, but also this measure out-performs the simple traditional measures of human capital used in the literature.

Therefore, overall, empirical evidence of the study supports the idea that human capital plays a crucial role in the growth of the economies for developing countries especially for these two countries. Moreover, treating human capital as a factor of production implies that in the growth accounting regressions, human capital affects the growth of gross domestic product for the selected countries.

Following the empirical analysis and extensive interactions with regional experts on the subject from India and Bangladesh, an attempt has been made to highlight the nature of challenges governing the policy frameworks on skills development and training in India and Bangladesh, in the next chapter. This study has observed that such challenges hinder the smooth functioning of institutional frameworks on skills development and technical and vocational education and trainingin India and Bangladesh. Moreover, they also obstruct the implementation of development friendly policies in the region. Finally, the study would deduce a set of recommendations which could serve as the backing support for formulating a structured policy

framework governing skills development and vocational training in India and Bangladesh.

CHAPTER 5
HUMAN CAPITAL DEVELOPMENT IN INDIA AND BANGLADESH: CHALLENGES IN EXISTING POLICY FRAMEWORKS

Human capital is an important factor of economic growth in South Asian economies along with physical capital and technology. According to Lee, et.al. (2017), the estimates of growth accounting between 1981 and 2010 suggest that human capital contributed directly as a productive input of about 22 percent of annual gross domestic product per worker growth in India and 21 percent in Bangladesh during the same period. In the last chapter, an attempt was made to empirically examine the role of human capital in the economic growth process of India and Bangladesh between the period from 1991 to 2015.

While the overall empirical evidence of the study supports the idea of human capital playing a crucial role in the growth of both economies, Bangladesh's efforts in putting together a structured VET platform since 1991 in the country are noticeable compared to the initiatives undertaken by India on the skills development front between 1991-2015. This could be deduced from the fact that the impact of vocational training at various levels of education on economic growth was empirically tested as positive and significant for Bangladesh in comparison to that of India.

At the same time, Bangladesh's reliance on vocational education and training has not been quite satisfactory in comparison to other emerging countries of the world, considering that the share of country's population enrolled with formal TVET qualifications is relatively small. Moreover, in India the share of South Asian country's TVET mechanism at formal education levels has been quite insignificant, as reflected through the regression results.

Education and skills of the labor force play a vital role in promoting the technological progress and innovation in an economy when it moves up the value chain transitioning from simple to sophisticated high value products. While estimating the impact of enrollment rates at various education levels and the quality of training being offered in the two countries, this study could infer that substantial school disparities in access, participation and completion of studies across gender have been prevailing

during the 25 year period under consideration. Moreover, the enrollment of teachers in offering vocational training to the youth has not been quite satisfactory especially in India as implied by the results of the regression analysis.

Likewise, the national financial architecture supporting human capital development in India and Bangladesh, respectively, has not been up to the mark. The national expenditures spent on education, health and research and development, while inferred to have a positive impact on economic growth (as reflected through the results of regression analysis), have been an insignificant proportion of the total expenditure and budget allocation by governments of both the countries respectively during 1991 to 2015. This has been largely due to the fact that these countries have been allocating quite small percentage of the national budget on education and healthcare with no separate budgetary allocation for skills development and training in the two countries.

As a result of such factors, education and skills remain the binding constraint. This study has made an attempt to examine the weaknessesunderlining skills development and TVET frameworks practiced in India and Bangladesh during 1991 - 2015. Various benchmarks have been listed out in this chapter to evaluate the VET systems of the two countries and for South Asia region as a whole. The parameters help addresses the following questions:

a) Do the ongoing systems on skills development and TVET meet socio-economic requirements of India and Bangladesh?

b) To what extent do the VET systems achieve the objectives of quality and efficiency in training delivery, management and administration?

c) How well do the VET systems mobilize resources and use them economically?

The chapter also drawsuseful lessons from the models on skills development practiced in some of the emerging and developed countries globally.

5.1. Economic Relevance

To what extent does the VET system of India and Bangladesh meet labor market requirements?

Indications of Weak Economic Relevance

5.1.1. Mismatches between Demand and Supply of Skills

One of the major issues governing the present framework of vocational training and skills development in India and Bangladesh is the mismatch between level of skills that employers require and the supply of employable skills in the labor market. This is primarily due to the lack of effective education especially at tertiary levels and vocational training programmes; due to outdated course structure, insufficient infrastructure to meet the challenges of growing demand and changing skills requirements as well as weak involvement of industry in the TVET processes.

For instance, in India, ITIs which are considered the key source of skills training are inadequate in number and have limited capacity to absorb the growing number of graduates. The dismal state of training capacities is reflected in the table below.

Table 5.1: Number of ITIs with Total Seating Capacity (in 2015-16)

Region	No. of Govt. ITIs	Seating Capacity (Government)	No. of private ITIs	Seating capacity (private)	Total ITIs	Total seating capacity at ITIs
North India	818	134530	4311	545695	5129	680225
South India	438	101100	3084	354486	3522	455586
East India	211	61066	1726	275257	1937	336323
West India	826	208922	1691	184564	2517	393486
Grand Total	**2293**	**505618**	**10812**	**1360002**	**13105**	**1865620**

Source: Labour Bureau, Ministry of Labour and Employment (2016-17)

Table 5.2: Enrolment in Higher Education in India (in 2015-16)

Level	Enrolment in University Teaching Departments	Enrolment in Colleges	Total	% Share
Graduate	1345639	23247682	24593321	86.33
Post Graduate	49725	2085643	2764886	9.71
Research (M.Phil / PhD)	180017	37619	217636	0.77
Diploma	117976	437137	555113	1.95
Certificate	13358	47950	61308	0.22
Integrated	89297	70750	160047	0.56
Grand Total	**1796012**	**25926781**	**28352311**	**100**

Source: University Grants Commission (Annual Report 2015-16)

It can be observed from the table above thatas against the enrolment of 28.35 million students in higher education, the skill training capacities in ITIs are a mere 1.86 million.

The lack of inadequate training capacities has also been reported by some studies, as the reason for inherent skills mismatch in the two countries. For instance, according to FICCI (2015), the number of people who enter the work force age group every year is estimated to be 26 million. With average labour participation rate of 90 percent for male and 30 percent for female, at least 16.16 million will enter the workforce and would need to acquire skills. However, the skilling capacity, including training for the farm sector, in India is estimated at only 7 million. According to India Labour Report (2012), it was estimated that 12.8 million new persons joined the labour market annually vis-à-vis the then current capacity of the skill development being 3.1 million. Therefore, as emphasized by Okada (2012), India's TVET system needs to be adequately prepared to equip the young workforce with skills that industries require to meet today's changing skill requirements.

In Bangladesh, while the problem of insufficient training capacities has not been encountered, but the lack of adequate provision of education services and several geographical disparities in the provision of training have been observed by this study.

Toufique (2014) shows that as many as 62 percent of young workers may not be appropriately educated for the work they do in Bangladesh. The undereducated are concentrated in agriculture, fishery, crafting and trading activities. This suggests the lack of education among the youth, despite the tremendous progress that has been made in primary and secondary school enrollment rates in recent decades.

The state of education in the country has also been spelt out by BBS. According to BBS (2015), a little over one-fifth of the labor force has no formal education whatsoever, with a similar rate for men and women. Over a quarter of the workforce has received only some years of primary education, while around 30 percent has made it to secondary school. The remaining 20 percent has attended upper secondary school or above, with just over 6 percent having received tertiary education. In comparison, 26 percent of general population of Bangladesh has received no education while a further 30 percent has only some primary education.

While the labour force as a whole is somewhat better educated in comparison to the general population, rates of unemployment continue to surge among the youth. According to ADB (2016), unemployment rates are actually higher among people with higher levels of education, especially among the youth. While that might, in part, suggest that the particular education they have received does not match the demands of the current job market; questions asked in the School-to-Work Transition Survey[43]suggest a more complex situation. Among the unemployed youth, 62 percent cited lack of education as the main obstacle to employment, while only a tiny proportion cited lack of available jobs. Another 16 percent mentioned lack of training. Together, these facts suggest that neither the volume nor the nature of education and training are adequate to the demands of the job market.

[43]The SWTS is a unique survey instrument that generates relevant labour market information on young people aged 15 to 29 years, including longitudinal information on transitions within the labour market. The SWTS thus serves as a unique tool for demonstrating the increasingly tentative and indirect paths to decent and productive employment that today's young men and women are facing.

In addition, the problem of lack of basic education in the districts of Bangladesh has also been a concern. According to World Bank (2013), only 25 percent of grade5 students master Bangla, and only 33 percent master mathematics competencies. At the grade 8 level, competencies in Bangla, English, and mathematics were 44 percent, 44 percent, and 35 percent, respectively. Moreover, there are substantial regional differences in educational performance. Students in Dhaka and Chittagong do better than the national average, but those in Rajshahi and Sylhetlag lag behind.

Moreover, significant regional variation in the provision and in the demand for training of such districts has also been reported, as reflected in the table below.

Table 5.3: Labor Force Receiving and Wanting Training (%)

Region	Percentage of those who have received training	Percentage of those wanting training of some type
Barisal	8.0	22.0
Chittagong	8.4	22.6
Dhaka	9.9	18.5
Khulna	6.9	21.0
Rajshahi	7.2	14.2
Rangpur	5.8	30.0
Sylhet	7.9	17.3

Source: Bangladesh Bureau of Statistics (2015)

For instance, in Rangpur district of Bangladesh, 30 percent of the population has demanded some form of training. However, only 6 percent receive. Such mismatches between the demand and supply of training could be witnessed in most of the districts.

More generally, those in rural areas receive much less training. According to BBS (2015), in the general population, the proportion receiving training in urban areas was more than two and a half times higher than in rural areas. While it is not immediately obvious how much of this gap comes from the demand for training as opposed to the supply, it is certainly the case that in general urban areas have more training facilities than rural areas. The greater population density in urban areas also means that, on

average, workers will be closer to training facilities, making it cheaper and more convenient for them to obtain training.

Substantial gaps have also existed between the areas of training being received and the areas of training desired. For instance, BBS (2015) has reported computer training is the most desired area of study as it is most commonly received with 42 percent of labor force being trained in the last one year of 2015 as against 30.8 percent desirous of such training. Therefore, the proportion desiring such training is lower than the proportion receiving it, suggesting that the training situation for computing skills may be reasonably adequate. By contrast, the proportion of workers wanting training in agriculture was substantially greater at over 15 percent in 2015 compared to proportion of the workforce receiving such training (nearly 10.9 percent).

Statistical evidence, although limited, also indicates that the skills imparted by much of the TVET system are not those that the job market requires in Bangladesh. In one tracer study conducted by the World Bank (2010), 47 percent of graduates from formal TVET programs reported being unemployed when surveyed at least 2 years after their graduation. Most of the remainder was continuing their education, so that very few were actually employed. This could imply that TVET is not providing skills in demand, whether because of the quality of the education or the nature of the skills imparted.

Even in the informal sector, the lack of basic education and skills impedes expansion and movement up the production chain. For example, the domestic bicycle market in Bangladesh is largely served by very small shops providing relatively low-quality products. Typically, the workers have no formal training and are often illiterate. There will be at least one more skilled worker, who will pass on knowledge of basic production processes to other workers. While such traditional, small-scale production provides a substantial volume of employment, it cannot easily adapt to new technologies or move up to manufacturing the higher-quality parts needed for the international market.

Similarly in the ship building industry of Bangladesh which is a part of the formal sector, many technical management positions are filled by foreign nationals or by citizens of Bangladesh who have pursued their education outside the country.

According to ADB (2011) skills gaps create one of the major impediments in this industry, as a result.

The pharmaceutical industry has the highest demand for managerial skills. However, the supply of skilled labor force could not be matched against the demand; which is why, though Bangladesh is self sufficient in this sector, its success as a major exporter of pharmaceutical products has been more limited (ADB, 2011).

The mismatch in both the countries underlines the grappling issue of little industry involvement in the entire skills development and TVET process.

For instance, Sharma and Nagendra (2016) have emphasized the need for employer's buy-in as one of the pertinent requirements for skills development in India. Their analysis is based on various predictions pertaining to estimated shortfall of sector specific skilled workforce in India by the year 2022 (reflected in the table below).

Table 5.4: Skills Gap: Expected Shortfall in Industries in 2022 (India)

Sectors	**Shortfall of Workforce (in million)**
Infrastructure	103
Auto and Auto Components	35
Building and Construction	33
Textile and Clothing	26.2
Transport and Logistics	17.7
Organized Retail	17.3
Real Estate Services	14
Healthcare	12.7
Food Processing	9.3
Education and Skills Development Services	5.8

Source: Sharma and Nagendra (2016)

The highest shortage has been estimated for the infrastructure sector. According to them, there is a lack of industry - faculty interactions, as a result of which the skills

set of candidates doesn't match the requirements of employers. Therefore, though the people may be skilled but they may not be employable.

The lack of employer involvement also leads to slow and inadequate response to changes in the labor market. According to ADB (2015), with no systematic feedback concerning industry requirements and no tracer studies of graduates, there is little scope for such responsiveness. The training institutions usually do not carry out analysis for skills in demand locally. Therefore, the formal TVET process reaches a limited portion of the labor force.

Moreover, while the curricula are centrally developed in both the countries, there is limited capacity to provide regulation, monitoring and inspection for accredited institutions to see that they are following the curriculums in any meaningful way. According to BTEB (2015) of the nearly 3,000 accredited private institutions in Bangladesh, visited 146 for inspection and monitoring purposes.

Therefore, it becomes extremely involve to involve industry in skills development and TVET process which should ideally take at least the following five forms:

- assisting curriculum design for industry- or occupation-specific programs;
- offering internships, so that all TVET institutions offer practical training;
- training conducted by their own employed staff members at courses offered by vocational secondary schools; and
- effective assessments of the training offered.

5.1.2. Low Employment Rates: Limited industry - academia - government engagements, low quality of education especially at higher levels of education and the lack of responsiveness of the education institutions to meet the changing skills demand of the job market, have led to growing instances of unemployment among the youth and adult population in the South Asia region. According to ADB (2013), a large proportion of the number of youth globally who are not in education, training, or employment are in South Asia.

In Bangladesh, youth unemployment has increased rapidly over the years while the overall unemployment rate remained stable. According to World Bank (2014), the total youth unemployment has risen 8.2 percent in 1991 to 9.1 percent in 2014. In the year 2014, Bangladesh was ranked 163rd in the overall world youth unemployment ranking[44].

There has been a massive increase in youth unemployment in just five years between 2010 and 2010. According to Mamun and Afrooz (2017), youth unemployment in Bangladesh rose to 9.5 percent in 2015 from 7.4 percent in 2010, as shown in the tablebelow.

Table 5.5: Youth Unemployment Rate in Bangladesh by Age Group Gender-wise (as a % of labour force)

Age Groups	Gender	2010	2013	2015 (July-September)
15 -19	**Female**	11.4	9.8	19.5
	Male	10.2	10.4	11.5
	Total	10.6	10.2	13.9
20 - 24	**Female**	7.7	9.1	14
	Male	6.8	9	9.2
	Total	7.1	9	10.9
25 - 29	**Female**	7.3	10.4	9
	Male	4.3	4.1	4.5
	Total	5.4	6.3	6
Grand Total		7.4	8.1	9.5

Source: Labor Force Surveys, 2010-15, Bangladesh Bureau of Statistics (BBS)

Gender-wise, unemployment rate among the female youth was disproportionately higher compared to their male counterparts during this period. As of 2015, nearly one in every ten youth participant of the labor force in Bangladesh remained unemployed, which was more than twice the national overall unemployment rate.

With respect to the level of education, this study has observed that unemployment rates have been higher among youth with higher levels of education. Youth

[44]The survey was undertaken by Bangladesh's Emerging Credit Ratings Limited (ECRL) Ratings Agency by taking into consideration the youth unemployment data from World Bank. The rankings were formulated on the basis of youth unemployment rate.

unemployment at secondary, senior secondary and tertiary levels of education has been almost three-times higher than that of youth labor force participants having only primary-level education. Moreover, irrespective of the level of education, it has been observed, that unemployment has been much higher for the female population compared to the males. These inferences have been drawn from the data on unemployment reflected in the table below.

Table5.6: Distribution of Youth Unemployment in Bangladesh by Levels of Education, gender-wise (as a % of total unemployed youth)

Gender and Education Level	2010	2013	2015 (July-September)
Female - No Education	18.8	7.7	9.1
Male - No Education	13.4	5.1	6.2
Total - No Education	15.7	12.8	7.5
Female - Primary	20.3	8.2	15.9
Male - Primary	12.2	9	14.3
Total - Primary	21.4	17.2	15.1
Female - Secondary	47.4	14.5	41.5
Male - Secondary	51.4	38.8	47.4
Total - Secondary	49	34.7	40
Female - Senior Secondary	10.5	13.3	30
Male - Senior Secondary	10.3	12.4	36.1
Total - Senior Secondary	10.4	25.6	33.3
Female - Tertiary	2.9	4.5	3.5
Male - Tertiary	2.8	5.2	4.4
Total - Tertiary	2.8	9.7	4

Source: Labor Force Surveys, 2010-15, Bangladesh Bureau of Statistics (BBS)

Moreover, technical-vocational graduates have had lower employment rates in the country than general education graduates. In the early millennium period, a 2006 tracer study by the World Bank of nearly 2300 students who had graduated in 2003 from public and private TVET institutions in Bangladesh, found that employment

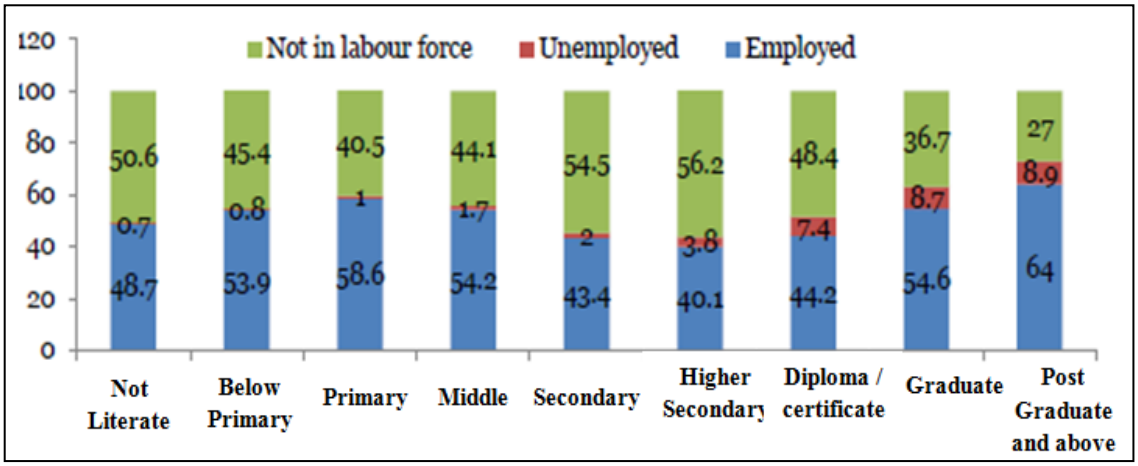
levels among such graduates were extremely low. The proportion of employed individuals was highest among HSC (Voc) graduates (30 percent), followed by diploma graduates (21 percent) and basic trades graduates (18 percent). However, these courses accounted for only a small proportion of total enrollment. The lowest proportions of employed were among SSC (Voc- 4 percent) and HSC (business management -5 percent).

Therefore, across all the respondents, only 8.5 percent were employed, 44.7 percent were pursuing higher education, and 46.8 percent were unemployed. The employment outcomes of graduates of the public and private institutions indicated little difference. These figures suggest that neither secondary vocational nor post-secondary diploma could make the graduates trained enough to be employable. Even in the marginally better streams, unemployment rates were at least 60 percent.

In India, open unemployment among the youth has been around 10 percent between the period from 2008 to 2014 according to available data from Government of India. Moreover, it is the second highest in South Asia after Sri Lanka (Lee, et.al., 2017). More worrying has been the fact that as much as half of female population (within ages 15-24 years) were neither educated nor employed. Results of a nationwide multidimensional skills assessment test known as the Wheebox Employability Skill Test (2013), has shown that only slightly over a third of the students who took the exam were found to be employable.According to Lee, et.al.(2017), inadequate technical and vocational education and training in South Asia, especially in India, has resulted in serious problems of skills mismatches in the job market, resulting in growing instances of unemployment.

Education wise, higher rates of unemployment could be witnessed in India at tertiary levels, just as in Bangladesh. This is reflected in the figure below.

Figure 5.1: Composition of Population (in the age group of 15+) by Activity and Education Levels in India (in %)



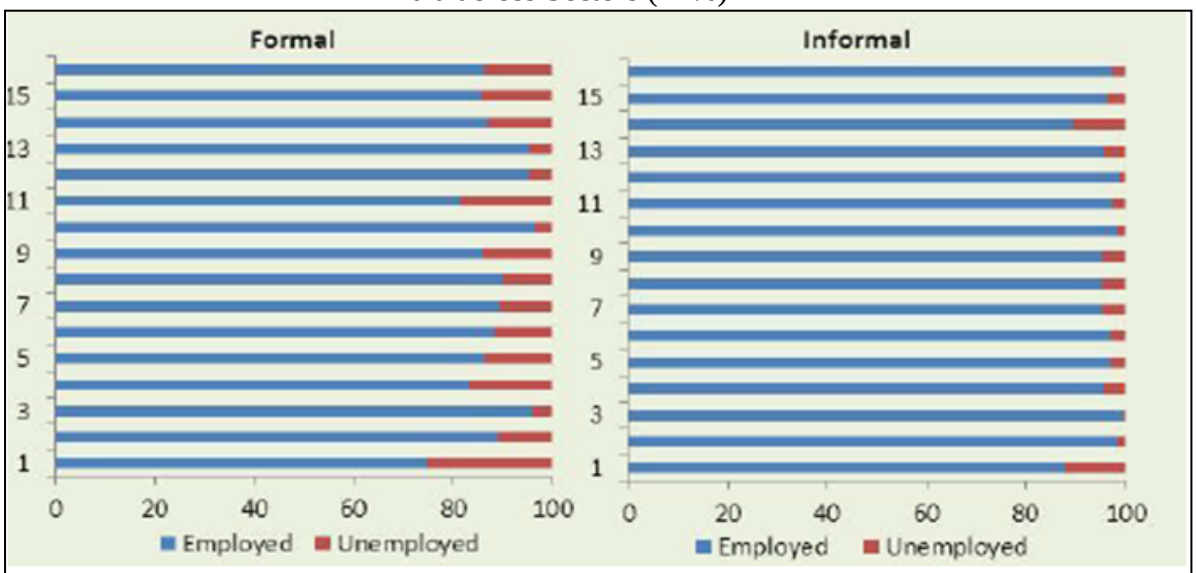
Source: Labour Bureau, Ministry of Labour and Employment (2013-14)

Labour Bureau (2013-14) has reported that nearly 9 percent of the graduates and post graduates in the labour force were unemployed as against only 1 percent of unemployed illiterates and semi-literates. The growing unemployment rates especially at higher levels of education reinforce the skills mismatch with respect to the requirements of the job market.

Moreover, among the formally trained labour force, the unemployment rate was over 10 percent for various services; significantly high in case of 'engineering trade other than civil and computer trade' (25.2 percent) and 'textile related work' (16.7 percent). Among the informally trained workforce, the percentage of unemployed were largely low (below 5 percent) for most of the trading activities except for certain services like fitter related work (which was 10.7 percent) and 'engineering trade other than civil and computer trade' (which was 12.2 percent).

This is shown in the figure below.

Figure 5.2: Workforce receiving Formal and Non Formal Vocational Training in India across Sectors (in %)



1. **Engineering trades other than civil, computer trades**
2. **Civil engineering and building construction related works**
3. **Leather related work**
4. **Textile related work**
5. **Catering, nutrition, hotels, and restaurant related work**
6. **Agriculture and crop production related skills and food preservation related work, non crop based agriculture**
7. **Health and paramedical services**
8. **Work related to childcare, nutrition, pre-schools, and crèche**
9. **Office and business related work**
10. **Driving and motor mechanic work**
11. **Beautician and hairdressing related work**
12. **Work related to tour operators / travel managers**
13. **Plumber**
14. **Fitter**
15. **Mechanist**
16. **Others**

Source: Labour Bureau, Ministry of Labour and Employment (2013-14)

According to the National Employability Report (2014),out of the six hundred thousand engineers that graduate annually, only 18.43 percent were employable in the IT industry, while a dismal 3.95 percent only were trained to be directly deployed on projects. For core jobs in mechanical, electronics/electrical and civil engineering services, only a mere 7.49 percent were employable, according to the report. Therefore, the problem of skills mismatch among the educated and trained labour force is a larger concern to be dealt with.

The problem of vulnerable unemployment is also being witnessed in both the countries. In Bangladesh for instance, the country's unemployment rate was low at

about 4 percent in 2013 (BBS , 2013), which is in part because people simply cannot afford to remain unemployed and try to eke out a living from whatever work they can get. As a result, a large proportion of the employed are engaged in work that can be called "vulnerable[45]," such as self-employed, own - account, unpaid family helper, and day labor. This is also confirmed by the data given by ILO (2015) on Bangladesh. The data has confirmed that over 95 percent of youth work in informal sector, nearly 32 percent are self - employed and about 11 percent are involved in some form of family work in Bangladesh which is unpaid.Such work force is classified under the 'vulnerable unemployment' category.

5.1.3. Lack of Enterprise Based Training

One of the challenges surrounding rising unemployment levels and frequent mismatches between demand and supply of skilled labor force is the lack of adequate on-the-job training in India and Bangladesh.

OECD's PIAAC has assessed the significant role of enterprise trainings on labor productivity and earnings. Republic of Korea is one such country which participated in PIAAC and confirmed the positive impact of such training sessions on wages earnings of workers. On top of formal schooling, on-the-job-training improves skills of workers entering the labor markets. World Bank (1995) found that enterprise training in countries like Colombia, Indonesia, Malaysia, Mexico and Taipei, China is associated with higher firm-level productivity in all five economies. According to Konings and Vanormelingen (2015), even after controlling for endogeneity of training, the marginal product of a trained worker, on average, was 23 percent higher than that of an untrained worker across firms in Belgium.

However, the countries in South Asia have not been an active part of any of theinternational tests or surveys, conducted on skills assessment world-wide (this issue has also been underlined in chapter two of this research study). The region faces the challenge of inadequate investment in upgradation of workers' skills on the job.

[45]No universally accepted definition of vulnerability exists in this context, but the sense of vulnerability conveyed is from perspectives such as job stability and the income earned. In 2003, the International Conference of Labour Statisticians adopted a Resolution, which defined vulnerable employment as own-account workers, and contributing family members.

For instance, in Bangladesh, according to ADB (2011), only about 22 percent of all firms provide formal training to their employees. Moreover, such firms extend training to a small fraction of the workforce and as a result majority of the labor force remains outside the gambit of such skills development sessions.

The rankings of World Economic Forum (WEF, 2016-17) also highlight Bangladesh's under-investment in skills development at the workplace which has placed it at a competitive disadvantage relative to other South Asian countries. The country has been ranked at 124^{th} and 127^{th} (out of 139 countries) on 'extent of staff training' and 'local availability of specialized training services', respectively. In comparison, India was ranked at 30^{th} and 55^{th} on the two parameters, respectively.

Similarly, India has also been ranked as one of the major countries in South Asia undertaking low incidences of formal on-the-job training in comparison to a lot of East Asian, Latin American and the Caribbean countries. In a survey undertaken by World Bank (2007) , only 16 percent of Indian manufacturing firms were reported as providing in-service training (either in-house or external) compared to 92 percent in China.

Lately, Government of India (2016-17) in a recent survey inferred that only 36 percent of companies are conducting in-house enterprise based training in India. In contrast, as many as 86 percent firms in Germany, 85 percent in China, 52 percent in Russia and 51 percent in Brazil skill workers themselves.

A lot also depends upon the regulatory framework in the country, enforcing such industrial training practices for its workforce. For instance, in China, the law makes it obligatory for the industries to provide for compulsory skill training and employment. Article 20 of the Vocational Education Law 1996 states - "Enterprises shall, in accordance with their actual situation, provide vocational education in a planned way for their staff, workers and persons to be employed". Enterprises may jointly run or run on their own vocational schools and vocational training institutions; they may also entrust vocational schools or vocational training institutions with the vocational education of their staff, workers and persons to be employed by them".

Moreover, according to Article 29, "If any enterprise fails to conduct vocational education in accordance with Article 20 of this Law, the local people's government at

the county level or above shall order it to make correction; if the enterprise refuses to make corrections, the vocational educational funds that the enterprise should bear may be collected, and such funds shall be used for vocational education in the locality". As a result, the occupational standards are clearly laid out in China and there is a strong integration of the industry with the education sector and the economy in general.

Similarly, Australia's apprenticeship system which is spread across diverse occupations is also a useful example. While there is no formal entry qualification required to enroll in such apprenticeship programs, legal contracts between the apprentice and the concerning employer are binding which determine the type and nature of apprenticeship, working hours and wage structure.

Therefore, the traditional focus on academic learning and professional qualifications is just not enough. Firms in South Asian countries need to act as a conduit between the national governments, financial institutions in the various countries and the ambitious work force to ensure effective development of skills and training. The governments of India and Bangladesh could examine the models practiced in other emerging economies such as China, as useful reference points to establish an enabling legal mechanism to support enterprise based training in their respective countries.

5.2. Social Relevance - Access and Equity

5.2.1. Skewed Skilled Proportions and Inappropriate Targeting: In India and Bangladesh, the percentage of skilled workforce in the formal sector has been significantly low compared to the labor force in the informal sector. As a result, their contributions to the economic growth process though positive have been inferred as insignificant from the empirical analysis.

India's formally skilled workforce is less than 3 percent of the total workforce. According to Labour Bureau (2013-14), only 6.8 percent of people ages 15 years and above had received or were receiving vocational training in India, of which only 2.8 percent received through formal channels while the remaining 4 percent received their training sessions through the informal system.

In comparison, the proportion of skilled labor force in the formal system of other countries was comparatively much higher - 52 percent in the United States of

America, 68 percent in the United Kingdom, 75 percent in Germany and 80 percent in Japan. In the emerging economies like China and South Korea, skilled labor accounted for 24 percent and 96 percent of the total workforce, respectively.

Similarly, in Bangladesh, while TVET has expanded rapidly, in comparison to the global standards, only small proportions of labour force have access to technical or vocational qualification. According to ADB (2016), enrollment in technical and vocational education was only 2.43 percent of secondary enrollment in the country in 2015, as against 6.31 percent in Malaysia and 18.41 percent in China.

Even those who are enrolled in such TVET programs have little intention to enter manual occupations for which the trainings are provided. A high proportion of vocational graduates do not want manual jobs in fields such as air-conditioning/refrigeration (ADB, 2011).Thus the clientele of formal vocational training is usually unsuitable for the training programs.

Even in the case of informal sector, the labour force is not skilled enough to enter the formal sector. According to World Bank (2010), little attention is paid by the government for enhancing the skills of 80 percent of the workers who are in the unorganized and informal sector in Bangladesh. Therefore, a paradox of formal - informal training exists. TVET can be made more relevant to the informalsector, and productivity can be improved by upgrading skills in certain occupations (e.g. motorbike repair, farm implement repair, food processing, and woodcarving).

It has also been noted by this study that the disadvantaged sections of the society are largely kept outside the scope of any form of skills and training sessions. In Bangladesh, for example, it was reported by ADB (2011) that courses remain inaccessible to the urban poor due to (i) the minimum entry requirement which is too high; and (ii) lengthy courses (1‑2 years), which means that the poor cannot stay away from informal remunerative work. Underprivileged youth are usually screened out of the educational system before they can qualify for entry into vocational training because TVET stipends are provided for merit rather than need (World Bank 2010).

Poor literacy levels impede skilling through formal channels in India as well. As per the Twelfth Plan (2012-17), 55 percent of workforce completed education only up to the primary level. According to the Annual Status of the Education Report (2018),

only one quarter of third grade students can read and understand a short story with a few simple sentences or subtract one two-digit number from another. Moreover, from the available data on the subject provided by ADB (2017) this study could infer that while 30 - 50 percent of the population aged 15-64 in India and Bangladesh had some secondary education or higher, around one-third remained uneducated. This striking observation suggests that there have been gaps in access to schooling in South Asia.

The drop - out rates of students in schools have also been high. Sabharwal (2013) has reported that only 66 out of 100 students could survive the last grade of primary education in Bangladesh. 7 in every 20 students who started school did not reach grade ten in India. Moreover, of the 26 million students who took the grade ten examinations, 10 million failed to clear them. Half of the 16 million who took the grade twelve examinations did not clear. Only 5 million of the nearly 8 million students who cleared, pursued their tertiary education.

Moreover, this study could infer [on the basis of the data provided by [FICCI (2015)] that among the formally skilled labour force, 74 percent has received higher secondary levels of education and within the labour force with informal skills, 78 percent of the workforce has completed only middle or lower education levels. The skewed nature of skilling could be attributed to two factors -

- the entry requirements in the existing skill set-up with respect to levels of education achieved could make it difficult for workers with minimal education to access formal skills training; and
- the lack of education also impedes the ability to absorb higher level of skills;

Global experiences on skills development and suggest that vocational programs initiated and taught at various levels of school education, help prepare potential apprentices for the job market. This study has examined two such skills development models practiced in Germany and People's Republic of China.

Germany largely follows a dual-system of vocational education and trainingwhich integrates work-based and school-based learning, thereby developing the skills of such candidates which are suitable for the job market. It is “dual” largely because of its nature of training which is conducted in two phases - at the enterprise level which captures largely 70 percent of VET and at the vocational school which is

approximately 20 percent of the overall training duration. Most of the youth in Germany begin their initial vocational training lessons by enrolling in for such dual apprenticeship programmes, when pursuing their school education.

On the other hand, in China, the vocational education forms an integral part of the educational programs of China which mandates, through the Education Law (1986), nine years of compulsory education including three years of vocational training. The institutional setting of vocational education broadly provides for pre-employment, post-school, and on-the-job-practical training besides training for school drop outs and a massive scale of vocational training for different levels of employees through Technical or Skilled Worker Schools. Thus, senior secondary school students enrolled in vocational education are trained through the three year participation in the vocational scheme education programme.

5.2.2. Geographical and Gender Inequities: Geographic mismatch in the provision of skills, education and training is one of the serious problems plaguing the labor market in South Asian countries. In India, the states with much higher economic growth rates have greater job opportunities but fewer workers are available since their population size grows slowly. On the other hand, the states with slower economic growth rates also have higher population but fewer employment opportunities to absorb the growing labor force. The lagging states, as a resulthave to rely on migrant workers as a short-term strategy to cope up with this challenge (ADB, 2013).

Regional imbalances also exist in Bangladesh. Most training institutions are in urban areas, which comprise of only about 20 percent of the total population. Moreover, the share of students enrolled in private institutions is far higher in poorer regions than in more affluent regions (Dohmen 2009). This is inequitable, because students are required to incur heavy expenditure for receiving education through private institutions in the form of tuition and other fees, whereas education in public institutions is virtually free.

Furthermore, on the basis of the existing data, this study could also deduce, that gender inequities exist heavily in these training institutions. Most trade programs in Bangladesh correspond to male-dominated activities and only about one quarter of total enrolment is female (ADB 2008). It is quite disappointing to note that only 7

percent of all females in formal TVET programs are enrolled in public institutions; 93 percent study in private institutions and are forced to pay the high cost of training, compared with a relatively greater number of male students who enroll in public institutions and can easily afford to pay the education fee as it is on the lower side. As far as the overall TVET enrolment is concerned, according to ADB (2015) the share of women has remained low persisting at 24 - 25 percent range throughout the millennium period and modestly rising to 27 percent after 2010.

Moreover, the availability of funding and subsidy facilities on education of female students is much less compared to males. For instance, the polytechnics sector of Bangladesh witnesses widespread training demand. According to Dohmen 2009, the cost per student in almost all women's polytechnic institutions is low as limited funding availability exist. Therefore, the funds spent on female students are lower than the already limited share of female students. On the contrary, male students enrolled in TVET receive a public subsidy far greater than that received by female students.

Such inequities also cause high levels of unemployment among women. The results of a World Bank tracer study in Bangladesh indicated that overall only 10 percent of TVET graduates were employed whilst in the case of female graduates; this was just 5 percent (World Bank, 2007).

The falling female labour force participation rate both in rural and urban areas is a cause of concern. The available literature suggests that either appropriate employment options are not available or women want to remain engaged in household chores in the background of the fact that the cost of education services is high.

In India, the workforce participation rate of females was only 25.5 percent in 2011. As per NSSO (2011-12), unemployment rate within the age bracket of 15-29 years was higher among urban females at 13.1 percent compared to 8.1 percent for urban males. It was 4.8 percent and 5 percent for rural female and males respectively. Moreover, low labor force participation impacts their contribution to global wealth of human capital. According to Lange et.al.(2018), women account for less than 40 percent of human capital wealth. Moreover, achieving higher gender parity in earnings could generate an 18 percent increase in human capital wealth with notably large potential gains in South Asia.

According to Government of India (2015), women continue to be under-represented in training programmes thus limiting their employment options, economic returns and longer-term career development. Moreover, female are primarily engaged in micro enterprises such as handicrafts, handlooms, basic food processing. Due to their restricted mobility, they are not able to attend rural training programmes.

5.2.3. Mobility Concerns: South Asian countries are constrained with inadequate vertical and horizontal mobilities in skills development and TVET. For instance, it is difficult for graduates of vocational programs in secondary school to get admitted to technical program at the university or polytechnic level. Similarly horizontal mobility from general academic education to a vocational program or vice versa is restricted; the reason being lack of equivalent recognition of vocational training as that of general education.

Moreover, the enrolment of students for vocational education and training is extremely challenging primarily because of the outlook of people towards skills development which is considered traditional. Education qualification is generally preferred over vocational training as the former is associated with better employment opportunities, in terms of pay packages and the nature of work. Sharma and Nagendra (2016) underline the fact that skilling has always been branded as a blue collar job, which is further associated with low pay scales, limited growth and less challenging roles.

Attempts have been made by India to address the mobility issue through National Skills Qualification Framework (NSQF). According to KAS (2015), recognition of prior learning, establishing a credit system for skills, knowledge and experience gained by an individual either formally or informally and multiple entry and exit between vocational education, skills training, general education, technical education and job markets were some of the identified ways and means to address the concern by NSQF.

However, a lot of effort still needs to be undertaken towards implementing promotional strategies in the South Asian countries which would ensure a high mobility towards such skills development programs.

A case in point which could be referred as a benchmark in this regard is the skills development model of Singapore. The South East Asian country lays a lot of

importance on skill development and invests heavily in vocational training and technical education for its citizens. Infact, Singapore is considered a preferred destination in terms of the skilled workforce as compared to India. The model is similar to India and focuses on the robustness in the technical training provided to the aspirants. It also lays emphasis on industry relevant curriculum and ensures on making it a cost effective model so that more aspirants can opt for the technical education.

The government of Singapore also wants to improve the visibility of such programs and hence participate in different advertising campaigns like “using the hand,” “Top of the Trade” competitions telecasted on the television, and “Apprenticeship of the Year” award.

The major advantage of the TVET model is that the curriculum involves industry professionals in the design and hence ensures that the relevant skills are transferred to workforce. The VTE has centres of excellence and it collaborates with other agencies that help in the exchange of training resources, expertise of members and technological initiatives focusing on skill development. The government through the VET model funds the training sessions of not only the school attendees but places equal importance on the drop outs so that the country's youth is motivated to train themselves.

5.3. Training Effectiveness

5.3.1. Lack of Qualified Instructors and Insufficient Material Inputs: The lack of trained and qualified technical teachers or instructors is one of the major constraints underlining effective delivery of VET services. Most TVET teachers have little pedagogical or competency-based training, few practicalskills, and little or no industry experience. The following constraints have been identified for such a poor performance:

a) lack of capacity and inadequate infrastructure to train teachers and instructors: Instances of sub-standard training and ineffective utilization of existing training capacities in TVET institutions are quite common in South Asia. For example, ADB (2011) has reported that despite the capacity of TVET system of Bangladesh to train about 80 teachers per year, the

Technical Teachers Training Center (TTTC) hasproduced far fewer graduates. Similarly, data collected through Bangladesh's Vocational Technical Training Institute (VTTI, 2012) indicated that the Institute had the capacity to train only 240 teachers in a year. That too was never achieved. BTEB (2012) estimates suggest that over 24,000 private sectorteachers needed training in Bangladesh by the end of the annual year. Such insufficiency in capacity availability and resource utilization could be attributed to lack of supporting infrastructure - both physical and human.

For example, the status of training and education infrastructure in Bangladesh's VTTI was examined and it was found out that classrooms often lack modern teaching aids, and training programs do not use ICT. At VTTI, most equipment is more than 20 years old.Institutions lack modern equipment and instruments with which to conduct practical classes, especially electrical, electronics, and refrigeration (ADB 2008; World Bank 2010).

Moreover, widespread dearth of instructional and resource materials has also been witnessed in Bangladesh. These materials are not developed systematically and produced regularly. According to World Bank (2010), there is no development center to design, develop, validate, and disseminate teaching-learning resources. Also, the labor market information available is inadequate. None of the countries in South Asiahave a labor market information system in place.

In India, the evaluation of the skills development was undertaken by a Committee for Rationationalisation and Optimisation of the Functioning of the Sector Skills Councils (2017). In its outcome report, it presented some grave realties of the performance of VET system in the country. According to the report, "many ministries lack training infrastructure and impart substandard training. Some of the short-term courses offered are as short as eight hours and neither meet the skills needs of employers nor provide decent livelihood opportunities. The NSDC and SSCs made a mockery of trainers training by giving fresh diploma and engineering graduates 2-5 day training to become a qualified trainer".

Moreover, India also faces the problem of scalability and limited capacity. According to Government of India (2017), the country needs to train 20,000 skills trainers of various kinds every year, but has a capacity to produce only 8,268 precisely, suggesting that trainers' selection criteria include basic entry qualification, pedagogy skills and minimum six months' industry experience.

While there is a need to create additional capacity in existing institutes, at the same time there is a need to create an adequate infrastructure even in small towns and villages. In terms of faculty, too, the training infrastructure is inadequate. For instance, figures reported by the Government of India indicate that corresponding to the current seating capacity of about 1.7 million trainees at ITIs, there is a need of almost 85,000 trainers (considering 20:1 student/faculty ratio). As against this, the seating capacity for various trainers' programme of DGET is just 4,438, which is far from adequate to meet the requirement.

b) Underutilization of capacity and budget constraints: Not only do the South Asian countries face lack of training capacity in TVET, instances of under-utilization of existing capacities and inadequate budget allocation to facilitate training and skills development programs effectively, have also been encountered. TTTC filled only13 of 33 sanctioned positions in 2010 and VTTI recruited only 3 teachers for 33 sanctioned positions in Bangladesh (ADB, 2011).

Moreover, at most times, TTTC is is unable to spend its budget. According to the data available on this front [ADB (2011)], about 40 percent of budget allocated to TTTC was left unspent over the past 3 years (which is 2008 to 2010). Similarly, VTTI had not conducted a single short course during the last 5 years beginning 2005 and offers no long-term programs (World Bank, 2010). As a result, the budget allocated to VTTI to conduct vocational training services, remained unutilized.

c) Lack of motivation: The study has also found out that the teachers which are recruited for addressing training needs of students are not qualified enough,

lack experience and hardly receive any form of on-the-job training. Teachers' qualifications do not concur with the system's needs, and, on the other hand, the system provides no further training beyond initial qualification in Bangladesh (ILO, 2011). No continuing staff development is available to address qualification deficiencies (ADB, 2008). Therefore, the system offers very few opportunities for training and upgrading of instructors' skills. Moreover, the teaching profession as a whole is looked upon as a low profile, having low wage structure and limited opportunities for professional advancement.

As a result, teachers and trainers are on an average poorly motivated to enter such a profession or continue with teaching services. According to the surveys conducted by Campaign for Popular Education (CAMPE, 2015), this study has inferred that low motivation is evidenced by 10 percent teacher absenteeism in Bangladesh, with a further group of more than 20 percent of teachers who arrive an average of half an hour late for school.In addition, no structured policy and regulations exist in the South Asian countries requiring in-service training.There is no formal policy or guidelines for the continuous professional development of TVET teachers (World Bank, 2010). This explains much of why VTTI and TTTC have been reported as largely empty.

Similar issues have been studied in the Indian context as well. Upgradation and hiring of qualified or skilled trainers are considered expensive and cost ineffective by the authorities (FICCI, 2015).

It has also been argued that teachers and training instructors engage in private tutoring for students, especially at tertiary levels of education to compensate for low levels of compensation. Infact, tutoring is the main learning modality in higher education in India and Bangladesh (World Bank, 2014).

In a number of cases, bureaucratic red tape has been reported as the reason for prolonged gaps in filling up teacher vacancies in public TVET institutions. According to ADB (2015), nearly 60 percent of sanctioned

teacher/trainer posts have remained vacant in public TVET institutions of Bangladesh. The highly centralized hiring system in most of the South Asian countries makes it difficultfor institutions to fill vacant positions.

5.4. Financial Structure Governing TVET and Policy Regulation[46]:

In South Asian countries, skill development initiatives continue to be largely dependent upon the government or public-private partnerships. Yet, investments in such programs are extremely low owing to governments and regulatory bodies' negligence in ensuring adequate attention to education, TVET and healthcare needs of their population.

For instance, governments provide inadequate financial allocation for skills training. In Bangladesh, government spends a relatively lowproportion of its education budget and total spending on TVET, averaging only about 1.5‐ 2.5 percent or 2.3 percent of education spending (ADB, 2011). In India, the share of education in total government expenditure declined by as much as 5 percentage points from 2000 to 2012 (i.e. public investment on education as a percentage of government expenditure declined from 16.36 percent in 2000 to 11.36 percent in 2012)

In comparison, countries like Indonesia, Republic of Korea, Singapore and Thailand have generally witnessed an increase in their budget allocations to such sectors over a period of time. In Indonesia, for example, the public investment on education as a percentage of government expenditure increased by almost 7 percentage points from 2000 to 2012 and in Singapore, a rise of over 6 percentage points has been reflected during the corresponding period (on the basis of the available figures provided by ADB, 2017).

Moreover, in South Asia, theeducation policies are largely directed towards increasing enrollment rates at primary and secondary levels of school education, downplaying the role of skills development and TVET in human capital development.

For instance, to improve enrollments and enable the completion of primary schooling of students, Bangladesh launched the Third Primary Education Development Program

[46]Based on interviews and interactions with regional experts on the subject from India and Bangladesh (ANNEXURE III).

in 2011 as part of its NEP, 2010. Bangladesh also pursued a series of interventions - such as Secondary Education Project on Teaching Quality Improvement, Secondary Education Quality and Access Enhancement Project and Higher Secondary Female Stipend Project - in order to improve access to and quality of secondary education since 2005.

Similarly, in India, a series of universal education programs such as Sarva Shiksha Abhiyan (2001) and Rashtriya Madhyamik Shiksha Abhiyan (2009) have beenintroduced by the national government to achieve universal enrolment and retention of students at the primary level by 2010 and at the lower secondary level by the year 2018. Moreover, Right to Education Act was enacted in 2009 to enable free and compulsory education for all children aged 6 - 14 years.

Considering the biased approach in policy making of the governments with respect to primary and secondary vis-a-vis tertiary education and TVET, public and private investments in education at primary and secondary levels have been rising in South Asian countries. At tertiary levels, the rates of investments have remained exorbitantly low.

For example, the ratios of private expenditure to GDP on primary and secondary education have been 0.6 and 0.4 percent respectively in various years in India which are comparable with that in the Republic of Korea. However, the ratio of private expenditure to GDP on tertiary education has been only 0.2 percent in the former country compared to 1.9 percent in the Republic of Korea and 2.2 percent in Philippines. Therefore, the large contribution of private spending to education expenditure, especially at the post primary and tertiary levels is a unique feature shared by East Asian economies in terms of education financing (ADB, 2017).

Moreover, skills and training programs are often perceived as non-scalable initiatives owing to high capital requirements and low return on investments. As a result, the sector largely remains underinvested. Moreover, the dependency on donor organizations for funding such low key initiatives is large. For instance, this study has observed that in the case of Bangladesh, the national government is largely dependent on international donor institutions like ILO, ADB and World Bank, to implement its policies and initiatives in the field of TVET and skills development.

It has also been found out that on an average the financial institution's willingness to lend for skill development activities is low as educational loans are perceived as high risk products due to uncertainty with respect to employment generation (ADB, 2017). Therefore, the private institutions charge heavy fee to render higher education and specialized training. For example, in Bangladesh, tuition and fee are typically between Taka 40,000–Taka 80,000 (approximately between INR 32,000 - INR 64,000) annually, at the level of tertiary education and in training institutions driven by the private sector. This is, at most times, out of the reach of students. While, studentloans are available through some banks, but there is no system ofgovernment-provided loans or loan guarantees, making such loansrelatively expensive. The burgeoning private university system comes at a highfinancial cost to students (World Bank, 2014).

On the other hand, public universities in urban areas and public rural colleges are reasonable. For suchinstitutions, average costs, at least for tuition and fees, were below Bangladesh Taka 10,000 (approximately Indian Rupee 8000) annually (World Bank, 2014). In some cases, tuition is nominal and, wherenot, substantial scholarships are available. However, the quality in rendering the education and training services in such universities and colleges is often compromised. Moreover, there is little accountability over the flow of funds received by the public institutions. It has also been observed by this study that supervision onthe expenditure flow of TVETis relatively weak, with improper record keeping leading to serious cases of misuseof funds and non-accountability based financing of public institutions (World Bank 2007; 2010).

The policy structure is such that institutions are not encouraged to engagein cost-recovery activities. For instance in Bangladesh, institutions have little incentive togenerate income from services or production, because any proportion of profits which are generated, have to be returned to the Government of Bangladesh (World Bank 2007; 2010) as they are owned and operated by the national government. The rules and regulations in the country are created in a manner in which there is no scope for training institutions to retain and reinvest the resources for future growth. The only exception is the delivery of short-term courses (which are less than 360 hours), in

which case any form of income and revenue generated by the institution can be retained by it.

Therefore, on an average, the governance structure surrounding skills development, higher education and TVET is centralized in South Asian countries and as a result complex and cumbersome; one of the reasons being that there are number of institutions and agencies in charge of the governance on skills development and training, in any particular country of South Asia. This study has found out that in Bangladesh, there are nearly twenty one agencies at the central level which are functioning in this area and governing the entire TVET and skills development framework of the country without appropriate integration and coordination among them, in the work and approach followed in this sphere. Similarly in India, it has been observed that there are over seventeen government ministries at the central level which offer skills development initiatives through school education, institutes of higher learning and specialized vocational training institutes. Such fragmentation leads to unnecessary delay in the implementation of necessary policies and plans.

In contrast, the legal frameworks governing skills development and TVET in some of the South East Asian emerging countries like China and Korea or an advanced economy like Germany have been studied.

For instance in China, the law discusses the roles and responsibilities of the local government, industry/private participation and the vocational training institutes in skill development in the country. It also clearly specifies the functions and responsibilities of the Ministry of Human Resources and Social Security and Ministry of Education in the vocational training. Infact, the funding of the vocational education and training is also decentralised with the largest responsibility of fund generation left to the local government.

In Germany, enterprises or employers fund the bulk of the programme's cost through an apprenticeship-based system - a crucial differentiating factor compared with the two South Asian countries. They offer practical training to the apprentices to prepare them as their potential employees or being successfully employed. The training is based on a compulsory curriculum which is customized to the interests of the respective enterprises offering such trainings. All companies are incentivized or

mandatorily asked to participate in the programme—so that even if a trained worker leaves one company for another, the industry as a whole doesn't lose out.

Such sessions are closely monitored by the various industry bodies in the country that also evaluate the performances of the students or apprentices during the duration of training being imparted to them. They also have to sign a contract with the respective company or enterprise offering such training sessions and are also given monetary incentives in accordance with the collective agreement. All such sessions are imparted by certified corporate trainers appointed by the respective enterprises. The government runs vocational schools to supplement the on-the-job training offered and funded by enterprises, with theory, lessons and basic knowledge of the job market. Most of the youth in Germany begin their initial vocational training lessons by enrolling in for such dual apprenticeship programmes.

In Korea, the enactment and enforcement of the Basic Vocational Training Act (1976) obliges employers to provide vocational training for their employees to ensure a skilled work-force. However, over a period of time, a need was felt to cope up with the rapid change in industrial structure, in order to enable life-long vocational competency based development. As a result, Eventually, Vocational Training Promotion Act was introduced by the Government of Korea in 1999, replacing the earlier Act. The new law integrates various dimensions of skills development under the Employment Insurance System.

Following the enactment of the 1999 Act, Korea's skills development programs have been largely executed on such industrial trades as mechanics, electronics, automobile repairs, and ICT, where main components of the program include TVET center building, training equipment provision, training curriculum design, as well as instructor training. In order to further improve the effectiveness of the program, recent focus has been weighed having stronger consideration of marginalized youths as primary beneficiaries; establishment of mechanisms linking training to the actual employment; and diversification of the financial sources of training program/institutions.

South Asian countries can derive useful lessons from such countries while formulating their respective policies on education, skills development and TVET and

healthcare. Desjardins and Rubenson (2011) argue that policies on skills formation have to take into account both supply and demand as there is distinction between skills mismatch and education mismatch. In this context, identifying the mechanisms that help to foster the optimal utilization of the existing skill base is essential.

Off late, Government of India is considering introducing a right-based legislation for skills training in line with those in Germany and South Korea, to make skills development enforceable by law. This in turn is expected to improve the employability of the Indian workforce significantly. The idea of legislation was first mooted in the final Report of the Sub-Committee on Skills Development (2015).

5.5. Conclusion

India and Bangladesh's demographic transition makes it imperative to ensure employment opportunities for millions of youth each year. In the case of India, it is even more reinforcing considering that the average age of India's population by 2020 is projected to be the lowest in the world—around 29 years compared to 37 years in China and the United States of America, 45 years in West Europe, and 48 years in Japan. Moreover, while the global economy is expected to witness a shortage of young population of around 56 million by 2020, India will be the only country with a youth surplus of 47 million. Alongside employment, therefore skill development is equally important as over the years jobs have become more skill-intensive with changes in technology as well as increased inter-linkages across economic activities.

The issue is vital both from the demand and supply perspectives. From the supply side, the issue is primarily related to employability of the workforce due to varying reasons ranging from inadequate access to education, lack of training facilities, inadequate skilling, quality issues leading to mismatch of skill requirements, and poor perception of vocational skilling vis-à-vis formal education. These have inadvertently created skill shortages and also contributed to higher unemployment. Hence, both employment and employability are key factors of concern today.

Over the years, while skills development has expanded rapidly in India and Bangladesh, there has been little assurance that greater learning has accompanied greater access, coverage and outreach of such initiatives within the respective countries of India and Bangladesh. While many ambitious goals have been set at the

levels of national government, those have not translated easily into improved educational outcomes. Further increasing the scale of training seems unwise at present until quality assurance can be improved. While some institutions and some public–private partnerships have been successful, there is limited evidence that a large proportion of the many students in TVET institutions are acquiring the skills that they need to succeed in a growing and diversifying economy.

As Bloom et.al. (2011) have rightly pointed out that the demographic dividend in South Asia has not been enjoyed to an appreciable extent, because it has been choked off by a non-enabling policy environment. Moreover, they have emphasized on the fact that if the governments of South Asia are to capitalize on the high share of working-age people in the population, they will have to ensure that those people are healthy, well educated, and well trained in the skills demanded by the labour market". Therefore a set of enabling policies and circumstances must be in place if a country or region is to receive an economic boost from a change in the age structure of its population".

If implemented effectively, VET can become one of the popular modes of learning in any country. Newas, et.al (2013) in their study have delineated the wide ranging impact it can have on the masses of any country. "VET is influential because firstly, it appeals to numerous groups, especially in its more general forms. Secondly, it achieves support from students in hunt of jobs, businesses in looking for trained workers, policy makers in explore of popular reforms that appear to deal with social and economic problems and finally educators in search of students and an important social function. Thirdly, it helps to serve several contradictory roles of education at the same time and this quality can be termed as the power of 'vocationalism'. Fourth, it promises to reward individual students while still dealing with combined goals like unemployment and national development. At the same time helping them equip to understand the art of using public resources while still mobilizing them for the private ends of businesses and individual students. Fifth, it can prepare students for an increasingly distinguished set of professions while still facilitating common core values and knowledge. Finally, it facilitates equality in achieving opportunities through education within unequal societies."

CHAPTER 6
CONCLUSIONS

This research thesis has examined the role of human capital in the economic growth of India and Bangladesh, during the period from 1991 to 2015. Being large economies of South Asia region, these countries constitute over 60 percent of its population and account for nearly 80 percent of the region's gross domestic product. While the region as a whole has been experiencing changes in the age structure of its population with falling infant mortality and total fertility rates, it has been noted that India and Bangladesh are the only two countries of South Asia which have been experiencing similar phases of demographic transition.

Besides witnessing a growth in their young population, of nearly 20 percent since the 1960s-1970s, both the countries have been experiencing a phenomenal rise in their working age population to over 60 percent over the three decades leading to rising inverse dependency ratios in the two countries. As a result of such demographic advantages, it could be deduced that the two economies possess immense potential to realize a demographic dividend. Against this background, this research study has been undertaken to analyze the contribution of human capital in growth processes of the two countries of South Asia.

This thesis is organized into six chapters including an *Introduction* to the research topic and a *Conclusion*. The introduction chapter broadly underlines the significance of human capital in South Asia region and in particular, in India and Bangladesh. It has been noted that demographically, the diverse South Asia region accounts for over one-fourth of the world's population and is witnessing an ‘age structure transition’ as reflected in falling total fertility rates and infant mortality rates as well as rising life expectancy at birth. The region has witnessed a rapid fall in infant mortality rate from about 160 per 1000 live births in the 1950s to about 38 per 1000 live births in 2016, a fall in total fertility rates from 6 births per woman in the 1950s to over 2 births per woman by the year 2015 anda rise life expectancy at birth which has improved from 40 years in the early 1960s to nearly 69 years by 2015. All these factors may have contributed to rising inverse dependency ratios in the region.

According to the existing literature, changes in the age structure creates a potential for faster economic growth and enables the realisationof a demographic dividend. Research on other regions such as East Asia and South East Asia, confirms such a phenomenon. In the case of East Asia for example, estimates in literature suggest that one-third of that region's economic growth during the 'East Asian Miracle' period can be accounted for by the effects of demographic change.

South Asia has already witnessed an acceleration of growth over the three decades since the 1980s, with the millennium period accounting for the highest growth in per capita annual GDP averaging at 5 percent between 2011 and 2015. The growth rate in this period surpassed that of the advanced and emerging economies of the world and primarily led by India, as confirmed by International Monetary Fund. Such international institutions have also reported that India's strong economic growth helped buoy the South Asian average. Infact, even in Bangladesh, a positive pattern of economic growth in all sectors of the economy was noted, especially throughout the millennium period. Considering the consistently improving growth scenarios of both economies, an attempt has been made through this research thesis to examine the impact of demographic transition driven human capital on economic growth of India and Bangladesh, since 1991.

The review of literature on the subject undertaken in *Chapter Two,* has assessedtheexisting theoretical framework on human capital and its impact on economic growth globally viz-a-viz South Asia. In growth accounting literature, it has been found out that the role of human capital has not been explicitly defined in neoclassical or exogenous growth models introduced by Robert Solow as compared to endogenous growth models advocated by Robert Lucas and Paul Romer. Infact the literature on endogenous growth theory considers human capital as an essential factor input, to impact growth or output, either directly through increases in factor productivity or indirectly due to externalities such as technological advancement or research and development activities.

The endogenous or new growth theory has also encouraged empirical studies drawing data from different countries and examining the role of human capital, reflected by its proxies, on economic growth patterns. A wide range of literature which examined the impact of human capital on growth at the global level, deduced its positive role

measured by gross enrollment ratio in schools, thereby explaining differences in growth rates across countries. However, such studies have not taken into consideration the quality dimension of human capital across countries. These research studies have assumed that a year of schooling renders the same increase in knowledge and skills regardless of the education system in all the sample countries and they also consider formal schooling as the primary and only source of education, ignoring the variations in the quality of non-school factors on education outcomes.

These were subsequently followed by another set of studies in literature which deduced that changes in human capital measured by education attainment were largely uncorrelated with economic growth. In some cases, it even reported a negative impact on growth, especially studies undertaking a panel data approach. The negative and inverse impact of human capital on growth was attributed to measurement error in education and insufficient measures of human capital being used as proxies in studies on economic growth.

In order to overcome such limitations, some research studies have included the measurement of cognitive skills achievement of individuals, with the help of international skills assessments. However, it has been noted that such studies omit the measurement of measuring non-cognitive skills, health and nutrition as a way of developing human capital, besides education and literacy.

In the case of South Asia specifically, the existing literature and various reports of multilateral institutions have emphasized the need for skills development of workforce coupled with an enabling policy framework to ensure sustainable growth and realise a qualitative demographic dividend. UNDP (2018) has reported that achievements in human development should not only be expressed in terms of quantity life expectancy, mean and expected years of schooling and gross national income, but also in terms of quality of investment in education and health. Similarly, it has also been argued in the literature that in the case of India and Bangladesh, demographic dividend has not been enjoyed to an appreciable extent because it has been choked off by a non-enabling policy environment. Some studies have also highlighted the skills shortage in India which is leading to growing instances of unemployment World Bank's Poverty Assessment (2013) for Bangladeshhas shown that the poverty in the country reduced during the period from 2000-2010

due increasing income per-capita on account of falling fertility rates and lower dependency ratios.

Moreover, a number of studies have also examined the impact of human capital proxied by gross enrollment ratios at various levels of education, on economic growth of South Asian countries. For instance, in an empirical analysis of India and Pakistan, a study in the year 2000 concluded of a crucial role being played by human capital, proxied with enrolment ratio at primary, secondary and senior secondary levels of education, on growth of these economies. Similarly, in a case study of India in 2010, investment in education and health dimension of human capital stock was concluded to have a positive long run impact on growth rate.

On the other hand, there have also been studies which have not acknowledged the role of human capital in growth. In 2007, a study analysed the sources of growth in Sri Lanka and deduced that human capital contributes only 10 percent of output growth in comparison to physical capital and labour which contribute 17 percent and 27 percent, respectively. Similarly, in 2009, a bi-variate causality analysis was undertaken to examine the impact of public expenditure on education on per capita gross domestic product. No impact of education dimension of human capital, was concluded by study, on economic growth.

Thus, during the course of the literature review it was noticed that the existing theories and studies which evaluates the relationship between human capital and economic growth in South Asia, presents mixed empirical results. This has also been reinforced by some researchers who pointed out that despite the conventional wisdom that output growth and human capital should be positively correlated, statistically significant results have been mixed, and strong and positive correlations between growth and human capital accumulation have been the exception rather than rule. This may be due to the several reasons such as the use of different research methodologies, reliance on traditional models of growth and development and inadequate data collection on the subject.

Moreover, this study also observed that the existing literature on the subject has made greater usage of quantitative as compared to qualitative measures of human capital. For instance, as mentioned above, a lot of studies in the literature have used the

education dimension of human capital measured by gross enrolment ratio as its closest proxy, to examine its impact on economic growth. Such studies might have missed the underlining measurement errors in schooling enrollment ratios besides maintaining a restrictive evaluation of human capital by keeping qualitative indicators such as skills development, training, healthcare, literacy levels outside their purview. Taking cue from the existing theoretical underpinnings and in order to overcome such limitations of existing research on this subject, this thesis has tried to gather a comprehensive perspective on human capital, examining the role of its qualitative and quantitative indicators, on growth.

Following extensive research work, this study has used enrolment ratios in vocational and general programmes, formal and non-formal vocational training received, employment of teachers in vocational training programmes and allocation of funds on education, health and research and development, as vital qualitative indicators or input measures of human capital. The quantitative indicators or output measures used in the study are gross enrollment ratio, mean years of schooling, adult literacy rate and life expectancy at birth. These indicators have been used as proxies for human capital in this study, analyzing their impact on economic growth of India and Bangladesh during the period from 1991 to 2015.

Chapter Four of our research thesis presents the empirical analysis examining the causal relationship between human capital and economic growth. Data has been collected for the time period under consideration, on all the above mentioned indicators of human capital besides annual percentage growth rate in gross domestic product which has been used as an indicator of economic growth, gross fixed capital formation and labour force participation rate, using primary and secondary data sources. This thesis has hypothesized that the qualitative dimension of human capital, indicated by skills development, vocational training, research and development and adequate financial support for education and healthcare services, has a positive impact on the economic growth rates of India and Bangladesh. In this respect, the analysis has been undertaken to test this hypothesis and compare the empirical results for both the countries.

The estimation equation formulated for our analysis is the human capital augmented Cobb Douglas production function in which human capital, physical capital and

labour are the factor inputs or independent variables and growth rate is the dependent variable. The modeling framework is based on the endogenous growth accounting model proposed by Robert E. Lucas in 1988. Lucas (1988) considered human capital as an effective factor input (besides physical capital and labour) to determine economic growth, reinforcing the demand of 'skilled' human capital which could contribute towards increasing total factor productivity of labour and thereby improving growth. The estimation equation is transformed into log linear form for the regression analysis and Ordinary Least Squares (OLS) has been used as the regression methodology to empirically deduce the causal relationship between human capital and economic growth. However, before running the regression, principal component analysis and stationarity tests were conducted on the data set.

This study has observed strong presence of multicollinearity among the independent variables considering the large number of human capital indicators which have been used in this study. As multicollinearity has a tendency to overinflate the standard errors and make some variables statistically insignificant even if their coefficients might be significant, this problem could render the empirical results unreliable. Therefore, Principal Component Analysis has been conducted to avert this problem. The total variance explained output deduced that primarily three components carried out the maximum variation in the variables in both the countries and accordingly the variables were sifted under Component one, two and three. The results were presented through the rotated component matrix.

For India, the three components were - Component 1 comprises of percentage of non formal vocational training, percentage of students in upper secondary education enrolled in vocational programmes, teachers in secondary vocational as a percentage of total teachers in vocational and general programmes, gross enrolment ratio at secondary upper secondary and tertiary level of education, percentage of students in secondary education enrolled in vocational programmes, expenditure on research and development as a percentage of gross domestic product, expenditure on total health as a percentage of gross domestic product, gross fixed capital formation as a percentage of gross domestic product, expenditure on education as a percentage of gross domestic product, labour force participation rate and life expectancy at birth;

Component 2 has adult literacy rate, mean years of schooling, public expenditure on health as a percentage of total government expenditure and public expenditure on education as a percentage of total government expenditure;

finally under Component 3, our analysis shows percentage of students in secondary education enrolled in general programmes and percentage of students in upper secondary education enrolled in general programmes.

Percentage of formal vocational training was omitted from the analysis as the data set available on this variable is constant for the time period under consideration.

Similarly, for Bangladesh, Component 1 comprises of gross enrolment ratio at secondary upper secondary and tertiary level of education, percentage of students in post secondary non tertiary education enrolled in vocational programmes, teachers in secondary vocational as a percentage of total teachers in vocational and general programmes, percentage of students in secondary education enrolled in vocational programmes, percentage of students in upper secondary education enrolled in vocational programmes, gross fixed capital formation as a percentage of gross domestic product, labour force participation rate and life expectancy at birth;

Component 2 includes mean years of schooling, adult literacy rate, mean years of schooling, expenditure on total health as a prcentage of gross domestic product, public expenditure on health as a percentage of total government expenditure, public expenditure on education as a percentage of total government expenditure and expenditure on education as a percentage of gross domestic product;

Component 3 comprises of the variables - percentage of students in tertiary education enrolled in agriculture, manufacturing and construction and information and communication technology programes, percentage of students in secondary education enrolled in general programmes and percentage of students in upper secondary education enrolled in general programmes.

Besides PCA, the dependent and the independent variables have also been tested for stationarity. Unit root tests such as Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) have been conducted on these variables. The tests indicate that almost all the variables are stationary at first difference and hence integrated of order one. Only

the except growth rate and life expectancy at birth (India), females' enrolment ratio in vocational training programmes at secondary level of education (India), formal vocational training received (India) are stationary at level.

The regression results of our empirical analysis confirm a vital role of qualitative dimension of human capital on economic growth of India and Bangladesh during 1991 to 2015. This inference is also reinforced by various regional experts from India and Bangladesh, during our interactions and consultations with them on the subject.

Taking into consideration the impact of enrolment ratio of students in vocational training programmes at different levels of education, on economic growth, our regression results reveal that the coefficient of the variable is positive for both the countries at upper secondary levels of education. Also, it was closely significant in the case of Bangladesh. In addition, its coefficients at secondary and post levels were found to be positive for this country. In other words, the impact of enrolment ratios, in vocational training programmes, on economic growth was found to be positive in Bangladesh during the period 1991 to 2015 at upper secondary, secondary and post secondary non tertiary levels of education and closely significant at upper secondary.

Gender wise enrolment ratios of students, in vocational programmes, reflect that percentage of female students, as compared to male students, enrolled in vocational programmes, especially at secondary levels of education, has a positive impact on economic growth rates of India and Bangladesh. Moreover, in the case of Bangladesh, the coefficient of female enrolment is closely significant, at post secondary - non tertiary levels of education. As against the ground reality of widespread gender inequality in South Asia, this regression result may draw attention of policy makers to narrow the gender gaps and inequalities prevailing in this region.

Moreover, in comparison with enrolment ratio of students in general programmes at various levels of education, the regression results reflect that the coefficient of enrolment ratio of students in vocational programmes is positive in Bangladesh as compared to the enrolment in general programmes. This could implythat vocational training at upper secondary, secondary and post secondary levels of education have a positive impact on economic growth compared to training in general programmes. In

India, the impact of enrolment ratios of school students in vocational training programmes was found to be positive only at upper secondary levels of education.

As far as formal and non formal training in India is concerned, the data available on the former shows that formal vocational training has remained constant in India at 2.4 percent for the age group between 15-29 years, over the reported years. As a result, regression could not be run due to a constant value and therefore, the impact of formal vocational training on economic growth could not be deduced. The regional experts from India have drawn their concern over the low and constant percentage of formal training being received in India over the years.

Further, with respect to non formal vocational training, it has been noted that National Sample Survey Office (NSSO) has classified it into four categories: hereditary, self learning, learning on the job and others which include all forms of informal learning. The data on this variable indicates that only 8.6 percent of the population has received non formal vocational training in the age group of 15-59 years for the time period under consideration and in the age group of 15-29, the percentage of population has fallen from 7.7 to 7.4 percent.

The estimation results reveal that the impact of non formal vocational training on economic growth pattern is inverse as reflected in the negative coefficient of the variable and an insignificant probability value. This could be attributable to the fact thata small percentage of population of India has been receiving non-formal vocational training being in the age group of 15- 29 or 15 - 59 years. As a result, its effect on economic growth could not be implied accurately, for the period under consideration.

Further to the regression results underlined above, an overview of the existing institutional framework and policies governing skills development and training in India and Bangladesh is noteworthy. In India, enrolment of students in Technical and Vocational Education and Training (TVET) is permissible at tertiary levels of education and beyond. The education services offered to students at primary, lower secondary, upper secondary and secondary levels of school are independent and not linked to the vocational training services offered through industrial training institutes and training centres.

On the other hand, in Bangladesh, vocational education and training comprises of short courses plus three levels of formal TVET, the duration for which are - two years each, to achieve a secondary school vocational certificate, higher secondary vocational certificate, respectively and four years to achieve a diploma in vocational training.

Moreover, most of the policies and programs on skills development and training in Bangladesh have been formulated and implemented under the aegis of TVET Reform Project which was initiated by the Government of Bangladesh, assisted by International Labour Organisation and funded by the European Union. The country has implementedprimarily five plans and policies with prescriptions and implications for TVET. These are Vision (2021), Poverty Reduction Strategy Program II, Education Policy (2010) which focused on an expansion of TVET program, emphasizing on vertical mobility from one level to another and access for underprivileged and marginalized segments of the population, National Skills Development Policy (2011) which advocateda flexible demand orientation for skills development, specifying the role of industry as well as training in the workplace. The Policy has also emphasized on the imposition of basic standards and structures for skills development through a qualifications framework and competency-based training rooted in workplace skill requirements, and the Sixth Five Year Plan (2011-2015). In addition, Skills for Employment and Investment Program was introduced by the Government of Bangladesh in 2014, with the assistance of Asian Development Bank, to strengthen skills development and increase employment in priority sectors such as agribusiness, manufacturing, construction, education, healthcare and information and communication technology.

It has also been noted that while both public and private institutions provide vocational training services, the latter accounts for a major share in enrolment of students. For instance, according to ADB (2011) private providers in Bangladesh account for almost 95 percent of all TVET institutions and about three-fourths of all enrolments.The public providers include the various ministries of of the government of Bangladesh and its departments such Department of Technical Education (under the Ministry of Education), Bureau of Manpower, Education and Training (under the Ministry of Expatriate Welfare and Overseas Employment), Ministry of Youth and

Sports, etc, which deliver some form of skills training. Bangladesh Technical Education Board (BTEB) is responsible for ensuring quality assurance through accreditation of training providers, curriculum development, examinations and certification.

This study has also examined some of the notable strengths of Bangladesh's TVET system, on the basis of literature review. These include, flexibility in training system which is offered via short-term training practices based on the model of cost recovery through subsidies; established links between training providers such as technical training centers (TTCs), technical school and colleges (TSCs), etc, and the industry or the employers; access to short, affordable and demand oriented courses especially to underprivileged sections of the society, and over 3000 accredited private institutions offering formal TVET programs in the country through various industry driven training initiatives.

On the other hand, the skill development efforts in India have been spread across approximately central ministries, State Governments, Union Territories and the private sector. The Ministry of Skills Development and Entrepreneurship, established in 2014, has been entrusted with the task of developinga skills development framework which encompasses skills upgradation, development of new skills as per the job market demands, innovative thought leadership, beside finding ways to mitigate the disconnect between demand and supply of skilled manpower.

The policy framework governing skills development eco-system include the Apprentices Act of 1961 which established the basis for skills acquisition throughformal channels, the National Skills Development Mission (2007) and subsequently the National Skills Policy (2009) which laid the policies and procedures for skill enhancement primarily through public private partnerships. It falls under the purview of Ministry of Skills Development and Entrepreneurship and finally the National Skills Qualification Framework (NSQF) enacted in 2013. Besides, some of the policies specifically governing the education sector as a whole have also been introduced. These include Vocationalisation of Higher Secondary Education (2011), Sarva Shiksha Abhiyan (2001) and Rashtriya Madhyamik Shiksha Abhiyan (2009), National Youth Policy (2014) and the Twelfth Five Year Plan (2012-2017) which has

accorded highest priority to the expansion of quality education across all segments of the society.

Skills acquisition in India is primarily undertaken through two channels which include both formal and informal methods. The public and private sectors aim at imparting the formal training. The Industrial Training Institutes (ITIs) are run by the government and are prime institutions to offer vocational training in the country. Besides this, there are privately run Industrial Training Centres (ITCs) and vocational schools. While there is a fair degree of participation from the private sector in skills development, it has been noted by this study public sector dominates the vocational training landscape in the country. The informal channel of offering vocational training is largely unstructured and can be imparted through working on the job or through experiential learning.

The nodal agency responsible for providing vocational training services in India is the Director General of Employment & Training (DGET) under the Ministry of Labour and Employment. DGET is responsible for overall formulation of policies, establishing skill standards, granting affiliation, trade testing and certification, and all related matters pertaining to vocational training and provision of employment services. The National Skill Development Council (NSDC), under the Ministry of Skill Development and Entrepreneurship, provides avenues for viability gap funding and promote private skill initiatives.The technical education is offered through technical institutes in India which are regulated by All India Council for Technical Education (AICTE). The Ministry of Human Resource Development governs the educational system in India. The functioning of education universities and colleges is regulated by the University Grants Commission (UGC) that is responsible for granting funds, ascertaining and ensuring standards for teaching, learning and evaluation in the Universities. A complete chapter (*Chapter Three*) has been dedicated to explaining the institutional and policy frameworks governing skills development and training in India and Bangladesh.

The policy frameworks in the two countries also govern the infrastructure facilities supporting skills development and training. Therefore, another qualitative indicator of human capital used in our analysis is the availability and enrolment of 'qualified, trained and motivated teachers' in vocational programmes. This measure has been

considered in the background of our research that countries in South Asia suffer from large scale absenteeism and drop out of students from formal education, primarily in the absence of good teaching practices. Therefore the impact of this variable on economic growth has been empirically tested.

The regression results show that the coefficient of teachers' enrolment in vocational programmes is positive for both the countries, and significant in the case of Bangladesh. This implies that the variable 'number of teachers in secondary vocational education as a percentage of total number of teachers in secondary education' has a positive influence on economic growth of India and Bangladesh between 1991 and 2015. Moreover, its impact is also significant in the latter country, which reinforces the observation on the data available for this indicator.

While India barely had close to 1 percent of the teachers employed for vocational programmes at the secondary level in 1991, Bangladesh was close to 3 percent, in its allocation of teachers for vocational education. By 2015, India had touched a little over 2 percent in its skilled teachers' enrolment in secondary vocational education. However, Bangladesh on the other hand, had already progressed to close to 6 percent by this year.

At the same time, the pupil teacher ratio (PTR) which is a qualitative indicator measuring the progress in provision of education, was quite impressive for Bangladesh in 2013 at 30.7 as compared to India which was 35.2. According to UNESCO (2015), a ratio of 30:1 is the most widely used benchmark in secondary education and Bangladesh was the only South Asian country achieving this ratio and above in the year 2012. The country also met the pupil teacher ratio target of 40:1 in primary education during the same year. The regional experts from India and Bangladesh have also reinforced the need for better infrastructure support in the form of well trained and qualified teachers and trainers, during our interactions.

Against the qualitative dimension of human capital, the role of quantitative indicators on economic growth has also been examined. An initial examination, from the data collected on different human capital indices, could deduce that India and Bangladesh have been witnessing improvements in their quantitative indicators of human capital owing to the favourable policies governing human capital development. For instance,

between 1990 and 2015, India's Human Development Index (HDI) value increased from 0.428 to 0.624, an increase of 45.7 percent. At the same time, Bangladesh witnessed an even higher progress. The country's HDI value increased from 0.386 to 0.579, an increase of 50 percent during the 25 year period though both the countries have been maintaining an improving trend since the 1990s. International agencies such as UNDP (2016) have reported that such an improvement in the country's HDI value has shifted Bangladesh from low to the medium human development category positioning the country at 139 in 2015 from 142 in 2014. Moreover, Bangladesh is also credited for achieving the highest annual average increase in HDI value in South Asia in 2013.

However, as against the HDI values, the inequality adjusted HDI values stood at 0.412 for Bangladesh and 0.454 for India in 2015. This implied that the resultant overall loss in the distribution of HDI dimension indices was higher, that is close to 30 percent, in case of former compared to the latter, which was nearly 27 percent. In other words, the loss to human development in Bangladesh is higher due to greater levels of inequality compared to that of India.

Similarly, in a comparison of human development indicators, it could be deduced that India has lagged behind on life expectancy at birth and expected years of schooling. Bangladesh, on the other hand has witnessed slow improvements in adult literacy rate, mean years of schooling and gross national income per capita, as compared to India. Data on these indicators reveals that Bangladesh's life expectancy at birth increased by 13.6 years, its adult literacy rate increased to nearly 62 percent from a little over 35 percent, the mean years of schooling increased by 2.4 years, its expected years of schooling by 4.5 years and the gross national income per capita increased by 160 percent between 1990 and 2015.

During the same period, India's life expectancy increased by 10.4 years, its adult literacy rate increased to a little over 72 percent from 48 percent, its mean years of schooling increased by 3.3. years and expected years by 10.4 years. India also reported an increase of over 223 percent in its gross national income per capita between 1991 and 2015. The regression analysis for these indicators could draw interesting inferences with respect to their impact on economic growth of the two countries.

For instance, the impact of students' gross enrolment ratios at various levels of education, on economic growth has been examined empirically. The regression results reflect that the coefficients of schooling enrolment at upper secondary and secondary levels are negative and insignificant for both the countries, which imply that the impact of gross enrolment ratio at upper secondary and secondary levels of education on economic growth is negative in India and Bangladesh during the period 1991 to 2015.

The reasons for such a dismal result could be cited in the existing literature on this subject that has reported insufficient attendance rates and increasing number of dropout rates in schools, especially in rural areas. It has been reported that only 66 out of 100 students survive to the last grade of primary education. Moreover, 30 to 50 percent of the population aged 15-64 in India and Bangladesh had some secondary education or higher and around one-third remained uneducated. Moreover, growing incidences of students missing school have also been reported by studies; especially in in the age group of 7-14 years on account their increasing participation in the labour market activities.

In the case of tertiary education, however, the coefficient of enrolment ratio at this level is positive for Bangladesh, signifying the positive impact of higher education on economic growth in the country. Moreover, the enrolment of students in each field of education at the tertiary level indicate that the most demanding field of research is agriculture, primarily agribusiness, followed by manufacturing, construction, and information and communication technology services.

Further, the regression results with respect to other quantitative indicators of education dimension such as mean years of schooling and adult literacy rates indicate that these variables have a positive influence on economic growth in Bangladesh, as compared to India. This could be due to the fact that growth rates in years of schooling and literacy rates have been proportionately higher in the former as compared to the latter country, as observed from the data collected on these indicators.

Similarly, as far as the health dimension of human capital is concerned, the impact of quantitative variable, life expectancy at birth has been examined in our analysis. The

regression result with respect to the impact of this independent variable on economic growth of India and Bangladesh, shows that its coefficient is negative for both the countries. This implies that life expectancy at birth has a negative impact on economic growth in India and Bangladesh, even though it has been increasing over the years. In the case of latter country, the test result, though negative, is highly significant. This reinforces the fact that the focus could be on improving the quality of health standards in the region to measure the progress on quantitative indicators such as life expectancy. Such an implication has also been suggested by regional experts during our interactions.

It has been noted that lost health expectancy which is the relative difference between life expectancy and healthy life expectancy as a percentage of life expectancy at birth, is a vital qualitative indicator for health dimension of human capital. However, this variable had to be omitted from the empirical analysis on account of lack of adequate availability of data on this variable. The lost health expectancy was 13.9 percent and 12.9 percent in India and Bangladeshrespectively, in 2016. According to UNDP (2018), these countries have been among some of the low performing nations globally, with respect to good health and well being.

As mentioned before, literature has emphasized the need for 'skilled human capital' which generates positive externalities, leading to growth in productivity as well as research and development and innovation. Taking cue from the existing literature on this subject, 'human capital embodied labor' or effective labour input has also been created in this thesis by combining labor force participation rate with enrolment ratios in vocational training programmes at various levels of education and formal and non formal vocational training. The impact of this variable on economic growth has also been examined empirically for India and Bangladesh during the time period under consideration.

The regression results reveal that the coefficient of effective labour input is positive for both the countries, which implies that human capital embodied labour has a positive impact on economic growth of India and Bangladesh. Moreover, it is also significant at the level of post secondary non tertiary level of education in the case of Bangladesh which reinforces the fact that higher education is vital for skills development and training.

Finally, various financial parameters have also been considered by this study to examine their impact on economic growth of India and Bangladesh during the period from 1991 to 2015. These are government expenditure on education and health (as a percentage of gross domestic product of the respective countries), expenditures on education and health (as a percentage of total government expenditures, respectively), and expenditure on research and development (as a percentage of gross domestic product of the respective countries).

The results of regression show that expenditures on education and health have a positive impact on economic growth of both the countries. However, they do not have a significant contribution towards growth, as per the regression results. This may be due to the abysmally low allocation of national budgets and funding on such services and which have stagnated over the years, in both the countries (this inference could be drawn after observing the change in the expenditure allocation for various years; the data set collected on the parameters reflects almost the same figure for different years in succession). Moreover, this study has observed that skills development and training as a service sector has not been allocated any separate funding and is clubbed with the budget allocated on education.

Also, this study has observed that the allocation of national expenditure on research and development in countries of South Asia, is miniscule. For instance, in the case of India, the data collected on this variable for different years, shows that expenditure spent research and development has not improved over the years and has also remained below 1 percent of the GDP. This could be inferred as one of the reasons for this variable to have a positive, yet insignificant, impact on economic growth in India (on the basis of the regression analysis).

In light of the above inferences and conclusions drawn on the basis of empirical analysis conducted in this thesis, the hypothesis presented in this thesis has been proven valid. In other words, the research findings of this study confirm that qualitative dimension of human capital and especially skills development and training is vital for economic growth.

However, some challenges were also encountered during the course of empirical analysis primarily related to lack of adequate data availability on several qualitative

indicators of human capital such as number of physicians (medical doctors) and hospital beds in a country, number of skilled teachers enrolled at various levels of school education, national expenditure spent on research and development in Bangladesh, among others. As a result, such indicators of human capital, though relevant, were omitted from the empirical analysis.

Subsequent to our empirical analysis and consultations with regional experts, challenges in policy frameworks governing qualitative dimension of human capital, have been underlined. These are delineated in *Chapter Five* of this research thesis. Some of the challenges underlined in the chapter include the growing mismatch between level of skills that employers require and the supply of employable skills in the labor market, low employment rates, lack of enterprise based training, skewed skilled proportions causing disparities in access and participation across gender, income and social groups, geographical inequities, mobility concerns, lack of skilled teachers and qualified instructors, lack of synergies among various stakeholders in designing the curriculum and finally the lack of pro-active policies and financial allocation on promoting qualitative development of human capital.

Taking some specific examples, while the enrolment ratios in vocational training is quite high in Bangladesh as compared to India, the percentage is low when compared with other emerging countries of Asia and dismal when it comes to percentage of workforce trained in the South Asian countries. Additionally, instances of de-linkages between academic institutions and industry in the formulation of teaching and training curriculum have also been noted during the course of our interactions with regional experts in these countries.

Therefore, focused attention of the governments in South Asian countries on strengthening synergies among all relevant stakeholders from government, academia and the industry could possibly mitigate the existing mismatch between demand and supply of skills. Moreover, the countries in South Asia may also consider participating in international skill assessment mechanisms to examine the progress on skills development. A review of the existing literature shows that test scores on international assessments such as Programme for International Student Assessment (PISA), Trends in International Mathematics and Science Study (TIMSS), Programme

for the International Assessment of Adult Competencies (PIAAC) etc, are all positively related to economic growth.

Similarly, it has also been observed that many vocational training systems in South Asia continue to focus rigidly on preparation for terminal examinations or trade tests, while they have become obsolete and disconnected with the requirements of the labour market. TVET systems are deficient in practical training, unlike in countries in East and Southeast Asia. In most of these countries, the content of the curriculum followed in technical secondary school qualifies its graduates to enroll in colleges and universities. In contrast, there is also no clear distinction or linkages between the curriculum taught in TVET institutions and that implemented in practice, South Asia region.

In addition, during the course of, interactions with regional experts on this subject it could also be deduced that the policies governing skills development, higher education and TVET services are highly centralized in South Asian countries. Therefore, they might not be implemented effectively. Moreover, the existence of too many governing bodies on skills development without proper coordination could make the operations complex and cumbersome. Such fragmentation could also lead to unnecessary delay in the implementation of necessary policies and plans.

Against the background of the above analysis, following measures are suggested to contribute towards effective policy making in South Asia. These include, ensuring a focus on qualitative development of human capital by investing in relevant infrastructure supporting education, healthcare and skills development that includes upgradation of quality of technical educators, trainers and teachers, formulation and implementation ICT strategies that are affordable and effective in reaching out, especially to the under-served, remote areas and enabling scrutiny, assessment and evaluation of performance for providers and receivers of education and training.

Moreover, in order to specifically narrow the demand and supply mismatch in skills of the workforce, and develop a demand oriented TVET system, there is a need to appoint employers in governance and policy making structures; institutionalizetracer and tracking studies to measure the effectiveness of training programs on a regular basis; ensure a continuous process of reforming the training programs in synergy with

the changing needs of the job market; provide incentives to training providers and employers for meeting the job centric performance standards in terms of quantity and quality of recruitment; ensureavailability and accessibility of authentic data on human capital indicators; make training institutions autonomous with proper safeguards, scrutiny mechanisms and accounting controls and finally enable gender sensitive work environment to ensure balanced participation of the female and male labor force in the job market.

In this context, several lessons may be drawn from some of the advanced economies of the West and emerging economies of East and South East Asia, which have been practicing effective training programs, engaging all stakeholders from the government, academia and the industry as well as implementing proactive policies and strategies on skills development. For instance, a noteworthy policy initiative, in some of the East Asian countries, is the enactment of a law on vocational training which has been instrumental in enhancing skills development and employment in those countries. On similar lines, countries in South Asia may also explore the possibility of such laws and Acts on skills development and vocational training.

A noteworthy development, which has also been acknowledged in this thesis, is India's recent consideration to introduce a right-based legislation for skills training in line with those in Germany and South Korea, to make skills development enforceable by law. It has been observed that the idea of legislation was first mooted in the final Report of the Sub-Committee on Skills Development in 2015. It could be inferred that such an initiative could significantly improve the employability of the Indian workforce.

Therefore, demographic transition in South Asia offers a window of opportunity in the form of a demographic dividend which remains to be capitalized. This could be realized if the work force is skilled, educated and healthy. In other words, investing in skills development, training, education, healthcare and research and development would help to unlock productivity and innovation, reduce poverty, create opportunities for growth, generate prosperity and foster progress in the economies of South Asia.

BIBLIOGRAPHY

Primary sources are mentioned by *

*Abbas, Q. (2000), "Endogenous Growth and Human Capital. A Comparative Study of Pakistan and India", *The Pakistan Development Review*, 39 Part II (Winter 2000) pp.451-473.

*Abbas, Q. (2001), "Endogenous Growth and Human Capital. A Comparative Study of Pakistan and Sri Lanka", *The Pakistan Development Review*, 40:4 Part II (Winter 2001) pp.987-1007.

Abbas, Q., and J. Peck (2007), *Human Capital and Economic Growth in Pakistan1960-2003*, Cardiff Economics Working papers, E2007/22.

Amassoma, D. and P.I. Nwosa (2011), "Investment in Human Capital and Economic Growth in Nigeria: A Causality Approach", *Canadian Social Science*, Vol. 7, No.4, pp. 114-120.

Amir, M., et.al. (2012). "Impact of human capital on economic growth with emphasis on intermediary role of technology: Time Series Evidence from Pakistan", *African Journal of Business Management*, 6, pp. 280-285.

Arora, S. (1999), *Health and Long-Term Economic Growth: A Multi-Country Study*, Doctoral Dissertation, Ohio State University, USA.

Arora, S. (2001), "Health Human Productivity and Long-Term Economic Growth", *Journal of Economic History*, 61(3), pp. 699-749.

*Asian Development Bank (2013), "Skills Development for Inclusive and Sustainable Growth in Developing Asia-Pacific", *Technical and Vocational Education and Training: Issues, Concerns and Prospects*, Vol.19.

*Asian Development Bank (2015), *Innovative Strategies in Technical and Vocational Education and Training for Accelerated Human Resource Development in South Asia* (Bangladesh), URL: https://www.adb.org/sites/default/files/publication/167320/tvet-hrd-south-asia-bangladesh.pdf

*Asian Development Bank (2016), "Skill Development in Bangladesh", *ADB Briefs*, No.67.

*Asian Development Bank (2016), "Skill Development in India", *ADB Briefs*, No.61.

*Asian Development Bank (2017), *Human Capital Development in South Asia: Achievements, Prospects, and Policy Challenges*,URL: https://www.adb.org/sites/default/files/publication/385696/hcd-sa.pdf

Asteriou, D. and G.M. Agiomirgianakis (2001), "Human capital and economic growth: time series evidence from Greece", *Journal of Policy Modeling*, Vol. 23, No 5, pp. 481-489.

Azariadis, C. and A. Drazen (1990), "Threshold Externalities in Economic Development", *The Quarterly Journal of Economics*, Vol. 105, No. 2, pp. 501-526.

*Barro, R. (1991), "Economic Growth in a Cross Section of Companies", *Quarterly Journal of Economics*, Vol.106, No.2, pp. 407-443.

Barro, R. (1998), *Notes on Growth Accounting*, National Bureau of Economic Research, Working Paper Series, Working Paper N 6654.

Barro, R. (2001), *Education and Economic Growth*, Research Paper, Harvard University.

Barro, R. and J.Lee (1993), "International Comparisons of Educational Attainment", *Journal of Monetary Economics*, Vol. 32, No.3, pp. 363-394.

Barro, R. and Sala-i-Martin (1995), *Economic Growth*, MIT Press, 1st edition.

*Becker, G. S. (1975), *Human Capital*, Chicago: University of Chicago Press, 2nd edition.

Becker, G.K. et.al. (1990),"Human Capital, Fertility and Economic Growth", *Journal of Political Economy*, Vol. 98, N 5, part II, p. S12-S37.

Benhabib, J. and M.Spiegel (1992*), The Role of Human Capital in Economic Development: Evidence fromAggregate Cross-Country and Regional U.S. Data*, Starr Center for Applied Economics,Working Paper N 9224.

Bhargava, A., et.al. (2001), "Modeling the effects of Health on Economic Growth", *Journal of Health Economics*, 20(3), pp. 423-440.

Bill and Melinda Gates Foundation (2018), *Goalkeepers: The Stories Behind the Data 2018*, URL: https://www.gatesfoundation.org/goalkeepers/report

Bils, M. and P. Klenow (1998), *Does Schooling Cause Growth or the Other Way Round?*, Working Paper N 6393, National Bureau of Economic Research.

Blaug, M., et.al. (1969), "The Causes of Graduate Unemployment in India", *Allen Lane the Penguin, London*.

Bloom, D. E and J. Sachs (1998), *Geography, Demography and Economic Growth in Africa*, Brookings Papers on Economic Activity, 2, pp. 207-95.

*Bloom, D. E. (2011), *Population Dynamics of India and Implications for Economic Growth, Harvard Institute for Global Health*, Program on the Global Demography of Aging, Working Paper No.65.

*Bloom, D.E and J. Williamson (1998), "Demographic Transitions and Economic Miracles in Emerging Asia", *World Bank Economic Review*, Vol. 12, No. 3, pp. 419–455.

*Bloom, D.E. (2011), *Demographic Change and Economic Growth in South Asia*, Harvard School of Public Health, PGDA Working Paper No.67.

Brempong, G.K. and M. Wilson (2004), "Health human capital and economic growth in Sub-Saharan African and OECD countries", *The Quarterly Review of Economics and Finance*, Vol. 44, pp. 296-320.

Centre for Universal Education (2013), *Accelerating Progress to 2015* (Bangladesh), The UN Secretary General's Global Initiative on Education - Working Paper

Comyn P. (2009), *Review of the Structure and Coordination of Skills Development in Bangladesh*, URL: http://www.ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/@ilo-dhaka/ documents/publication/wcms_121310.pdf

Contractor, F.J. and S.M.Mudambi (2008), "The Influence of Human Capital Investment on the Exports of Services and Goods: An Analysis of the Top 25 Services Outsourcing Countries", *Management International Review*, Vol.48, No.4, pp. 433-445.

Dauda, O.R. (2010), *Role of Human Capital in Economic Development: An Empirical Study of the Nigerian Case*, Manuscript, Oxford Business and Economics Conference Program.

Denison E. F. (1962), *The Sources of Economic Growth in the United States and the Alternatives Before Us*, Committee for Economic Development.

Denison E. F. (1965), *Improved Allocation of Labor as a Source of Higher European Growth Rates*, Brookings Institution.

Denison, E.F. (1967), *Why Growth Rates Differ: Postwar Experience in Nine Western Countries*, Washington, DC: Brookings Institution.

Desjardins, R. and K. Rubenson (2011), *An Analysis of Skill Mismatch using Direct Measures of Skills*, OECD Education Working Papers No. 63 (Paris, OECD).

Duma, N. (2007), *Sri Lanka's Sources of growth*, IMF working paper No. 07/225.

Dundar, H., et.al.(2014), *Student Learning in South Asia: Challenges, Opportunities, and Policy Priorities,* World Bank Publications.

Eigbiremolen, O. and U. Anaduaka (2014), "Human Capital Development and Economic Growth: The Nigerian Experience", *International Journal of Academic Research in Business and Social Sciences*, Vol. 4, No. 4, pp. 25-35.

*Estevão, M. and E. Tsounta (2011), *Has the Great Recession Raised U.S. Structural Unemployment?*IMF Working Paper, WP/11/105 (Washington, DC, International Monetary Fund).

Fogel, R. W. (1997),"New Findings on Secular Trends in Nutrition and Mortality: Some Implications for Population Theory", in Oded Stark and Mark Richard Rosenzweig (eds.)*The Handbook of Population and Family Economics Volume 1A.*

Frank, R. H. and B.S. Bernanke (2007), *Principles of Microeconomics* (third edition), New York: McGraw- Hill/Irwin.

Ghatak, S. and D.Jha (2007), *Does Human Capital Play a Role in Economic Growth? A Time Series Study in India*, Social Science Research Network, URL: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2569095

Goel, V.P.(2012), "Technical and Vocational Education and Training (TVET) System in India for Sustainable Development", *Progress Paper*, Ministry of Human Resource Development, Government of India

Gopalakrishna, B.V. and J.Rao (2012), "Economic Growth and Human Development: The Experience of Indian States", *Indian Journal of Industrial Relations*, Vol. 47, No.4, pp. 634-644.

Hajela, R. (2012), *Shortage of Skilled Workers: A Paradox of the Indian Economy*, SKOPE, Research, Paper No. 111, ESRC Centre on Skills, Knowledge and Organisational Performance, COMPAS, University of Oxford.

Haldar, S.K. and G. Mallik (2010), "Does Human Capital Cause Economic Growth? A Case Study of India", *International Journal of Economic Sciences and Applied Research*, Vol. 3(1), pp. 7-25.

Hall, R. and C. Jones (1999), "Why Do Some Countries So Much More Output Per Worker Than Others?",*The Quarterly Journal of Economics*, Vol. 114, No.1, pp. 83-116.

Hanushek, E. and D. Kimko (2000), "Schooling, Labour-Force Quality and the Growth of Nations", *The American Economic Review*, Vol. 90, No. 5, pp. 1184-1208.

*Hanushek, Eric A and L. Woessmann (2012a), "Do better schools lead to more growth? Cognitive Skills, Economic Outcomes, and Causation", *Journal of Economic Growth*, 17(December (4)), pp. 267–321.

Harbison, F. (1973), *Human Resources as the Wealth of Nations*, Oxford University Press, New York.

Helal, M and Md. A. Hossain (2013), “Four Decades of Economic Development of Bangladesh: An Assessment”, *Journal of the Asiatic Society of Bangladesh*, Vol. (58)2, pp.335-362.

*International Labour Organisation (2009), "Survey and Assessment of Formal and Informal Apprenticeships in Bangladesh", *Final Report*, ILO-JOBS Assessment.

*International Labour Organization (2011), *Bangladesh: (Technical and Vocational Education and Training) Skills Vision 2016*, URL: http://www.ilo.org/dhaka/Whatwedo/Projects

*International Monetary Fund (2015), *South Asia: Robust Growth Amid Global Uncertainty*, South Asia Regional Update, URL: https://www.imf.org/external/country/IND/rr/2015/103015.pdf

Islam, N. (1995), "Growth Empirics: A Panel Data Approach", *The Quarterly Journal of Economics*, Vol. 110, No. 4, pp. 1127-1170.

Johnson, A.O.(2011), "Human Capital Development and Economic Growth in Nigeria",*European Journal of Business and Management*, Vol. 3, No. 9, pp. 29-38.

Jorgenson, D.W. and Z. Griliches (1967), "The Explanation of Productivity Change", *Review of Economic Studies*, Vol. 34, pp. 249-280.

Judson, R. (1998), "Economic Growth and Investment in Education: How Allocation Matters", *Journal of Economic Growth*, Vol. 3, No. 4, pp. 337-359.

Karan, A.K., and S. Selvaraj (2012), *Why Publicly Financed Health Insurance Schemes are Ineffective in Providing Financing Risk Protection*,URL: http://re.indiaenvironmentportal.org.in/files/file/PubliclyFinanced%20Health%20Insurance%20Schemes.pdf

Karan, A.K., et.al (2014), "*Moving to Universal Coverage? Trends in the Burden of Out-Of-Pocket Payments for Health Care across Social Groups in India, 1999-2000 to 2011-12*", URL: https://doi.org/10.1371/journal.pone.0105162

Kathuria, S. and M. Mezghenni (2016),"Toward New Sources of Competitiveness in Bangladesh: Key Findings of the Diagnostic Trade Integration Study", *Directions in Development Series*, Washington, DC: World Bank.

Khan, M.A. (2007), "Role of Human Capital in Attracting Foreign Direct Investment: A South Asian Perspective", *SAARC Journal of Human Resource Development*, pp. 5-25, retrieved from URL: http://www.shrdc.org/doc/sjhrd/2007/3.Dr.Aslam-Pakistan.pdf.

*Konrad Adenauer Stiftung (2015), *Skills Development in India,* Report, URL: http://www.kas.de/wf/doc/kas_42848-1522-2-30.pdf?151016072126

Krueger, A. and M. Lindahl (1999), *Education for Growth in Sweden and the World*, National Bureau of Economic Research, Working Paper N 7190.

Kyriacou, G. (1991),*Level and Growth Effects of Human Capital: A Cross-Country Study of the Convergence Hypothesis*., C.V. Starr Center for Applied Economics, Economic Research Reports, pp. 19-26.

*Lange, G., et.al. (2018), *The Changing Wealth of Nations 2018: Building a Sustainable Future*, International Bank for Reconstruction, World Bank Group, URL: http://documents.worldbank.org/curated/en/727941517825869310/pdf/123137-Replacement-PUBLIC.pdf

Lazear, E.P. (2003), "Teacher Incentives", *Swedish Economic Policy Review,* Vol. 10, No. 3, pp. 179–214.

Lee, Y. (2009),*Vocational Education and Training in the Process of Industrialization.* Understanding Korean Educational Policy, Vol. 5, Seoul: Educational Development Institute.

Lee, J., et.al. (2017), *Human Capital Development in South Asia: Achievements, Prospects, and Policy Challenges*, Asian Development Bank, URL: https://www.adb.org/sites/default/files/publication/385696/hcd-sa.pdf

Leeuwen, B.V. (2007), *Human Capital and Economic Growth in India, Indonesia and Japan*: A Quantitative Analysis (1890-2000)", Research Report, URL: www.iisg.nl/indonesianeconomy/humancapital/pdf/proefschriftbvl.pdf

*Lucas, R. (1988), "On the Mechanics of Economic Development", *Journal of Monetary Economics*, Vol. 22, pp.3-42.

Maclean, R., et.al.(2013), *Skills Development for Inclusive and Sustainable Growth in Developing Asia-Pacific*, Asian Development Bank, Volume 19, Springer.

Madsen, J. B., et.al. (2008), *The Indian Growth Miracle and Endogenous Growth*, Department of Economics Discussion Paper No. 17/08, Monash University of Business and Economics.

*Mankiw, G. et.al (1990), *A Contribution to the Empirics of Economic Growth*, Bureau of Economic Research, Working Paper Series, Working Paper N 3541.

McMahon,W. W. (1998), "Education and growth in East Asia", *Economics of Education Review*, Vol. *17*, pp. 159–172.

Md. R.Islam (2014), "Education and Economic Growth in Bangladesh - An Econometric Study", *IOSR Journal of Humanities and Social Science,* Vol. 19, Issue 2, pp. 102-110.

Mehrotra, S. et.al (2013), "Estimating India's skill gap on a realistic basis for 2022", in *Economic and Political Weekly*, Vol. 48, No. 13, pp. 102–111.

*Ministry of Education, Government of Peoples Republic of Bangladesh, *National Skills Development Policy 2011*, URL: http://www.ilo.org/wcmsp5/groups/public/@asia/@ro-bangkok/@ilo-dhaka/documents/publication/wcms_113958.pdf

*Ministry of Finance, Government of Peoples Republic of Bangladesh, *Budget 2015-16*, URL: www.mof.gov.bd/en/budget/15_16/ber/en/Ch-12.pdf

*Ministry of Health and Family Welfare, Government of India, *Situation Analyses (2017)*, URL: http://www.thehinducentre.com/multimedia/archive/03145/Situation_Analyses_3145486a.pdf

*Ministry of Human Resource and Development (2012), *XI Plan Document*, URL: http://mhrd.gov.in/sites/upload_files/mhrd/files/document-reports/XIPlandocument_1.pdf

*Ministry of Human Resource Development, Government of India, *Education Statistics At a Glance (2016)*, URL: mhrd.gov.in/sites/upload_files/mhrd/files/statistics/ESG2016_0.pdf

*Ministry of Human Resource Development, Government of India, *Education Statistics At a Glance (2013)*, URL: mhrd.gov.in/sites/upload_files/mhrd/files/statistics/EAG_2013.pdf

*Ministry of Primary and Mass Education, Government of the People's Republic of Bangladesh, *Education for All 2015 National Review*, URL: unesdoc.unesco.org/images/0023/002305/230507e.pdf

Ministry of Primary and Mass Education, Government of the People's Republic of Bangladesh, *Annual Primary School Census 2014*, URL: http://dpe.portal.gov.bd/sites/default/files/files/dpe.portal.gov.bd/publications/35332e71_7177_43e4_acad_69855daff795/APSC2014_for%20National%20Committee_11032015.pdf

*Ministry of Skills Development and Entrepreneurship, Government of India, *National Policy for Skill Development and Entrepreneurship 2015*, URL: http://msde.gov.in/assets/images/Skill%20India/policy%20booklet-%20Final.pdf

*Ministry of Skills Development and Entrepreneurship, Government of India, *National Skills Development Policy 2009*, URL: http://www.skilldevelopment.gov.in/assets/images/NationalSkillDevelopmentPolicyMar09.pdf

Mitra, A. et.al (2002), 'Productivity and Technical Efficiency in Indian States Manufacturing: The Role of Infrastructure", *Economic Development andCultural Change*, Vol. 50, No. 2, pp. 395–426.

*Mitra, A. (2013), *Can Industry be the Key to Pro-poor Growth? An Exploratory Analysis for India,* ILO Asia-Pacific Working Paper Series, DWT for South Asia and Country Office for India, 2227-4391.

Mulligan, C.B. (1999), "Galton Versus the Human Capital Approach to Inheritance", *Journal of Political Economy*, Vol. 107, no. 6, pt. 2, pp. S184–224.

Murnane, R.J., et.al. (2000), "How Important are the Cognitive Skills of Teenagers in Predicting Subsequent Earnings?",*Journal of Policy Analysis and Management,* Vol. 19, no. 4, pp. 547–68.

Nakamura, J.I (1981), "Human Capital Accumulation in Pre-modern Rural Japan", *The Journal of Economic History,* Vol. 41 (2), pp. 263-281.

*National Sample Survey Office (2005), *Status of Education and Vocational Training in India,* NSS 60th Round Report, Ministry of Statistics and Programme Implementation, Government of India

*National Sample Survey Office (2006), *Status of Education and Vocational Training in India*, NSS 61st Round Report, Ministry of Statistics and Programme Implementation, Government of India, URL: http://mospi.nic.in/sites/default/files/publication_reports/517_final.pdf

*National Sample Survey Office (2012), *Employment and Unemployment and Migration Survey*, NSS 64th Round Report, Ministry of Statistics and Programme Implementation, Government of India, URL: file:///E:/user%20profile/anjali.taneja/Downloads/IHSN%20Study%20Report-NSS64R-Schedule%2010dot2.pdf

*National Sample Survey Office (2013), *Status of Education and Vocational Training in India,* NSS 66th Round Report, Ministry of Statistics and Programme Implementation, Government of India

*National Sample Survey Office (2015), *Status of Education and Vocational Training in India*, NSS 68th Round Report, Ministry of Statistics and Programme Implementation, Government of India,

*National University of Education, Planning and Administration, Ministry of Human Resource Development, Government of India, *Education For All: Towards Quality with Equity (2014)*, URL: http://www.nuepa.org/Download/Publications/UnPriced/EFA%20Towards%20Quality%20with%20Equity,%20India.pdf

*Navaneetham, K., and A. Dharmalingam (2012), "A Review of Age Structural Transition and Demographic Dividend in South Asia: Opportunities and Challenges", *Journal of Population Ageing*, Vol. 5, pp. 281-298.

Newland, C. and M.J.S. Segundo (1996), "Human Capital and Other Determinants of the Price Life Cycle of a Slave: Peru and La Plata in the Eighteenth Century", *The Journal of Economic History*, Vol. 56 (3), pp. 694-701.

*Niti Ayog (2015), *Report of the Sub-Group on Skills Development*, URL: http://niti.gov.in/writereaddata/files/Final%20report%20%20of%20SubGroup%20Report%20on%20Skill%20Development.pdf

*OECD and the World Bank (2013), *Indicators of Skills for Employment and Productivity: A Conceptual Framework and Approach for Low-Income Countries*, URL: http://www.oecd.org/g20/topics/development/indicators-of-skills-employment-and-productivity.pdf

*Ojha, V.P. and B.K. Pradhan (2012), *Human Capital Formation and Economic Growth in India: A CGE Analysis*, Working Paper, National Council of Applied Economic Research (NCAER), New Delhi.

Parida, P.C. and P. Sahoo (2007), "Export Led Growth in South Asia: A Panel of Cointegration Analysis", *International Economic Journal*, Vol.21, No.2, pp. 155-175.

Park, J. (2012), "Total Factor Productivity Growth for 12 Asian Economies: The Past and the Future", *Japan and the World Economy*,Vol.24, No.2, pp. 114–27

Piazza, G. and Barbara (2002), "The role of human and social capital in growth: extending our understanding", *Cambridge Journal of Economics*, Vol. 26, No. 4, pp. 461-479.

Pradhan, B.K (2002), Role *of Education in Wage Inequality Change in India: 1988-97*, Working Paper, National Council of Applied Economic Research, New Delhi.

Pritchett, L. (1996), *Where Has All the Education Gone?*, Policy Research Working Paper N 1581, World Bank.

Psacharopoulos, G (1993), *Returns to Investment in Education: A Global Update*, PPR Working Paper No. WPS 1067, World Bank, Washington, D.C.

Qadri, F.S. and A. Waheed (2011), *Human Capital and Economic Growth: Time Series Evidence from Pakistan*, MPRA Paper No. 30654.

Rauche, J.E. (1988), *The Question of International Convergence of per capita Consumption: An Euler Equation Approach*, mimeo, University of California at San Diego.

Rebelo, S. (1990), *Long Run Policy Analysis and Long Run Growth*, Working Paper N 3325, NBER Working Paper Series, National Bureau of Economic Research.

Romer, C. and D. Romer (1989), "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Swartz", *NBER Macroeconomics Annual*.

*Romer, P. (1990), "Endogenous Technological Change", *The Journal of Political Economy*, Vol. 98, No.5, pp. S71-S102.

Romer, P. (1994), "The Origins of Endogenous Growth", *The Journal of Economic Perspectives*, Vol. 8, No. 1, pp. 3-22.

Romer, P. (2001), "Is Growth Exogenous? Taking Mankiw, Romer and Weil Seriously", *NBER Macroeconomic Annual*, Vol. 16, University of Chicago Press.

Rosés, J. R. (1998), "Measuring the Contribution of Human Capital to the Development of the Catalan Factory System (1830-1861)", *European Review of Economic History*, Vol. 2, pp. 25-48.

Sachs, J. and A. Warner (1997), “Fundamental Sources of Long-Run Growth”, *American Economic Review* (Papers and Proceedings) Vol. 87, pp. 184-188

Sala-i-Martin X., et.al. (2004), “Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach”, *American Economic Review*, Vol. 94, no. 4, pp. 813–35.

Sandberg, L.G. (1979), "The Case of the Impoverished Sophisticate: Human capital and Swedish Economic Growth before World War I", *The Journal of Economic History*, Vol. 39 (1), pp. 225-241.

Sharif, T. et.al. (2013), "Human Resource Development and Economic Growth in Bangladesh: An Econometric Analysis", *European Journal of Business and Management*, Vol.5, No.7, pp. 133-144.

*Solow, R. (1956), “A Contribution to the Theory of Economic Growth”, *Quarterly Journal of Economics*, Vol. 70(1), pp. 65-94.

Srivatsan, R., R. Shukla and V. Shatrugna (2011), "Aarogyasri Healthcare Model: advantage Private Sector", *Economic and Political Weekly*, Vol XLVI No 49.

Sulaiman, C., et.al. (2015), *Human Capital, technology and Economic Growth: Evidence from Nigeria*, Article, October -December, SAGE Publication.

Temple, J. (2001), *Growth Effects of Education and Social Capital in the OECD Countries*, OECD Economic Studies No. 33, OECD.

Tilak, J.B.G. (1987), *Economics of Inequality in Education*, Working Paper, Sage Publications/Institute of Economic Growth, New Delhi.

Tilak, J.B.G. (2003), “Higher education and development in Asia”, *Journal of Educational Planning and Administration*, Vol. 17, No. 2, pp. 151–73.

Toufique, K. A. (2014), "Labour Market Transition of Young Women and Men in Bangladesh", *Work4Youth Publication Series*, No. 13, International Labour Organisation

*United Nations Development Programme (2015), *Human Development Report: Work for Human Development*, URL: http://hdr.undp.org/sites/default/files/2015_human_development_report.pdf

*United Nations Development Programme (2015), "Work for Human Development", *Briefing Note for Countries on the 2015 Human Development Report (Bangladesh),* URL: http://www.in.undp.org/content/dam/india/docs/GHDR2015/GHDR-2015-Briefing-Bangladesh-Explanatory-Note.pdf

*United Nations Development Programme (2015), "Work for Human Development", *Briefing Note for Countries on the 2015 Human Development report (India),* URL: http://www.in.undp.org/content/dam/india/docs/GHDR2015/GHDR-2015-Briefing-India-Explanatory-Note.pdf

*United Nations Development Programme (2016), "How Changing Demographics can Power Human Development", *Asia Pacific Human Development Report,* URL: http://hdr.undp.org/sites/default/files/rhdr2016-full-report-final-version1.pdf

*United Nations Development Programme (2016), "Human Development for Everyone", *Briefing Note for Countries on the 2016 Human Development report (Bangladesh),* URL: http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/BGD.pdf

*United Nations Development Programme (2016), "Human Development for Everyone", *Briefing Note for Countries on the 2016 Human Development report (India),* URL: http://www.in.undp.org/content/dam/india/docs/humandevelopment/India_Country%20Explanatory%20Note_HDR2016.pdf

*United Nations Development Programme (2018), "Human Development Indices and Indicators: A Statistical Update", *Human Development Report,* URL: http://hdr.undp.org/en/2018-update

*United Nations Educational, Scientific and Cultural Organization (2013), "Adult and Youth Literacy: National, Regional and Global Trends, 1985-2015", *UIS Information Paper*

United Nations Educational, Scientific and Cultural Organisation (2014), "Achieving Quality Education for All", *2013/4 Report.*

*United Nations Educational, Scientific and Cultural Organisation (2015), "Education for All Global Monitoring Report", *Policy Paper 19.*

*United Nations Educational, Scientific and Cultural Organisation (2017), *InternationalStatistics* (Bangladesh), URL: uis.unesco.org/country/BD

*United Nations Educational, Scientific and Cultural Organisation (2017), *International Statistics* (India), URL: uis.unesco.org/country/IN

*United Nations Educational, Scientific and Cultural Organisation (2017), *International Statistics*, URL: data.uis.unesco.org/

United Nations Population Fund (2009), "Demographic Prognosis for South Asia: A Future of Rapid Ageing", *Papers on Population Ageing*, No.6

Vinod, H.D. and S.K.Kaushik, (2007), "Human Capital and Economic Growth: Evidence from Developing Countries", *The American Economist*, Spring, Vol. 51, No.1, pp 29-39.

Wilson, R.A. and G. Briscoe (2004), *The Impact of Human Capital on Economic Growth: A Review,* Third Report on Vocational Training Research in Europe, URL: www.cedefop.europa.eu/files/BgR3_Wilson.pdf

*World Bank (2006), *The Bangladesh Vocational and Training System: An Assessment*, URL: http://siteresources.worldbank.org/BANGLADESHEXTN/Resources/publications/384630-1209074736457/Bangladesh_Nov2006.pdf

*World Bank (2012), *More and Better Jobs in South Asia*, URL: http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/2235461296680097256/7707437-1316565221185/Jobsoverview.pdf

*World Bank (2016) – *Data Bank*, URL: http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

*World Bank (2016) –*Data Bank,* URL: http://databank.worldbank.org/data/reports.aspx?source=education-statistics-~-all-indicators

*World Bank (2016) –*Data Bank,* URL: http://databank.worldbank.org/data/reports.aspx?source=health-nutrition-and-population-statistics

*World Bank (2017), *Databank* (Bangladesh), URL: https://data.worldbank.org/country/bangladesh

*World Bank (2017), *Databank* (India), URL: https://data.worldbank.org/country/india

World Economic Forum (2016), *Global Competitiveness Report, 2016-17*,URL: http://www3.weforum.org/docs/GCR20162017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

World Health Organization (2015), "Bangladesh Health System Review", Asia Pacific Observatory on Health Systems and Policies ,*Health Systems in Transition*, Vol.5, No.3

Wößmann, L. (2000), *Specifying Human Capital: AReview, Some Extensions and Development Effects*, Kiel Working Paper no. 1007.

ANNEXURE I

Test for Multicollinearity: Variance Inflation Factor

Results of Variance Inflation Factor for India

VARIABLE	VIF	1/VIF
Life Expectancy at Birth (LEB)	485.56	0.002059
Gross Enrolment Ratio at tertiary level of education (GER_T)	449.69	0.002224
Gross Enrolment Ratio at secondary level of education (GERs)	405.10	0.002468
Enrolment Ratio in vocational training programmes at secondary level of education (VT_S)	175.96	0.005683
Gross Enrolment Ratio at upper secondary level of education (GER_{US})	155.80	0.006418
Expenditure on Education as a percentage of GDP ($Expenditure_E$)	124.08	0.008060
Gross Fixed Capital Formation (GFCF)	84.87	0.011783
Teachers Enrolment in vocational training programmes at secondary level of education ($Teachers_{SECVT}$)	78.67	0.012711
Mean Years of Schooling (MYS)	71.48	0.013989
Expenditure on Research and Development as a percentage of GDP ($Expenditure_{R\&D}$)	69.58	0.014371
Enrolment Ratio in vocational training programmes at upper secondary level of education (VT_{US})	53.77	0.018598
Public Expenditure on Education as a percentage of government expenditure ($PubExp_E$)	47.16	0.021203
Adult Literacy Rate (ALR)	44.68	0.022379
Labor Force Participation Rate (LFPR)	24.09	0.041516
Expenditure on Health as a percentage of GDP ($Expenditure_H$)	15.45	0.064737
Non Formal Vocational Training Received	13.22	0.075632
Public Expenditure on Health as a percentage of government expenditure ($PubExp_H$)	9.47	0.105651
MEAN VIF	135.80	

Results of Variance Inflation factor for Bangladesh

VARIABLE	**VIF**	**1/VIF**
Enrolment Ratio in vocational training programmes at secondary level of education (VT_S)	11782.70	0.000085
Enrolment Ratio in vocational training programmes at upper secondary level of education (VT_{US})	8644.75	0.000116
Gross Fixed Capital Formation (GFCF)	670.13	0.001492
Life Expectancy at Birth (LEB)	350.59	0.002852
Enrolment Ratio in ICT at tertiary level of education (ICT_T)	241.44	0.004142
Gross Enrolment Ratio at tertiary level of education (GER_T)	227.27	0.004400
Gross Enrolment Ratio at secondary level of education (GERs)	221.22	0.004520
Enrolment Ratio in manufacturing at tertiary level of education (MAN_T)	142.96	0.006995
Mean Years of Schooling (MYS)	128.52	0.007781
Adult Literacy Rate (ALR)	79.63	0.012559
Enrolment Ratio in vocational training programmes at post secondary non tertiary level of education (VT_{PSNT})	74.29	0.013461
Teachers Enrolment in vocational training programmes at secondary level of education ($Teachers_{SECVT}$)	64.96	0.015393
Expenditure on Education as a percentage of GDP ($Expenditure_E$)	47.08	0.021242
Public Expenditure on Education as a percentage of government expenditure ($PubExp_E$)	32.15	0.031100
Labor Force Participation Rate (LFPR)	29.17	0.034280
Gross Enrolment Ratio at upper secondary level of education (GER_{US})	27.30	0.036633
Expenditure on Health as a percentage of GDP ($Expenditure_H$)	26.22	0.038143
Enrolment Ratio in agriculture at tertiary level of education (AGR_T)	18.16	0.055070
Public Expenditure on Health as a percentage of government expenditure ($PubExp_H$)	9.83	0.101737
MEAN VIF	1200.97	

ANNEXURE II

Results of ADF and PP Tests for Unit Root (Critical Values)

VARIABLES	Augmented Dickey-Fuller test for unit root				Phillips-Perron test for unit root			
	Test statistic	1% critical value	5% critical value	Inference	Test statistic	1% critical value	5% critical value	Inference
Growth Rate (%) - Level (Bangladesh)	-3.875	-3.750	-3.000	stationary at level	-3.875	-3.750	-3.000	stationary at level
Growth Rate (%) - Level (India)	-4.532	-3.750	-3.000		-4.532	-3.750	-3.000	
ALR (%) - Level (Bangladesh)	-0.164	-3.750	-3.000	stationary at first difference	-1.287	-3.750	-3.000	stationary at first difference
D_ALR - First difference (Bangladesh)	-5.154	-3.750	-3.000		-4.135	-3.750	-3.000	
ALR (%) - Level (India)	-0.352	-3.750	-3.000	stationary at first difference	-0.352	-3.750	-3.000	stationary at first difference
D_ALR - First difference (India)	-5.109	-3.750	-3.000		-5.109	-3.750	-3.000	
GER_S (%) - Level (Bangladesh)	-0.826	-3.750	-3.000	stationary at first difference	-0.826	-3.750	-3.000	stationary at first difference
D_GER_S - first difference (Bangladesh)	-4.326	-3.750	-3.000		-4.326	-3.750	-3.000	
GER_S (%) - Level (India)	0.233	-3.750	-3.000	stationary at first difference	0.233	-3.750	-3.000	stationary at first difference
D_GER_S - first difference (India)	-5.631	-3.750	-3.000		-5.631	-3.750	-3.000	
VT_S (%) - Level (Bangladesh)	0.55	-3.750	-3.000	stationary at first difference	0.55	-3.750	-3.000	stationary at first difference
D_VT_S - first difference (Bangladesh)	-3.898	-3.750	-3.000		-3.898	-3.750	-3.000	
VT_S (%) - Level (India)	-2.056	-3.750	-3.000	stationary at first difference	-2.056	-3.750	-3.000	stationary at first difference
D_VT_S - first difference (India)	-5.558	-3.750	-3.000		-5.558	-3.750	-3.000	
GT_S (%) - Level (Bangladesh)	0.561	-3.750	-3.000	stationary at first difference*	0.561	-3.750	-3.000	stationary at first difference*
D_GT_S - first difference (Bangladesh)	-3.604	-3.750	-3.000		-3.604	-3.750	-3.000	
GT_S (%) - Level (India)	-2.056	-3.750	-3.000	stationary at first difference	-2.056	-3.750	-3.000	stationary at first difference
D_GT_S - first difference (India)	-5.558	-3.750	-3.000		-5.558	-3.750	-3.000	
FVT_S (%) - Level (Bangladesh)	0.02	-3.750	-3.000	stationary at first difference	0.02	-3.750	-3.000	stationary at first difference
D_FVT_S - first difference (Bangladesh)	-4.557	-3.750	-3.000		-4.557	-3.750	-3.000	
FVT_S (%) - Level (India)	-4.273	-3.750	-3.000	stationary at level	-4.273	-3.750	-3.000	stationary at level
MVT_S (%) - Level (Bangladesh)	0.365	-3.750	-3.000	stationary at first difference	0.365	-3.750	-3.000	stationary at first difference
D_MVT_S - first difference (Bangladesh)	-4.243	-3.750	-3.000		-4.243	-3.750	-3.000	
MVT_S (%) - Level (India)	-0.828	-3.750	-3.000	stationary at first difference	-0.828	-3.750	-3.000	stationary at first difference
D_MVT_S - first difference (India)	-4.384	-3.750	-3.000		-4.384	-3.750	-3.000	
GER_{US}(%) - Level (Bangladesh)	1.405	-3.750	-3.000	stationary at first difference*	1.405	-3.750	-3.000	stationary at first difference*
D_GER_{US} - first difference (Bangladesh)	-3.43	-3.750	-3.000		-3.43	-3.750	-3.000	
GER_{US}(%) - Level (India)	1.396	-3.750	-3.000	stationary at first difference	1.396	-3.750	-3.000	stationary at first difference
D_GER_{US} - first difference (India)	-5.743	-3.750	-3.000		-5.743	-3.750	-3.000	
VT_{US}(%) - Level (Bangladesh)	0.497	-3.750	-3.000	stationary at first difference*	0.497	-3.750	-3.000	stationary at first difference*
D_VT_{US} - first difference (Bangladesh)	-3.593	-3.750	-3.000		-3.593	-3.750	-3.000	
VT_{US}(%) - Level (India)	-1.323	-3.750	-3.000	stationary at first difference	-1.323	-3.750	-3.000	stationary at first difference
D_VT_{US} - first difference (India)	-5.927	-3.750	-3.000		-5.927	-3.750	-3.000	
GT_{US}(%) - Level (Bangladesh)	0.274	-3.750	-3.000	stationary at first difference	0.274	-3.750	-3.000	stationary at first difference
D_GT_{US} - first difference (Bangladesh)	-4.83	-3.750	-3.000		-4.83	-3.750	-3.000	
GT_{US}(%) - Level (India)	-1.323	-3.750	-3.000	stationary at first difference	-1.323	-3.750	-3.000	stationary at first difference
D_GT_{US} - first difference (India)	-5.927	-3.750	-3.000		-5.927	-3.750	-3.000	
FVT_{US} (%) - Level (Bangladesh)	-0.063	-3.750	-3.000	stationary at first difference	-0.063	-3.750	-3.000	stationary at first difference
D_FVT_{US} - first difference (Bangladesh)	-4.44	-3.750	-3.000		-4.44	-3.750	-3.000	
FVT_{US} (%) - Level (India)	-2.24	-3.750	-3.000	stationary at first difference	-2.24	-3.750	-3.000	stationary at first difference
D_FVT_{US} - first difference (India)	-5.752	-3.750	-3.000		-5.752	-3.750	-3.000	
MVT_{US} (%) - Level (Bangladesh)	0.365	-3.750	-3.000	stationary at first difference	0.365	-3.750	-3.000	stationary at first difference
D_MVT_{US} - first difference (Bangladesh)	-3.901	-3.750	-3.000		-3.901	-3.750	-3.000	
MVT_{US} (%) - Level (India)	-0.933	-3.750	-3.000	stationary at first difference	-0.933	-3.750	-3.000	stationary at first difference
D_MVT_{US} - first difference (India)	-5.602	-3.750	-3.000		-5.602	-3.750	-3.000	
GER_T(%) - Level (Bangladesh)	0.52	-3.750	-3.000	stationary at first difference*	0.52	-3.750	-3.000	stationary at first difference*
D_GER_T - first difference (Bangladesh)	-4.895	-3.750	-3.000		-4.895	-3.750	-3.000	

GER_T(%) - Level (India)	1.785	-3.750	-3.000	stationary at first difference*	1.785	-3.750	-3.000	stationary at first difference*1%
D_GER_T - first difference (India)	-3.637	-3.750	-3.000		-3.637	-3.750	-3.000	
$M\&C_T$ - Level (Bangladesh)	-1.357	-3.750	-3.000	stationary at first difference**	-1.357	-3.750	-3.000	stationary at first difference**
$M\&C_T$ - first difference (Bangladesh)	-2.979	-3.750	-3.000		-2.979	-3.750	-3.000	
ICT_T - Level (Bangladesh)	-1.312	-3.750	-3.000	stationary at first difference	-1.312	-3.750	-3.000	stationary at first difference
ICT_T - first difference (Bangladesh)	-5.188	-3.750	-3.000		-5.188	-3.750	-3.000	
A_T - level (Bangladesh)	-2.137	-3.750	-3.000	stationary at first difference	-2.137	-3.750	-3.000	stationary at first difference
A_T - first difference (Bangladesh)	-5.616	-3.750	-3.000		-5.616	-3.750	-3.000	
VT_F(%) - Level (India)	OMITTED	-3.750	-3.000	stationary (values are constant)	OMITTED	-3.750	-3.000	stationary (values are constant)
VT_{NF}(%) - Level (India)	-1.861	-3.750	-3.000	stationary at first difference	-1.861	-3.750	-3.000	stationary at first difference
D_VT_{NF} - first difference (India)	-4.599	-3.750	-3.000		-4.599	-3.750	-3.000	
VT_{PSNT}(%) - Level (Bangladesh)	-0.699	-3.750	-3.000	stationary at first difference	-0.699	-3.750	-3.000	stationary at first difference
D_VT_{PSNT}(%) - first difference (Bangladesh)	-4.718	-3.750	-3.000		-4.718	-3.750	-3.000	
GT_{PSNT}(%) - Level (Bangladesh)	-0.699	-3.750	-3.000	stationary at first difference	-0.699	-3.750	-3.000	stationary at first difference
D_GT_{PSNT}(%) - first difference (Bangladesh)	-4.718	-3.750	-3.000		-4.718	-3.750	-3.000	
FVT_{PSNT}(%) - Level (Bangladesh)	-0.168	-3.750	-3.000	stationary at first difference	-0.168	-3.750	-3.000	stationary at first difference
D_FVT_{PSNT}(%) - first difference (Bangladesh)	-4.759	-3.750	-3.000		-4.759	-3.750	-3.000	
MVT_{PSNT}(%) - Level (Bangladesh)	-0.916	-3.750	-3.000	stationary at first difference	-0.916	-3.750	-3.000	stationary at first difference
D_MVT_{PSNT}(%) - first difference (Bangladesh)	-4.744	-3.750	-3.000		-4.744	-3.750	-3.000	
MYS - Level (Bangladesh)	-0.781	-3.750	-3.000	stationary at first difference	-0.781	-3.750	-3.000	stationary at first difference
D_MYS - first difference (Bangladesh)	-5.325	-3.750	-3.000		-5.325	-3.750	-3.000	
MYS - Level (India)	0.141	-3.750	-3.000	stationary at first difference	0.141	-3.750	-3.000	stationary at first difference
D_MYS - first difference (India)	-5.983	-3.750	-3.000		-5.983	-3.750	-3.000	
$Teachers_{VT}$ - level (Bangladesh)	0.378	-3.750	-3.000	stationary at first difference*	0.378	-3.750	-3.000	stationary at first difference*
$Teachers_{VT}$ - first difference (Bangladesh)	-3.577	-3.750	-3.000		-3.577	-3.750	-3.000	
$Teachers_{VT}$ - level (India)	0.612	-3.750	-3.000	stationary at first difference	0.612	-3.750	-3.000	stationary at first difference
$Teachers_{VT}$ - first difference (India)	-4.569	-3.750	-3.000		-4.569	-3.750	-3.000	
GFCF - Level (Bangladesh)	-2.115	-3.750	-3.000	stationary at first difference*	-2.115	-3.750	-3.000	stationary at first difference*
D_GFCF -first difference (Bangladesh)	-3.157	-3.750	-3.000		-3.157	-3.750	-3.000	
GFCF - Level (India)	-1.211	-3.750	-3.000	stationary at first difference	-1.211	-3.750	-3.000	stationary at first difference
D_GFCF -first difference (India)	-4.076	-3.750	-3.000		-4.076	-3.750	-3.000	
LFPR- Level (Bangladesh)	-1.057	-3.750	-3.000	stationary at first difference	-1.057	-3.750	-3.000	stationary at first difference
D_LFPR - first difference (Bangladesh)	-4.914	-3.750	-3.000		-4.914	-3.750	-3.000	
LFPR- Level (India)	-0.405	-3.750	-3.000	stationary at first difference	-0.405	-3.750	-3.000	stationary at first difference
D_LFPR - first difference (India)	-4.582	-3.750	-3.000		-4.582	-3.750	-3.000	
LEB - level (Bangladesh)	-2.631	-3.750	-3.000	stationary at first difference	-2.631	-3.750	-3.000	stationary at first difference
LEB - first difference (Bangladesh)	-5.504	-3.750	-3.000		-5.504	-3.750	-3.000	
LEB - level (India)	-8.17	-3.750	-3.000	stationary at level	-8.17	-3.750	-3.000	stationary at level
$Expenditure_E$ (% of GDP) - Level (Bangladesh)	-2.961	-3.750	-3.000	stationary at first difference	-2.961	-3.750	-3.000	stationary at first difference
D_$Expenditure_E$ - first difference (Bangladesh)	-4.801	-3.750	-3.000		-4.801	-3.750	-3.000	
$Expenditure_E$ (% of GDP) - Level (India)	-1.559	-3.750	-3.000	stationary at first difference*	-1.559	-3.750	-3.000	stationary at first difference*
D_$Expenditure_E$ - first difference (India)	-3.539	-3.750	-3.000		-3.539	-3.750	-3.000	
$PubExp_E$ (% of Govt. Exp) - Level (Bangladesh)	-2.201	-3.750	-3.000	stationary at first difference	-2.201	-3.750	-3.000	stationary at first difference
$PubExp_E$ (% of Govt. Exp) - first difference (Bangladesh)	-4.354	-3.750	-3.000		-4.354	-3.750	-3.000	
$PubExp_E$ (% of Govt. Exp) - Level (India)	-1.565	-3.750	-3.000	stationary at first difference*	-1.565	-3.750	-3.000	stationary at first difference*
$PubExp_E$ (% of Govt. Exp) - first difference (India)	-3.483	-3.750	-3.000		-3.483	-3.750	-3.000	
$Expenditure_H$ (% of GDP) - Level (Bangladesh)	-1.64	-3.750	-3.000	stationary at first difference*	-1.64	-3.750	-3.000	stationary at first difference*
D_$Expenditure_H$ - first difference (Bangladesh)	-3.232	-3.750	-3.000		-3.232	-3.750	-3.000	
$Expenditure_H$ (% of GDP) - Level (India)	-1.17	-3.750	-3.000	stationary at first difference	-1.17	-3.750	-3.000	stationary at first difference
D_$Expenditure_H$ - first difference (India)	-5.173	-3.750	-3.000		-5.173	-3.750	-3.000	
$PubExp_H$(% of Govt. Exp) - Level (Bangladesh)	-1.144	-3.750	-3.000	stationary at first difference	-1.144	-3.750	-3.000	stationary at first difference
$PubExp_H$ (% of Govt. Exp) - first difference (Bangladesh)	-6.753	-3.750	-3.000		-6.753	-3.750	-3.000	
$PubExp_H$(% of Govt. Exp) - Level (India)	-1.006	-3.750	-3.000	stationary at first difference*	-1.006	-3.750	-3.000	stationary at first difference*
$PubExp_H$ (% of Govt. Exp) - first difference (India)	-3.324	-3.750	-3.000		-3.324	-3.750	-3.000	
$Expenditure_{R\&D}$- Level (India)	-1.013	-3.750	-3.000	stationary at first difference	-1.013	-3.750	-3.000	stationary at first difference
D_$Expenditure_{R\&D}$- first difference (India)	-4.834	-3.750	-3.000		-4.834	-3.750	-3.000	

*stationary at 5 percent ;non stationary at 1 percent ; **stationary at 10 percent

ANNEXURE III

List of Regional Experts from India and Bangladesh

During the course of this research, relevant experts from India and Bangladesh were consulted to get first hand information, their perspective and insights on the subject of human capital and its linkages with economic growth, in India and Bangladesh. The experts are listed below in alphabetical order :

1. Dr. AMM Zowadul Karim Khan, Skills Development and Program Management (Bangladesh)
2. Ms. Mandakini Kaul, Senior Regional Cooperation Officer, South Asia, World Bank (India)
3. Dr. Arup Mitra, Director General, National Institute of Labour Economics Research and Development and Professor, Institute of Economic Growth (India)
4. Dr. Md. Mokhlesur Rahman, Senior Operations Officer, Education Global Practice, World Bank (Bangladesh)
5. Professor Mustafizur Rahman, Distinguished Fellow, Centre for Policy Dialogue (Bangladesh)
6. Dr. Selim Raihan, Professor, Department of Economics, University of Dhaka (Bangladesh) and Executive Director, South Asian Network on Economic Modeling
7. Dr. Aarti Srivastava, Associate Professor, Higher and Professional Education, National University for Educational Planning and Administration