HUMAN CAPITAL AND INDUSTRIALIZATION NEXUS AND ITS IMPLICATION ON ECONOMIC GROWTH IN PAKISTAN

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DEDICATION

This thesis is dedicated to my family specially my parents for their love, endless support and encouragement. Dad you are in my every breath.

Also Dedicated to

My Teachers

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ABSTRACT

The study's aim to investigate the impact of human capital and industrialization on economic growth in Pakistan. Human Capital & Industrialization are the major factors that increase the level of output and accelerate the economic growth. The ongoing study is a time series analysis from the period 1980 to 2021. Human Capital Index, industrialization Index, combine variable (Industrialization Index* Human Capital Index) are selected as independent variables and control variable is trade while economic growth as a dependent variable. After checking the unit root or order of integration of all variables with the help of Augmented Dickey Fuller Test and Philip-Perron unit root tests. P-Values are stationary at level and first difference. The relation among variables is checked through Autoregressive Regressive Distributed Lag Model and Error Correction Term. The findings of the ARDL test show that increasing economic growth, Human Capital Index*industrialization index increases the employment opportunities in Pakistan during the long-run and short-run. In contrast, (industrialization index*Human Capital Index) and industrialization index positively connect with economic growth for both long run and short-run in Pakistan. The findings of ARDL express the long run nexus between human capital, industrialization and economic growth. The Significant relationship among the variables like trade, Industrialization Index, Human Capital Index, combine variables Human Capital Index*Industrialization Index. Coefficients of ECT express the short run relationship between human capital, industrialization and economic growth. The significant outcomes show that there is a short run relation exists among variables.

Keywords: Economic Growth, Industrialization Index, Human Capital Index, Trade

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LIST OF ABBREVIATIONS

ADF	**Augmented Dickey Fuller**
WCM	**Working Capital Management**
ISE	**Islamabad Stock Exchange**
TFP	**Total Factor Productivity**
UNIDO	**United Nations Industrial Growth Organization**
R&D	**Research & Development**
ECM	**Error Correction Model**
ARDL	**Auto Regressive Distributive Lag**
HCI	**Human Capital Index**
TR	**Trade**
MVA	**Manufacturing Value Added**
GDP	**Gross Domestic Product**
CIPI	**Competitiveness Industrial Performance Index**
WDI	**World Development Indicator**
FEM	**Fixed Effect Model**
OLS	**Ordinary Least Square**
LDCs	**Least Development Countries**
VECM	**Vector Error Correction Model**
FDI	**Foreign Direct Investment**
OECD	**Organization for Economic Co-operation and Development**
CPI	**Consumer Price Index**

CHAPTER 1

INTRODUCTION

1.1 Background

Human capital is widely recognized as the driving factor behind economic growth. Education has the potential to increase the quality of human resources. The elements of human capital are skilled and educated labour for the expansion and development of the economy. The word "human capital," as used by economists, can refer to education as well as other forms of human capital, such as health experience and abilities that, if developed further, would boost productivity. A person's or a group's knowledge, skills, abilities, experience, intelligence, judgment, and wisdom make up their human capital, which is a collection of assets. These assets include the people's collective abilities, which are a type of wealth that may be utilized to forward the goals of the country or state (Hafeez, 2019).

Health and education, the two aspects of human capital are most closely associated work together to increase an individual's usefulness or productivity. A person with greater education may be able to pick things up much more rapidly. Human capital is a feature in Pakistan's economic expansion because of public health investment and enrollment in elementary, secondary, and higher education. Human capital was not just about understanding or knowledge such as education, health, experience was included in human capital and education creates awareness among the individuals, which helps in increasing output. An educated worker more capable of producing more output (Mincer, 1996).

The term of human capital is used to describe the monetary value of a worker's skills and expertise. This includes attributes that employers value, such as loyalty and punctuality, as well as assets such as education, training, intellect, abilities, and health. One of the procedures that are thought to be useful in creating human capital is education, especially formal education that has been governed and standardized by the state, which is in charge of increasing the population's human capital. By improving worker quality, education promotes technological innovation, which leads to greater economic growth. The success of increasing human capital and advancing technology depends on the success of educational development since education plays a part in

improving the quality of human resources. The skills, education, aptitude, and characteristics of labour that affect their productivity and earning potential are measured as human capital (Serrat, 2017).

Industrialization is the process to enhance a country's ability to transform inputs, including raw materials, into completed commodities for use in other production or end consumption (Anyanwu; Oyefusi & Oaikhenan; Dimowo, 1997). Industrialization is the foundation for economic growth and development of a nation. It results in an increase in the quantity and diversity of goods produced, creating more jobs and improving the standard of living for locals (Ajmair, 2014). (Adeoye, 2005) asserts that industrialization can help countries meet their lofty goals and enhance the quality of life of their population. In most developing countries, industrialization is the main topic of economic policy and is regarded as a significant and potent element of an economy's entire development and structural process (Uniamikogpo, 1996). The goal and objective of every independent state or economy is to achieve and maintain full industrialization.

Industrialization and human capital both help to explain the many roles that knowledge and skills of the average worker play. According to a plethora of historical evidence, knowledge enables industrial enterprises to keep up with technical improvements. Advanced skills are especially important in times of fast technological advancement, claim Nelson & Phelps, (1966). Large knowledge elites experience industrialization more quickly. Secondly, if the collective technical frontier advances more quickly, as it did after the Industrial Revolution, knowledge elites' impact on local growth increases. Assuming they join production using the conventional labour augmentation approach, the role of average worker skills. Thus, better educated workers boost the output of any given technology, but they do not act like industrialists, that is, they do not adopt new technology. The third prediction that follows is that worker skill levels affect cross-sectional income but not long-term growth. Gliches & Jorgenson, (1967) Higher worker skill levels advance a given production function, boosting output, whereas upper-tail innovative abilities can change the production function, improving output by raising total factor productivity. Additionally, access to contemporary technology through higher education promotes the growth of new industries Anwar & Elfaki, (2021). Due to the numerous advantages it has brought to growth and development, researchers and policy makers

feel that the manufacturing and human capital sectors are a growth driver (Arjun et al., 2020).

Manufacturing growth rates in Pakistan have been far more erratic than industrial and manufacturing growth rates during the past five decades. Particularly, manufacturing has exploded. The difference suggests that the commission factor of significant projects in different years may have an impact on manufacturing Naqvi & Kemal, (1991).

The industrial sector is essential to any nation's economic development, together with human capital. (Acemoglu, 2009) made the claim that technological advancement and increased labour productivity could lead to long-term economic growth. Due to Pakistan's industrial sector accounting for around 24% of GDP, the country was regarded as a developing country. However, despite this, Pakistan's current economic situation is still not as promising as it ought to be. Pakistan's industrial sector is growing more slowly than other countries throughout the world on average. According to (Qaiser, 2020), the industrial sector only experienced a 6.5 percent growth rate in FY2016.

1.2 Human Capital in Pakistan

While differences in education and skill levels which are the prime cause of discrepancies in living standards among nations, the development of human capital is the main force behind economic advancement (Amjad, 2005). Numerous empirical studies Akram et al., (2008) Kakar et al., (2011) Naeem et al., (2012) have shown a most relevant and favourable correlation among human capital (education) and economic expansion. According to Akhtar et al., (2011) & Afzal et al., (2012), most studies used enrollment rates at the primary, secondary and postsecondary levels as a substitute for human capital. This widespread practice has been followed by continued concerns about using school enrollments as a metric of human capital because there was a gap between an individual's educational success and their entry into the employment market. Other studies, like Awan et al., (2011), Khan & Rehman (2012), Qadri & Waheed (2011), used public education spending as a proxy for human capital, however this wasn't a good enough proxy given the huge private education sector in the country. In light of this, this study analyze the role of human capital production throughout the education levels of Pakistan's employed labour force in

describing economic development rather than using school enrollments and public education spending as measures of human capital. A better predictor of human capital than the standard literacy rate, school enrollment, or average number of years of education was the education of the labour force that was in employment.

1.3 Industrialization in Pakistan

Economic progress was influenced by industrialization. Pakistan has a semi-industrial economy and is still in development. Among the most significant export goods are textiles, leather goods, and sporting goods. Pakistan, a developing nation, is making an effort to speed up its economic expansion in order to stay up with the quickly expanding economies in the area. The depletion of natural resources, air and water pollution, modern machinery, energy shortages, and water scarcity are just a few of the significant environmental problems Pakistan is currently dealing with. Developing nations become developed if they make greater use of their own resources. If we work together on industrialization and human capital, we'll see what happens and how it affects Pakistan's economic development.(Wikipedia, Economy of Pakistan 2010).

Out of the 921 industrial units on the subcontinent, just 34 were left in Pakistan when it came into existence. Cigarettes, sugar, cotton ginning, rice husking, flour mills, as well as cotton textiles, were all listed. Together, this scarcely made over 7% of the nation's GDP and employed just over 26,000 workers (Saeed, 2010). The industrial sector in Pakistan has rapidly expanded since the 1950s, when it was essentially nonexistent. The growth rate of industrial sectors was doubled in the early years. Moreover, the large-scale manufacturing increased by more than 20% from 1950 and 1955. On the other hand, large-scale production nearly produced stunning outcomes in 1960, according to (Saeed, 1995). How manufacturing and industrialization are perceived in both wealthy and developing countries has a significant impact on their justification. It is a technique for quickening economic growth through changes in societal norms that support future growth and development as well as resource utilization, distribution patterns, production processes, and revenue generation (Khan, 2006). Pakistan's economy is semi-industrialized and consists of a variety of industries, including textiles, chemicals, food processing and agriculture. Pakistan's major industries like cement, fertilizer, edible oil, sugar, steel, tobacco, chemicals, equipment, food processing, textiles and garments are key factors

of economic development. Pakistan's most significant industries are the production and manufacture of cotton textiles, which account for roughly 64% of all exports and 40% of the labour force (Ajmair, 2014).

It is Pakistan's responsibility to promote industrialization, human capital development and improvements in the effectiveness of industries and manufacturing facilities, as well as education, skills, and equipment, all of which would enable a major growth in exports. Thus, the fundamental issues / crises in the textile industry, industrial productivity and efficiency, and export competitiveness must be addressed in Pakistan's industrial growth and performance strategy (Anka, 2010).

1.4 Summary

In this study, we integrated our studies to examine how industrialization and human capital affect economic growth. The knowledge, skills, talents, abilities, experience, intellect, and wisdom of an individual or organization are all included in the human capital, which is a collection of resources. These assets, which can be utilized to forward the goals of the country or state, are the people's collective skills. An educated person is better able to pick things up much more quickly. Human capital includes things like education, health, and experience and is not just limited to information or comprehension. Pakistan's economic growth was influenced by human capital index and industrialization index. Economic expansion can be significantly boosted by human capital, raising the standard of worker’s life; education encourages technical innovation and effectively boosts economic growth. The process of industrialization entails turning raw materials and other inputs into completed commodities for use in some other manufacturing processes or for end-user consumption. In the majority of emerging economies, it serves as the main focus of economic policy. Every independent country or economy consequently has full industrialization as its objective and desire. While upper-tail inventive talents can change the production function, average worker skills result in higher output by moving along a production function. According to a plethora of historical evidence, knowledge enables industrial enterprises to keep up with technical improvements. Although income increase over time is unaffected by worker skill levels, income in the cross-section is. Economic growth studies began to include industrialization and human capital alongside physical capital and the manufacturing sector in the 1960s. By lowering business costs, enhancing the environment for investment, and bolstering

institutions to support the movement of people, goods, and technical innovation, Pakistan may revive its manufacturing sector. The variance may result from the commission factor of significant projects in various years. According to a research by the Pakistan Chamber of Commerce and Industry (PCI), manufacturing in particular has experienced tremendous growth. 24 percent of Pakistan's GDP is accounted for by the industrial sector. Only 6.5% increase was seen in the industrial sector in FY2016. Although Pakistan is seen as a developing nation, its economic outlook is still not ideal. Differences in education and skill levels are the main cause of the disparities in living standards between countries. Numerous empirical studies have revealed that the human capital (education) and economic growth are extremely correlated. Textiles, leather products, and sporting items are the main export commodities. The depletion of natural resources, air and water pollution, modern machinery, energy shortages, and water scarcity are just a few of the significant environmental problems Pakistan is currently dealing with Pakistan has an economy that is semi-industrialized and includes the textile, chemical, food processing, and other industries. In Pakistan's industrial sector, growth began in the 1950s from a nonexistent base. Between 1950 and 1955, there was a 20% increase in large-scale manufacturing. Pakistan's challenge is to encourage industrialization, human capital development, increased manufacturing unit and industry productivity, as well as education, skill development, and machinery that will support rapid export growth. The basic problems or crisis in the textile sector, as well as industrial efficiency and productivity, as well as export competitiveness, must be addressed in Pakistan's plan.

1.5 Research Questions

1. What impact does human capital on the economic growth?
2. What impact does industrialization on the economic growth?
3. How does human capital and industrialization influence on economic growth in Pakistan?

1.6 Objectives of the Study

1. To evaluate the impact of human capital on economic growth in Pakistan.
2. To examine the impact of industrialization on economic growth in Pakistan.
3. To assess the combined impact of human capital and industrialization on economic growth in Pakistan.

1.7 The Statement of Problem

Most of the advanced countries, developed on the basis of improvement in human capital & industrialization such as Japan, Korea, Germany, Singapore Theresa (Moyo, 2018) but in case of Pakistan most research and development in physical capital like (Sajid Ali, 2012) which concluded that health & physical capital are significant to boost economic growth. Therefore, there is a need of comprehensive study on human capital & industrialization in the context of Pakistan.

1.8 Significance of the Study

This study's main objective is to evaluate how human capital and industrialization concern economic expansion in Pakistan. Studies on the effects of industrialization, human capital and its factors are separately available. The study's focus, however, is on how industrialization and human capital influence economic expansion. The study's conclusions will assist businesses and government agencies in boosting internal HCI (Human Capital Index), Industrialization Index (INI), and Trade (TR) initiatives to boost economic growth. Due to the introduction's first three factors, the Industrialization Index*Human Capital Index, the trade, and the Industrialization Index Pakistan, a developing nation, has the problem of higher imports and lower exports. There are several researches available to determine how factors like the Industrialization Index, Trade, and Human Capital Index affect economic growth. This will assist investors in placing their money into the economy. An economy's foundation and skeleton are its human resources. By investing in its people to raise literacy rates and build skills for the country's developmental process which also played a crucial part in industrialization of Pakistan which might accelerate economic progress. Human capital is a necessary factor of economic expansion because an institution needs a certain degree of people skills and knowledge to achieve bigger goals. The contribution of human capital is also

significant for indirect returns or spillover effects. Such knock-on effects also contribute to the advancement of knowledge, inventiveness, and productivity, all of which boost growth rates and productivity. We will be able to identify which factor is more successful at accelerating economic advancement after conducting this study. Many past studies that looked at the connection among human capital and economic growth discovered that it had a favourable and considerable impact (Abbas, 2000); Haldar & Malik, (2010).

1.9 Research Gap

Most of the research on human capital & industrialization has been done in advanced countries such as Germany, Singapore, Japan, Korea Theresa (Moyo, 2018) whereas, in the context of Pakistan separate research have been conducted on industrialization and human capital like (Kemal 1998; Ajmair 2014; Jelilvo 2013; Qaiser 2020; Ara 2004; Khan 2009; Rehman 2006; Ahmed 2013; Ali 2012 ; Abbas 2001 ; Ali 2018; Khatoon; 2021; Khan 2015 ; Afridi 2016; Waqas M. 2014 ;Awan 2016; Ashraf M. 2015; Shahzad 2015; Asghar et al,. 2012; Hafeez A. 2019; Khan 2005; Asma 2011; Irfan et al. 2011; Akram et al., 2010; Rehman 2006; Nasr ; 2007 Weli 1992; Mahboob -ul-Hassan & Muhammad Shaid; 2012 ; Seren F. 2001 ; Judson, 1998; Mogues 2005 ; Zhang 2011; Silies 2009; Romer 1989 ; Ramos, 2009; Haldar 2010; Dumont A. 2008; Ljungberg & Nilsson 2009 ; Alatas S. 2016; Afridi 2016; Nazir; 2007). The current study aims to conduct a combined study on human capital & industrialization on economic growth in Pakistan.

CHAPTER 2

LITERATURE REVIEW

The literature review includes a thorough analysis of the works that discuss industrialization and human capital. It offers a study of the factors influencing the industrial sector and human resources. The vital goal of this study is to examine how Pakistan's industrial sector and human capital affect the country's economic growth.

2.1 National Studies & International Studies on Industrialization

Koo & Lou, (1997) was investigated the relationship between the agricultural and industrial sectors in Chinese economic growth. From 1988 to 1992, they used panel data from 20 provinces. The findings showed that while agriculture growth does not contribute to industrial expansion, industrial growth does contribute to agricultural growth. Moreover, (Kemal, 1998) examined at Pakistan's industrial growth, the 1949–1997 period covered by the secondary data. The outcome demonstrates that local demand was the main driver of growth during the succeeding periods, despite import substitution serving as a significant source of demand during the initial stage. The report also recommends simulating domestic demand and increasing investment levels in order to stimulate industrial recovery. Additionally, Mahmood & Siddiqui, (2000) examined at the TFP for Pakistan's industrial industry from 1972 to 1997. They have noted that the country has seen a surge in R&D spending, scientific advancement, technical personnel and investments in human capital, all of which have a major and favourable impact on the expansion of the manufacturing sector. In addition, it is discovered that the knowledge and level of human capital, along with the favourable impact of trade openness on the development of the manufacturing sector, respectively, account for 18 and 30% of the variation in TFP. Moreover, Aqeel & Butt, (2001) examined the relationship among manufacturing production and economic performance from the Kaldor first and second growth rate perspectives by used a sample of Latin American states. The study covered the years 1985 to 2001, and its results shown a sturdy and favourable connection among industrial growth and overall economic productivity. Additionally, it has been shown that the manufacturing sector is a key driver of economic growth in Latin America, where it has seen particularly rapid expansion.

IMF, (2002) determined TFP for the entire GDP of Pakistan. The information was utilized between 1961 and 2001. The findings show that TFP generally grew negatively in the 1960s and positively in the 1970s and 1980s. However, growth in the 1990s only decreased annually. Moreover, the total factor production (TFP) of the large-scale manufacturing sector was calculated by Wizarat, (2002). The information was utilized between 1951 and 1991. The findings reveal a rising TFP trend. Additionally, she discovered that, on average, from 1955 to 1991, TFP had a negative (-27 percent) contribution to economic growth. According to her research, capital accounted for 88 percent and labour for 40 percent of economic growth. According to Pasha et al., (2002) examined the manufacturing sector's TFP growth exhibits a persistent downward tendency. The annual statistics covered the years 1973 through 1998. TFP's annual growth rate decreased from 9.4% between 1968 and 1983 to a pitiful 1.44% between 1993 and 1998, and its annual share of overall growth, which was 554% between 1968 and 1983, decreased to as low as 164%. The findings indicated that human capital had a large impact on the expansion of total factor productivity (TFP) in the industrial sector. From 1973 to 1998, TFP increased by 4.6 percent year, with 1.8 percent of the growth coming from human capital. Furthermore, Iffat & Ara, (2004) conducted a competitive analysis of Pakistan's manufacturing industry by contrasting the trend in rising factor and non-factor input prices with that of export prices. Data from the years 1972–1973 to 2002–2003 were used to examine the trend in productivity growth. Prices for factors and non-factors have increased more rapidly than both the overall price level and export prices. The rise in input factor prices is a direct result of the rise in productivity. Moreover, Carmen et al., (2004) analyzed into how China's manufacturing sector growth affected employment and real GD, the data for the time span from 1979 to 2002. The study finds a long-term positive connection among manufacturing growth and economic expansion. Likewise, Dutta & Ahmed, (2004) evaluated how Pakistan's industrial development was impacted by trade policy. Data from a time series were used. The information was utilized from 1973 to 1975. They employed the econometrics approach of co-integration and error correction modeling. The results demonstrated that trade liberalization and industrial growth had a beneficial association.

Similar to this, Zaidi, (2005) used rigid and random effects to examine the relationship between the rise in GDP per capita and the value-added share of the

manufacturing sector. Additionally, the Hausman test is used for the sample of 92 countries, with the time period being divided into 1950–1970, 1970–1990, and lastly 1990–2005. Results from the specified time were compared to those from the service sector using the same study population. They have discovered that the manufacturing sector, along with other advancements like education and health, is acting as an engine for the economy's growth. Additionally, it has been discovered that the manufacturing sector has a favourable effect on the development of the economy.

Shah & Sana, (2006) analyzed into a fairly small sample of 7 companies in the oil and gas industry. The information was used for the years 2001 to 2005. The findings revealed that managers may increase shareholder returns by efficiently managing working capital, which supported GDP growth over the period. Moreover, Rehman, (2006) studied into how working capital management affected the profitability of 94 Pakistani companies listed on the Islamabad Stock Exchange (ISE). The information was used for the years 1999 through 2004. The outcome demonstrates that the profitability of enterprises and working capital ratios above are strongly inversely related. Furthermore, by bringing the cash conversion cycle down to an ideal level, good management can add value for the shareholders. Subsequently, Cuyvers et al., (2006) was examined the relationship between foreign investment in the textile and apparel industries. The nation used Cambodia for this investigation. The information utilized from 1994 to 2001. According to the empirical findings, foreign investment in the apparel industry has a far stronger correlation with improvements in a country's comparative advantage than does foreign investment in the textile business. The country's exports have improved, and similar outcomes have been observed.

Only 94 companies that are listed on the Karachi Stock Exchange were examined by Rehman & Nasr, (2007) in terms of profitability and working capital management performance. The information was used between 1999 and 2004. According to the study's findings, working capital management practices and profitability have a bad association. In the same way, Afza & Nazir, (2007) examined at how 205 companies from 17 different industries that are listed on the Karachi Stock Exchange related to aggressive and cautious working capital approaches. The information was used from 1998 to 2005. They discovered a negative correlation between a firm's profitability metrics and how aggressively it pursued working capital

investment and financing strategies. Moreover, Knilvila, (2007) investigated the impact of industrial development on the expansion of seven nations, including China, India, Taiwan, Korea, Indonesia, Mexico, and Brazil. She discovered that an important foundation for economic progress has been industrial development. Industrial development is crucial for achieving long-term, sustained growth and the alleviation of poverty. Furthermore, Usman, (2008) evaluated the effects of fluctuating oil prices and currency rates on Nigeria's economic expansion. The quarter-to-quarter statistics were used from 1986Q1 to 2007Q4. Data from a time series were used. The findings demonstrated a one-way causal relationship between oil prices and real GDP as well as a two-way relationship between real exchange rates and real GDP.

Likewise, Yousaf K.M. (2008) analyzed the Pakistan's measures towards commercial liberalization. The information was used for the years 1990 through 2007. The outcome demonstrated that since 1998, the manufacturing sector's exports have remained unchanged in terms of composition. Moreover, Raza K. A. (2008) studied on how the building industry contributes to economic expansion. The information was utilized from 1950 to 2005. The findings revealed a significant causal association between Pakistan's construction industry and the country's overall economy. Additionally, Keane & te-Velde, (2008) evaluated the link among the textile industry and economic expansion in 32 rising nations. The investigation's findings made it possible to draw the conclusion that the growth of nations is significantly influenced by the textile and apparel industry. The study found that in the short run, the textile industry's benefits are linked to creating more jobs and attracting foreign investment. However, in the long run, the textile sector, combined with investments, institutional changes, and institutional and governmental policies, can help developing economies flourish economically. Furthermore, Chan & Au, (2008) analyzed the variables affecting textile export. The study's use of China as a country. The information utilized between 1985 and 2004. The study's findings showed that increasing China's textile exports requires significant economic growth as assessed by GDP and GDP per capita. According to the findings, the exchange rate has a substantial impact on how the country conducts its textile exports, and a devaluation of the native currency is likely to have a beneficial effect on exports from the Chinese textile industry.

Moreover, Hanif & Jafri, (2008) analyzed into the relationship between economic development and textile growth. The study's subject was Pakistan. The information utilized from 1974 to 2004. According to the investigation's findings, foreign investment is essential to growing the textile industry in a nation and can help the economy expand. Particularly, the results showed that external financing is important in affecting Pakistan's textile growth and has a beneficial effect on the growth process. Furthermore, Chan et al., (2008) examined the elements that affect textile export. India was employed in this study by the nation. The information utilized between 1985 and 2005. According to the study's findings, India's textile exports are significantly impacted by population increase. Furthermore, the country's textile exports benefited from the expansion of the Indian economy as indicated by GDO and GDP per capita. Finally, it was determined from the exchange rate data that the devaluation of the local currency stimulates textile export by making textile goods more affordable for exporters. Likewise, Sultan, (2008) evaluated into the long-term links between various variables in Bangladesh. Exports, imports, industrial value added, and gross domestic product are among the factors. The years 1965 to 2004's worth of time series data were utilized. The World Development Indicator was used to compile the data. The results showed that the value added of industry and GDP continue to have a substantial link.

Moreover, in Pakistan's textile industry, Chhappra IO & Naqui NA, (2009) studied into the connection between working capital management (WCM) and firm likelihood. They chose 55 Pakistani textile enterprises as their sample size. The information was used for the years 2003 through 2008. In Pakistan's textile industry, their findings indicated a sturdy positive significant association among working capital management (WCM) and firm probability as well as a substantial negative relationship between firm probability and debt utilized by the firm. Furthermore, Zamam B.U. et al., (2009) examined the sectoral oil consumption and economic expansion in Pakistan. Utilized were time series data covering the years 1972 through 2008. The outcome demonstrated that the main consumers of oil (transport, electricity production, and industry) are making a beneficial contribution. Moreover, Khan K. et al., (2009) examined at how corporate governance affects a company's success. The Pakistani tobacco industry has been the subject of this study. Pakistan Tobacco, Lakson Tobacco, and Khyber Tobacco are the three listed tobacco companies. The

analysis of the data for the years 2004 to 2008 revealed a significant and favourable influence of corporate governance on firm performance. Furthermore, Khalid S. & Aslam, (2009) examined the possible effects of coal on Pakistan's economic development and electrical production. Data from a time series were used. The 1995–2007 time frame covered by the secondary data was used. The outcome demonstrated that coal is a more effective energy resource than other energy sources; coal and power production have a positive relationship. Additionally, the influence of agriculture on the path to industrialization and long-term economic development was assessed by Hye Q.M.A. (2009). Manufacturing and agriculture production were the factors used. The long-term outcomes show that the sample period's agricultural production had a favourable impact on the manufacturing output. The short-term outcomes show that agricultural production has a favourable impact on manufacturing output.

Likewise, Ellahi et al., (2010) investigated the relationship between Pakistan's trade openness, industrial value addition, and economic growth. Time series were made using the data. The information used covered the years 1980 through 2009. World Development Indicators and International Financial Statistics were used to gather the data. The findings demonstrated that, when industrial value is taken into consideration, imports and exports have a favourable and important impact on economic expansion.

Moreover, Szirmai A. (2011) investigated the manufacturing industry in underdeveloped nations. The information was utilized from 1950 to 2005. The manufacturing sector has contributed significantly to growth in developing nations; however the results do not support the engine of growth idea. The more extensive historical data lends the industrialization hypothesis more credence. Additionally, Dan et al., (2012) looked into how industrialization affected Nigeria's economic expansion. The information collected from the Nigerian Central Bank. The outcome showed that industrialization has a detrimental effect on Nigeria's economic expansion. Furthermore, Aggarwal & Kumar, (2012) examined the connections between industrialization, structural change, and poverty. The information used came from the Indian economy between 1950 and 2010. This development is the result of structural modifications, which also lessen poverty by increasing value added and employment in the industrial sector.

Moreover, Cherniwchan, (2012) examined the environment, industrialization, and economic development in Canada using data on sulphur emissions from 1970 to 2000. The results show that the industrialization process was a significant contributor to the observed increases in emissions: a 1% increase in the share of total production attributable to industry is associated with an increase in emissions per capita of 11.8 percent. In the same way, Umoh et al., (2012) estimated the effect of FDI on the performance of the industrial sector and expansion of the Nigerian's economy. When using the impulse response function and variance decomposition approach, it is discovered that GDP is extremely sensitive to the amount of FDI in the economy for the period of 1981 to 2015 when using time series analysis. A bidirectional link between FDI and industrial output in the chosen economy is also explained by the application of VDC and VAR with co-integration. Moreover, Khan & Ahmed, (2013) studied into how Pakistan's industrial production was affected by trade liberalization. The data used for the period 1972 to 2012. The information was gathered from the State Bank of Pakistan and the Pakistan Economic Survey. A trade liberalization index was created using the principal component method. They choose to employ the independent variables GDP, Industrial Value Added, Agriculture Value Added, Industrial Sector Labour Force, and Private Investment in Industrial Sector. The study's findings showed that trade liberalization have an effect on industrial productivity both directly and indirectly.

Accordingly, Jelilov & Gylych, (2013) evaluated the effects of industrialization on economic growth in Nigeria using secondary data from the Statistical Bulletin 2011 of the Central Bank of Nigeria and the Nigerian National Bureau of Statistics. The study's conclusion demonstrates that industrialization had a long-term negative influence on Nigeria. Moreover, Ibbih, et al., (2013) examined how industrialization and growth are related 54 African countries' cross-country data. Data from a panel were used. The information was gleaned from 2012 World Bank data. Domestic Credit to Credit Sector, GDP Growth, GDP per capita, Industry Value Added, Growth of Industry Value Added, Manufacturing Value Added, and Growth of Manufacturing Value Added were used as independent variables, and GDP was used as the dependent variable. The findings showed that there was a correlation among industrialization and economic expansion, but it was a weak one. Similarly, Tandon & Reddy, (2013) found that increases in finance and labour skills could lead

to higher-quality textile production of the Indian textile industry. This could strengthen the sector's propensity to boost India's economic growth. In the same way, Anowor et al., (2013) examined that there is a substantial correlation between foreign direct investment and the Nigerian manufacturing sector when using the ordinary least squares approaches. Even though Nigeria is still a developing country, the strong correlation between FDI and manufacturing sector growth is crucial for the nation's future prosperity. It is proposed that putting more emphasis on macroeconomic policies and practices will result in improved economic health and overall economic growth.

Moreover, Ajmair, (2014) investigated the connection between Pakistan's industrial sector's growth and the country's overall economy. The 61-year period between 1950 and 2010's secondary data was used. The study's findings indicate a positive correlation between the industrial sector and GDP, with the exception of the mining and quarrying industries, which not only exhibit a negative correlation but also provide insignificant findings.

Similarly, Shahbaz et al., (2015) investigated Pakistan's manufacturing industry from 1972 to 2003 while taking cost competitiveness into account. The important thing to note, however, is that after 1995, data on costs in the manufacturing sector were not organized very well, and in order to do this, the composite price index and export prices were compared. It is discovered that during the sample period, both the nonfactor price output index and the composite price index are expanding more quickly. The higher level of inflation in the economy is also defined by the cost of energy, imported machinery, and wage rates. The impact of industrialization on Nigeria's economic development was studied by Alexander et al., (2015) studied by the impact of industrialization on Nigeria's economic expansion. The time series data used for the period 1973 to 2014.The information was taken from the Statistical Bulletin. The outcome showed a favourable but not statistically significant link between industrial output and economic growth.

Likewise, Makinde et al., (2015) analyzed the connections between Nigeria's economic success and the expansion of its textile sector. Nigeria was employed in this study by the nation. The study's findings, which relied on the method of data collecting through archives, print media, interviews, and electronic media, came to the conclusion that Nigeria's growth process is negatively impacted by deteriorating

trends in the textile industry. The findings specifically showed that the import of textile products, technological constraints, and power shortages are the main causes of the Nigerian textile sector's decline and its detrimental consequences on the nation's economic growth.

Furthermore, Mercan et al., (2015) was examined the Kaldors's Laws in recently industrialized nations. The study's panel data set. The annual statistics from 1965 to 2012 were used. A cointegration link between the variables was evident in the results. Also established was the applicability of Kaldor's Laws. Moreover, Szirmao & Verspagen, (2015) analyzed the significance of the manufacturing industry for advancing the economy. The study's panel data set. The information used covered the years 1950 to 2005. The study discovered that manufacturing had a favourable effect on growth. Similarly, Mangla & Din, (2015) examined the empirical effects of key macroeconomic and environmental factors on the expansion of Pakistan's manufacturing sector while keeping an eye on the country's fiscal and monetary policies. It has been stated that Pakistan's macroeconomic position has been unbalanced over the past 20 years, which has eventually resulted in financial instability over time. Although the trade account, deficit and low foreign remittances have brought about certain macroeconomic adjustments. But it was crucial to consider how leverage would affect the nation's overall economic growth.

Furthermore, Anyanwu & Yameogo, (2015) highlighted how FDI and its effects on economic growth are related, using agriculture, manufacturing, mining, and telecommunications as their primary areas of research from 1980 to 2011. The use of economic instruments explains why manufacturing and the agricultural sectors have long had a detrimental impact on the expansion of the economy. According to the findings, mining and telecommunication have positively impacted economic growth. However, FDI does not significantly relate to the agriculture sector in the medium term, while seeing the impact of the manufacturing sector negatively. Additionally, they advocated that each level of government, the public sector, and the private sector each exert a large amount of control over economic growth. Likewise, Ahmed et al., (2015) investigated the expansion of the manufacturing, services, and agricultural sectors in Pakistan. Time Series data covering the years 1989 to 2012 has been collected to investigate this relationship. The Econometrics method was used in this study to appear at the connection among sector share and economic expansion. Vector

Error Correction Model (VECM) was used to choose the optimum method. The short-term causality between variables (such as GDP, manufacturing, services, and agriculture) was examined using the Wald test. The VECM verified that the GDP in Pakistan was long-term causally related to the sectors of agriculture, manufacturing, and services. GDP and the manufacturing and service sectors both showed a short-term causal relationship, and the same is true for the manufacturing and agricultural sectors. However, there was a one-way causal relationship between the manufacturing sector and GDP as well as between the services sector and the agricultural sector. According to the report, rising agricultural and manufacturing output will have a good impact on GDP, whereas rising services output will have a positive impact on GDP in Pakistan.

Ahmad et al., (2016) evaluated three different methodologies to assess the total factor productivity for the large-scale manufacturing industry from 1975 to 2001. The classical model and its comparison to four other models were taken into account in the first method. The use of the simultaneous equation method is crucial for increasing productivity in the large-scale industrial sector. The sector's productivity is influenced by factors including labour, capital, and national product per person income, according to the overall findings. Additionally, the results of the study are highly helpful in creating long-term strategic planning for the nation. In the same way, Isilsal Z. & Chimezie, (2016) examined the relationship between Nigeria's GDP, agriculture, industry, and service sector. They made use of secondary data from the Statistical Bulletin of the Central Bank of Nigeria (2012). GDP was a dependent variable, but services, industry, and agriculture were independent variables. Data was gathered between 1997 and 2012. The findings showed a strong positive correlation between GDP, agriculture, industry, and services.

Furthermore, Hasan et al., (2016) analyzed the role of textile sector influences economic expansion. Bangladesh was employed in this study by the nation. The information from 2004 to 2014 was used. According to the study's findings, the textile industry of the nation contributes significantly to its economic growth by boosting export revenues by 85% and creating 1.5 million new jobs. Moreover, Rasiahandna, (2016) evaluated the comparing industrialization and the East Asian Economies in Pakistan. From 1960 to 2015, secondary data were used. The study's findings give Pakistan the chance to examine the more and less successful East Asian industrialized

nations in order to establish the conditions for rapid economic growth and structural change. Additionally, Iya, et al., (2016) evaluated the impact of industrialization on Nigeria's economic expansion. The data utilized between 2001 and 2003.This study's data came from the 2013 CBN statistical bulletin. The outcome demonstrates that the economic growth was more susceptible to changes in industrial output than to those in industrial employment.

Furthermore, Vietnam et al., (2016) was studied the textile industry along with its comparative advantage over the rival Chinese textile market. The results, which made use of the Generalized Double Diamond Approach, highlighted the fact that, in terms of the linked industrial circumstances and the factor Environment, Vietnam's industrial sector is less globally competitive than the Chinese industrial sector. The improved export of textiles and apparel as well as the ease of doing business, however, confirmed the findings and the comparative advantage of Vietnam's textile industry. The study came to the conclusion that Vietnam may significantly increase its economic growth through its textile industry by preserving the sector's strength and overcoming associated industrial conditions and factor environment disadvantages. Moreover, Sharma & Dhiman, (2016) focused on the variables that can affect textile export in India to examine textile trends in the Indian economy. The study's findings indicated that labour costs had a substantial impact on Indian textile exports. The findings, in particular, showed that declining export revenues were caused by rising labour costs. According to the report, economic expansion also has a big impact on how well the textile industry exports. Similar findings were found for the exchange rate, which showed that a rise in that figure would likely boost Indian textile. Textile exports by enabling the exporter to make more money through lower textile buying costs. Khalid, (2016) analyzed studied the connections between economic expansion in Pakistan and imports, exports, and foreign direct investment. The time series data from 1971 to 2013 were used. The research demonstrates that Pakistan's economic growth has been significantly impacted.

Subsequently, Ejaz, (2017) also studied into the factors that influence industrial development in Bangladesh, Pakistan, Sri Lanka, and India, all of which are in South Asia. The 1990–2015 panel data period was used. Industrial growth is greatly and favourably impacted by per capita income, foreign direct investment, trade openness, governance, and government spending. According to the panel data

regression analysis's finding. Similarly, Meyer & McCamel, (2017) evaluated the connection between employment, economic output, and the manufacturing sector. South Africa was used by the nation. The information from 1994 to 2015 was used. The findings showed a long-term, favourable association between employment, GDP, and the manufacturing sector. No short run existed between the variables. The creation of new jobs may be supported by the manufacturing sector. Additionally, a rise in manufacturing contributed to GDP expansion.

Moreover, Su & Yao, (2017) investigated how the manufacturing sector primarily contributes to economic growth in medium income countries. They discovered that manufacturing had an impact on all other sectors, including the services sector, during the middle income period. Additionally, there is a long-term and short-term positive association among the manufacturing sector and other industries. The results showed that the manufacturing industry continues to be the main driver of economic growth in middle-income countries. Furthermore, Mirza & Kanwal, (2017) used the stochastic production frontier approach and a sample of 101 industries to analyze the effectiveness of Pakistan's large-scale manufacturing industry among 1995 and 2001. The study's findings indicated that the efficiency of the large-scale manufacturing sector needs to be greatly improved. But after using the disaggregate analysis, a study produced a range of results. Some industries initially see a decline in productivity, while others do not.

Moreover, Olanrewaju, (2018) investigated the link between Nigeria's manufacturing production and economic expansion. The data from 1980 to 2017 were utilized to estimate both the long-term and short-term outcomes. The study's findings showed that the factors included in the estimation have a long-term association. The causality test indicates that there is a one-way connection among manufacturing production and economic expansion. Thus, the study suggested that more resources should be directed into manufacturing activities in order to increase productive potential while lowering poverty. Furthermore, Mongale & Tafadzwa, (2018) investigated the connection between the manufacturing industry and economic expansion. The 1980 to 2016 time series data were used. South Africa was used by the nation. The study's findings demonstrated that the manufacturing sector, as represented by manufacturing output, has a sizable positive coefficient, confirming that the industry has a beneficial impact on economic growth. The research advised

policymakers to advance and market the manufacturing industry. Policies should be designed to improve the business environment, encourage capital development, and boost employment.

Likewise, Ndiaya & Kangjuan, (2018) examined the Senegalese manufacturing enterprises; researchers looked at the influence of industrialization on economic expansion. The secondary data used from 1960 to 2017. The study's findings demonstrate that increasing industrial production will boost Senegal's economic development. As a result, there is a sturdy association among Senegalese economic expansion and industrial development. Similarly, Ossadzifo, (2018) examined how the manufacturing sector affects economic development in Sub-Saharan Africa. From 1990 to 2015, secondary data were used. The outcomes displayed in the joint effects are typically used to measure growth and are associated to a steady state of growth connected to global knowledge diffusion. Similar to this, Odeleye, (2019) investigated the connection between Nigerian industrialization based on information from 1981 to 2015, and economic growth. The study's empirical findings demonstrate that raising industrial production will boost Nigeria's economy. As a result, Nigeria's industrial development and economic growth are intertwined.

Likewise, Haraguchi et al., 2019 examined the causes of higher industrial growth rates. 134 developing nations used the sample. The information used covered the years 1970 to 2014. Their findings demonstrated that institutions and human capital serve as a foundation for the expansion of manufacturing sectors, capital, and investment. They also discovered that the majority of elements do not work alone to support industrial growth. They also contribute to the ongoing industrialization that characterized the economic expansion of some successful nations from 1970 to 2014. Additionally, Qaiser, (2020) was also studied the long-term correlation in Pakistan between industrialization and economic growth. The years 1976 through 2015 were used in the time series. World Development Indicators (WDI) was the source of the study's data. The outcome demonstrates that raising industrial output is a means of raising Pakistan's Gross Domestic Product (GDP).

2.2 National & International Studies on Human capital

Romer, (1989) examined how human capital and economic expansion are related. The paper described the significance of human capital for economic growth using both facts and a theoretical framework. Heston and Summer's 1960–1985 data collection contains a sample of several nations that is used for the investigation. The key finding is that schooling does not add any additional explanatory power to a cross-country regression of other factors and investment growth rates, although primary education does contribute to the model's ability to forecast consecutive investment rates and, eventually, growth rates. Similarly, Romer, (1989) studied into how human capital fits into an endogenous growth paradigm. This study made use of the 112 nations. The information was utilized between 1960 and 1985. The results demonstrate that the starting degree of literacy influences future investment rates and, indirectly, growth rates. Moreover, Weil, (1992) investigated how the level of output for economic development was impacted by the human capital pool. The study's conclusions demonstrate that changes in GDP also affect the growth of human capital. By using the examples of LDCs and the OECD, it is meant that education contributes to a country's development. A country's degree of development changes when education is raised on various levels.

Benhabib & Spiegel, (1994) analyzed at how human capital affected the rise in total factor productivity and found a favourable correlation. This study made use of the 78 nations. The information was used between 1965 and 1985. In this paradigm, there are two ways that human capital influences growth. First, the amount of human capital directly affects how quickly new technologies are developed domestically. Second, the availability of human capital influences how quickly foreign technology is adopted. Furthermore, Judson, (1998) evaluated into whether or not spending on education promotes a nation's economy. He also discovered the link between education spending and its distribution. He created a model to measure each person's aptitude both before and after receiving an education for that purpose. He used information from UNESCO on educational enrollments and spending to calculate the effectiveness of current educational allocations in his analysis of the panel countries. The connection among the growth of GDP and the accumulation of human capital is not statistically significant in those nations where resource allocations are reasonable, according to the results of regression of cross-country decomposition growth.

Hall & Jones, (1999) examined at data from several countries and discovered a connection between outputs per worker. They discovered that investing in both human and physical capital can boost output per worker. According to them, social infrastructure (institutions and government policies) determines the differences in capital accumulation, productivity, and then production per worker. They use the UNESCO data on enrollments and spending in education to analyze the panel countries' data and determine how effectively current educational budgets are being used. The correlation between the growth of GDP and the accumulation of human capital is not important in countries where resource allocation is poor, but it is important and positive in countries where resource allocation is in a reasonable position, according to the results of regression of the cross-country decomposition growth. In their study, Fernandez & Mauro, (2000) studied at the contribution of human capital to Spain's economic development. The research builds a human capital index for the Spanish labour force from 1998 to 2007. A growth experiment from 1978 to 1997 is conducted to help determine the effect of human capital on Spain's economic expansion. The findings indicate that production rises with increased levels of schooling. Finally, this study's findings suggested that the significant quantity of productivity lost as a result of youth unemployment.

Additionally, Abbas, (2000) examined how human capital impacted economic expansion in Pakistan and India using time series data from the years 1970 to 1994. The results show that higher education was found to be favourably related in the case of Pakistan and that basic education was positively related in the case of India, both at a 1% level of significance. Similar to this, Abbas, (2001) examined how human capital affects economic expansion in Pakistan and Sri Lanka using time series data from 1970 to 1994. The results demonstrate that in the secondary and higher secondary level, human capital was positively correlated with economic expansion in Pakistan at the 1% level of significance and in Sri Lanka at the 5% level of significance. Likewise, Seren F. (2001) examined the connection between global human capital and economic prosperity. In this study, the 72, 65, and 22 countries were used. The information was utilized between 1960 and 1990. This evaluation comes to the conclusion that the process of accumulating Human capital is considerably and positively influenced by the degree of wealth.

Moreover, Jesus, (2001) examined the role of education in advancing the economy. There are two distinct ways to look into the impact of education on economic expansion. First, human capital directly contributes to production as a productive factor and has a level effect. The second effect is the rate effect, where human capital aids in accelerating technical advancement. The study made use of combined data from 1960 to 1990. The outcome demonstrates a positive correlation between economic growth and human capital. In their study, Asteriou & Agiomirgianakis, (2001) examined the role that education plays in the health of the Greek economy. Data gathered between 1960 and 1994. According to the study's conclusions, there is a considerable long-term connection among GDP and educational characteristics. The study comes to the conclusion that education has a vital role in fostering economic growth.

The connection between the growth of human capital and the economy was examined by Barro R. J. (2001). One hundred chosen states make up the panel regression estimation. The research included information from 1965 to 1995. According to the study's findings, spending on the government has a significant negative impact on growth while other factors such as international openness and inflation have constructive and significant effects on growth. Government spending has a negative relationship with economic development. Moreover, Ashton, (2002) studied into how human capital affects the procedure of development. It is thought that the progress of human capital is positively correlated with that of physical capital.

Likewise, Ghosh & Maji, (2003) investigated the effectiveness of the working capital of the Indian cement industry. The information was used between 1992-1993 and 2001-2002. It was discovered that the Indian cement industry did not do very well during this time.

Moreover, Fafchampas & Quismbing, (2003) examined the connections between human capital, productivity, and labour allocation. Data from a household survey conducted in four areas of Pakistan were utilized in the analysis. The study moves along in two steps. The estimation of the labour supply and demand equation is the first phase, and the examination of the production function is the second. The findings show that higher education influences household resource allocation towards non-farm activities and that education leads to off-farm output. Moreover, Khan, (2005) found a strong correlation between Pakistan's economic growth and human

capital. Data from the time series were utilized between 1980 and 2002. The outcome demonstrates a favourable correlation between economic growth and human capital as well as links between health and education indicators of human capital and economic expansion.

Furthermore, the connection between social capital and economic development was discovered by Mogues & Carter, (2005). They came to the conclusion that regions of the world with higher social capital have faster rates of growth than those with lower social capital investments. As a result, social capital focuses on economic expansion for the economy as a whole, and on a personal level, social capital acts as a hub for economic growth and success.

Moreover, Lazaaridis & Tryfonidis, (2006) studied into the connection between corporate profitability and working capital management. The findings show a statistically significant connection among the Cash Conversion Cycle and profitability as evaluated by gross operating profit. Likewise, For 58 small manufacturing companies in Mauritius, Padachi, (2006) investigated working capital management trends and how they affected business performance. Between 1998 and 2003, the data were used. The research showed an increasing trend in the short-term working capital financing element and a link between large inventories and receivables investment and low profitability.

Moreover, Greiner, (2007) studied into the connections between economic development, human capital, and public debt. The findings indicate a positive correlation between the development of human capital and economic expansion. The productive sector, household sector, and government sector were the three sectors employed in the study's growth model framework. The findings show that it is impossible to guarantee economic development with an impractical fiscal strategy. In the same way, Khan, (2007) examined how human capital plays a part in luring foreign direct investment to countries in South Asia. According to the study, highly trained and skilled labour is very attractive to foreign private investment. By examining the connection between FDI and human capital, a study put forth the idea that in order for South Asia to gain from private foreign investment, they must skill its workforce. The study's main finding is that improving output and attracting FDI both heavily rely on human capital.

Moreover, Cohen, (2007) examined the number of school years in various nations. Data from a panel were used. Data from 1960 to 2000 were used. In estimates using panel data, our series also have a large impact on education. For companies listed on the Athens Stock Exchange. Moreover, Ogunade, (2008) investigated how human capital contributes to economic expansion in underdeveloped nations. The general training programmers in India, South Africa, and Singapore were examined, and it was found that human capital development practices must be implemented in developing nations in order to boost economic progress. The findings demonstrate that when human development practices are applied in developing nations, these nations are able to generate surplus value and competitive returns that can be applied to advance technology, boost economic growth, and advance economic development.

Moreover, Abbas Q. et al., (2008) explored the connection between Pakistan's economic growth and human capital. The time period covered by the time series data was 1960 to 2003. The 1990s' poor contribution to economic growth serves as evidence of the effects of inadequate human capital initiatives. Furthermore, in their study on the importance of human capital for economic expansion, Appleton & Francis, (2008) found that south Asia had better conditions for the development of human capital than other African nations. These nations' economies are growing at a slower rate due to measures of human capital including health and education. Numerous metrics of human capital, including life expectancy, the percentage of students enrolled in schools, and GDP, show that Africa has the lowest levels of human capital among all other continents. Similarly, Aka & Dumont, (2008) investigated the link among economic growth and human capital (education and health). In this study, the USA was the study's subject. The information was utilized between 1929 and 1996. The findings indicate a two-way causal Economic expansion and human capital development characteristics.

According to Ljungberg & Nilsson, (2009) analyzed human capital gained via education was a major factor in Sweden's economic growth in the late 19th and early 20th centuries and following World War II. In this study, the nation of Sweden was utilized. The information was used between 1870 and 2000. The results demonstrate that economic expansion frequently has an impact on higher education. Moreover, Human capital and regional economic growth in the European Union were analyzed by Ramos et al., (2009). 229 and 190 Regions in the European Union were the

countries used in this study. The information was used from 1995 to 2000 and from 2000 to 2005. They come to the conclusion that a growth in over education is related to the continent's recent regional economic performance.

Murphy & Tamura, (2009) studied at the connections between economic growth, human capital, and fertility. The study demonstrates that as fertility rises, investment in human and physical resources declines. Additionally, investing in human capital accelerates economic growth. The findings demonstrate that investment in human capital generates higher returns in industrialized nations than in less developed nations. In the same way, Human capital was shown to be crucial to economic expansion in Abbas & Foreman's, (2009) analyzed how economic expansion and human capital are related. The findings indicated that human capital is crucial to Pakistan's economic development. The study demonstrates that the GDP per capita increases quickly when human capital is invested in the form of education and health services.

Silles, (2009) studied into how the minimum school age affected economic growth. According to this study, education has a favourable impact on health, and the coefficient used to. More education increases work opportunities and raises health and education spending even more. The study comes to the conclusion that an economy must invest in both physical and human capital to achieve the highest level of monetary development. Likewise, According to Akram et al., (2010) investigation into the connection between economic growth and health, GDP increases per capita as people's health improves. The findings indicate that human capital is a crucial component of economic expansion. They discovered a considerable influence of health on economic expansion.

Furthermore, Roses et al., (2010) analyzed into the connection between human capital and economic expansion. Spain, the nation under study from 1850 to 2000, secondary data were gathered. To further the current study, the writers concentrated on two approaches: an income-based approach and an education-based method. The authors analyze the effect of human capital on total factor productivity and draw the conclusion that the Spanish economy is a good fit for the skilled premium approach based on the findings. High incomes are correlated with high levels of schooling. However, human capital only makes a little contribution to the increase in labour productivity in the economy. Likewise, In Pakistan, Afzal, (2010) evaluated the short-

term and long-term relationships among education and economic expansion. The time series data for the years 2008 and 2009, as well as 1970 and 1971, were used. The study also discovered that education in schools produces positive outcomes throughout the short and long terms.

Haldar & Mallik, (2010) examined at how investments in output, human capital, and physical capital behaved. India was the nation used in this study. The information was utilized between 1960 and 2006. The findings imply that whereas human capital investment has a considerable long-term impact on per capita GNP, physical capital investment neither has a long-term nor a short-term impact. Moreover, Lebe, (2011) used annual data to analyze the quantitative connection between economic growth and education as a part of human capital. Turkey was the nation used in this investigation. The information was utilized between 1938 and 2007. Their research demonstrates a long-term link and bidirectional causality between economic growth and education. Furthermore, Zhang & Zhuang, (2011) investigated how China's human capital was affected by economic development. They used information from various Chinese provinces between 1997 and 2006. The outcome demonstrates how important human capital is to a nation's economic growth.

In Nigeria, Bakare & Sanmi, (2011) studied into the connection between health care costs and economic expansion. The study of the data reveals a considerable and favourable correlation between health care spending and economic expansion.

Additionally, Mayer, (2011) studied at the connection among human capital, technological diffusion, and economic expansion in developing countries. The connection among human capital and economic expansion was examined using data on the import of machinery from both developed and less developed countries, as well as the spending on technology in developing nations. The growth accounting framework is used in relation to the imports of machinery. The results of the growth accounting method demonstrate that the stock of human capital and machinery imports have a substantial influence on economic growth, and the findings imply that the import of machinery for advancing technology has a positive connection with economic growth. In the same way, Asghar & Asma, (2011) examined the connection between Pakistan's economic development and human capital. Data from a time series were used to examine the relationships between variables across the long and short

terms. The findings indicate a close relationship between economic growth and human capital. Pakistan makes greater investments in its health and educational systems to support the nation's economic development. Furthermore, the connection between the creation of human capital and economic expansion was examined by Irfan et al., (2011). Data from the time series were used from 1972 to 2010. The co-integration result suggests a long-term link between the variables. The results show a casual bidirectional connection between the development of human capital and economic expansion.

Qadri F. & Waheed W. (2011) studied the element of human capital in Pakistan's economic growth. The time series information covered the years 1978 to 2007. The estimation results confirmed the prior studies' findings that human capital contributes to economic expansion in a favourable way and that the results are unreliable. Moreover, Asghar et al., (2012) investigated the impact of human capital, including health and education, on Pakistan's economic development. Annual data from 1974 to 2009 were used. The findings show that human capital has a important positive impact on economic expansion.

According to Ali et al., (2012) examined the Pakistan's economic growth depends greatly on its human capital. The 1972–2011 time frame covered by the secondary data was used. The findings indicate a beneficial association between economic expansion and the development of human capital. Likewise, Ali, (2012) studied how Pakistan's economic growth is influenced by its human capital. Between 1972–1973 and 2010–2011, the secondary data was used. The Pakistan Economic Survey provided the data for this study. Gross fixed capital development has a favourable, considerable impact on economic expansion, as evidenced by the results of the enrolment in education. A negative and considerable impact on Pakistan's economic expansion is caused by CPI inflation and the rate of investment growth.

Khilji et al., (2012) evaluated into how enhancing vocational education increases labour productivity and efficiency as well as the connection between economic growth and human capital formation. Data from the time series were utilized from 1980 to 2010. The findings demonstrate that raising the level of vocational training increases production and labour efficiency. Furthermore, In the South African Development Community (SADC), Khembo & Tchereni, (2013) examined the impact of human capital formation on economic development. Panel

data covering the years 1990 to 2005 were used. T he information gathered from 13 ASDC nations. The findings indicate a strong relationship between education and economic expansion. Similarly, Koc, (2013) looked into how human capital affects economic expansion. In this study, 27 EU Member States were employed. The information was utilized in 2012. The results demonstrate a statistically important and favourable impact of human capital on economic expansion.

Moreover, Gebrehiwot, (2014) examined how human capital affects economic growth in the short- and long-term. using information from the years 1975 to 2011. The findings indicate that gross capital formation, health, GDP per capita, labour force, education, and government spending are all correlated over the long term and with stability. These findings are in line with ideas of endogenous growth. It asserts that raising investment in the creation of human capital will raise productivity in any economy. Furthermore, Samar B. and Waqas M. (2014) examined how Pakistan's economic growth is impacted by the creation of human capital. The data for the period from 1979 to 2010 were time series data. The findings suggest that human capital accumulation significantly affects GDP. In the same way, And in Africa, Mekdad et al., (2014) studied the Ordinary Least Square (OLS) method to observe the association between public education spending and economic expansion in Algeria. The information used covered the years 1974 through 2012. The outcome is consistent with the study's core hypothesis, which holds that education investment stimulates Algeria's economy. Similarly, Using the Ordinary Least Square (OLS) method, Dahmani & Louaj, (2014) evaluated the connection among public education spending and economic expansion in Algeria. The information used enclosed the years 1974 through 2012. The study's central hypothesis that education investment has a favourable impact on Algeria's economic expansion his supported by the findings

Moreover, the benefits of human capital investment on migration, health, and education are also studied by Mat et al., (2015) in Sabah (Malaysia). The information used enclosed the years 1980 to 2010. The conclusion indicate that increased gross domestic product (GDP) per capita is influenced by increasing rates of literacy, longer life expectancy at birth, and the requisite number of immigrants, as well as by sustained GDS and a decrease in the unemployment rate. Furthermore, Owusu-Nantwi, (2015 studied into the connection between Ghana's economic growth and educational spending. The information used covered the years 1970 to 2012. The

empirical findings indicate a long-term, hard positive correlation between real GDP and education spending.

Moreover, Amir & Khan, (2015) investigated at how Pakistan's human capital development has been impacted by health. Data from a time series were used. The findings demonstrate a beneficial relationship between economic growth and human capital. According to Bashir K. & Ashraf M.'s, (2015) investigated the human capital is a critical factor in promoting Pakistan's sustainable economic growth. Between 1977 and 2014, time series data were used. The study could be helpful for Pakistan's economic growth through forming human capital and influencing health and educational policy. Similarly, Shahzad F. (2015) examined how Pakistan's economic expansion is impacted by the creation of human capital. The time series covered the years 1990 through 2013. These findings suggest that in order to maintain Pakistan's economic growth, the health and education sectors need to receive high priority attention.

Moreover, from 2000 to 2012, Pelinescu, (2015) studied the connection between human capital and economic development in the individual European Union member states. Education costs and exports of goods and services are exogenous variables in this study, while GDP per capita is taken into account as an endogenous variable. For econometric analysis, the researcher used Hanushek's (2013) panel model and the pooled least squares method. The study's findings showed that, with the exception of education spending, all explanatory variables significantly correlated. In the same way, Hadir & Lahrech, (2015) used annual data for the years 1973 to 2011 to analyze the connection among the creation of human capital and economic expansion. The authors of this study used the OLS econometric approach. The study's findings demonstrated that there was a constructive correlation among economic expansion and human capital for all variables. Furthermore, Ali H.S. et al., (2015) analyzed into the contact of increased human investment on Pakistan's annual monetary expansion from 1972 to 2011. The study's conclusions show that while certain factors had a large and negative impact on Pakistan's GDP, others had a positive and dominant impact for monetary expansion.

Likewise, Omitogun et al., (2016) evaluated the impact of human capital factors on Nigeria's monetary expansion between 1986 and 2014.The research's conclusions demonstrated that investments in health care and education have

benefited Nigeria's economy. Using yearly data from 2000 to 2013, Pescu & Srefan, (2016) analyzed into the connection between human asset and monetary progress in 29 European states. The study's findings showed that, with the exception of social protection spending, all explanatory variables have positive correlations. The author discovers a bad relationship between social protection spending and fixed capital formation. In the same way, Adeyemi PA & Ogunsola AJ, (2016) examined the connection between economic expansion and human capital in Nigeria. Data from a time series were used. The findings showed that there is a long-term, constructive but negligible correlation between life expectancy rate, gross capital formation, and public expenditure on education. The findings also show a long-term inverse link between public health spending, primary and secondary school attendance, and economic growth.

Further, Alatas & Cakir, (2016) analyzed at the empirical connection between economic growth and human capital. In a panel data study spanning 65 countries from 1967 to 2011. In order to measure human capital per person, an index based on years of education, returns to education, infant mortality rate (per 1,000 live births), and GDP per capita (constant 2005) as a proxy for economic growth all of which are regarded as major components of human capital in the literature on economics has been used. Human capital has a positive and statistically important impact on economic expansion in poor countries, according to estimates for the health and education indices. Moreover, The connection among human capital index and economic expansion in Pakistan was studied by Afridi A.H. in 2016. The outcome suggested that Pakistan's human capital index is promoting progress. Similarly, Saeed A. & Awan A. (2016) examined the result of human capital generation on financial expansion in Pakistan. Between 1985 and 2015, time series data were used. According to the findings, Pakistan's economic progress has been strongly influenced by the progress of human capital.

In a panel of eleven nations from 1992 to 2014, Jameel & Naeem, (2016) seek to demonstrate the connection among human capital and monetary development. In a fixed effect OLS test, the outcome obtained by using panel econometrics methods indicates that there is a long-term connection among the real gross domestic product (GDP) and human capital. Furthermore, Hanif & Arshed, (2016) use ordinary least squares (OLS) and the fixed effect model (FEM) to analyze the influence and

contribution of primary, secondary, and postsecondary education as well as the significance of education in the SAARC region's economic growth between 1960 and 2013. Findings demonstrated that investing extensively in the educational sector will help the government get better results and that education has a strong beneficial collision on monetary expansion. Moreover, Hussain & Zafar, (2017) investigated the connection among public spending and Pakistan's economic expansion. This research is based on yearly data from 1972 to 2015. The research's findings showed that there are short-term associations between variables. Furthermore, The connection between human capital and economic expansion in emerging nations was examined by Bahadur & Chhetri, (2017). He examined the nation's technological advancement using the slow growth model. The research demonstrates a positive connection among economic expansion and its determinants.

Ali et al., (2018) used data from 132 nations spanning 15 years, from 1996 to 2011, to examine the connection among human capital, social capacity, and economic expansion. In this study, the panel data approach panel ARDL is used. The study's findings showed that excluding variables relating to social capacities resulted in inclusive results, and the authors also discovered that both monetary development and human capital are important. Similarly, the impact of healthy spending, education expenditure, and gross fixed capital creation on the economic development of the Indonesian province of South Sumatra was examined by Kadir et al., (2018). From 2010 to 2015, 14 South Sumarta districts were included in this study. The major conclusions of the study demonstrated that spending on labour, education, and happiness has a favourable impact on growth in a particular district of the province of South Sumatra. Likewise, similar to this, Ali, (2018) examined Pakistan's human capital, social capabilities, and economic growth based on data from 1996 to 2011. The World Development Indicator (WDI) was the source of the data used in this study. The outcome demonstrates that human capital only contributes positively to per capita GDP growth in the context of superior financial opportunities and superior judicial systems. In the same way, Ogundari et al., (2018) looked at how human capital affects economic expansion. 35 countries' secondary data were utilized. Africa sub-Saharan employed in this investigation. The information was utilized between 1980 and 2008. The study's findings maintain the idea that human capital is crucial for

boosting economic development. However, in many economies, the contribution of health is greater than that of education.

Moreover, Affandi & Bary, (2019) studied into how human capital affects economic expansion. The nation was studied in Indonesia. The cross sectional and panel data used in this investigation. According to the study's findings, human capital is a crucial component of economic expansion. The study also found that different regions with a focus on manufacturing have different relationships between human capital and economic expansion. Years of education have been utilized as a stand-in for human capital, greatly affecting economic growth. Higher economic growth in Indonesia will be facilitated by the development of cognitive capabilities.

Hafeez, (2019) examined how human capital affects economic expansion in Pakistan. Data from 1981 to 2013-2014 were used. The time series data was gathered from statistics from the World Bank, the Economic Survey of Pakistan, and surveys of the labour force. The findings indicate a considerable power of human capital on monetary expansion. Additionally, Usman F.K. et al., (2019) analyzed the impact of human capital growth on the economic expansion of ECOWAS member nations. The information was used for the years 1980 through 2016. This is crucial since studies have shown that boosting investments in education and health will improve human capital, which will boost economic growth and development.

Moreover, Khatoon, (2021) also studied at the outcome of human capital on Pakistan's economic development. The years 1990 through 2019's time series data were utilized. The outcome demonstrates that while human capital has a unconstructive influence on population development and newborn mortality rates, it has a favourable and considerable collision on economic expansion. Furthermore, Matousek & Tzeremes, (2021) evaluated into how human capital affects economic expansion. The study's panel data set. The information from 1970 to 2014 was used. The results have demonstrated that both have a favourable impact on economic expansion. The human capital patterns that have been proven to be asymmetrical contain more pronounced assumptions about the substitutability of both skilled and unskilled workers. According to the study's findings, these countries' economic growth is strongly and favourably correlated with their human capital. In the same way, Ogbeifun &Shobande, (2021) analyzed into how human capital affects economic expansion. This research used the 24 OECD nations. This study made use of panel

data. The information from 1986 to 2018 was used. The outcome indicates that inflation will negatively impact growth rates. Economic growth and human capital were positively and significantly correlated. Divergence and growth were present in these nations. The writers claimed that investments and R&D had raised the standard of living for people and restrained inflation.

Widarni & Bawono's, (2021) investigated of the collision of technology and human capital on economic expansion. In this investigation, time series data were employed. The nation was studied in Indonesia. The information utilized from 1984 to 2019. The outcome must demonstrate that human capital, when used as a proxy for education, had favourably impacted economic growth. Economic growth had been positively impacted by technology. The writers claimed that Indonesia's human capital and technological progress depended heavily on education.

Minhaj, (2021) studied at Pakistani economic growth and human capital development to evaluate the many policy foundations on which capital development exists among countries and the effects it will have on the domestic economy. The purposeful intent of capital development as a gauge of economy progress was also questioned in this essay. The vector error correction approach was used in the study as an estimation tool to display the short- and long-term disequilibrium. The report suggests that the government of Pakistan keep spending at the current level because health and education are crucial for achieving capital development as well as deliberate growth and development in the Pakistani economy. The study's conclusions show a clear connection between Pakistan's economic development and the issue of human capital. Likewise, Chani I. (2021) investigated the long-term link between economic growth and the investment in human capital. The analysis uses annual data from 2001 to 2015 and focuses on 12 Muslim- and non-Muslim-majority countries from the SAARC and ASEAN regions. According to panel FMOLS statistics, there is a constructive connection among inflation, gross fixed capital structure, labour force participation, and expenditures on health care, education, and labour.

Shah, (2022) evaluated the position that human capital plays in Pakistan's economic expansion. For the empirical results, the study has collected secondary time series data from the years 1974 to 2020 and used the ARDL method. According to the study's result, there is a physically powerful correlation among economic expansion and the education enrolment index. The rate of GDP growth and the rate of inflation

are inversely correlated. The study's findings indicated that in order for Pakistan to continue on the road of economic progress, the supply of educational facilities is essential, particularly at the secondary and higher education levels.

2.3 Combine Studies of Human Capital and Industrialization

Singh L. (2017) was studied by the collision of competitiveness, skill expansion, and industrialization on economic expansion in South Asian countries. MVA per capita, the 2013 Industrial Competitiveness Index, the share of MVA in GDP, and medium- and high-tech exports as a percentage of all exports are indicators of industrial competitiveness. Social indicators include HDI, life expectancy and expected mean years of schooling, mean years of schooling, and the percentage of the population with at least a secondary education. The findings indicate that the Competitiveness Industrial Performance Index's performance indicators are performing fairly poorly. Additionally, Africa has a clear agenda to accomplish the aim of an inclusive and transformative industrialization. According to Moyo, (2018)'s analysis of Development of Human Capital for Industrialization. However, it has not been very effective in creating the necessary skill set. The outcome demonstrates that the continent can learn from industrialization leaders like Germany, Singapore, Japan, and the Republic of Korea. Investments in both human and physical capital, as well as growth in the manufacturing and industrial sectors, are some of the key elements influencing these countries' success.

Most of the research on human capital & industrialization has been done in advanced countries such as Germany, Singapore, Japan, Korea Theresa (Moyo, 2018) whereas, in the context of Pakistan separate research have been conducted on industrialization and human capital like Ajmair, (2014) & Afridi, (2016). The current study aims to conduct a combined study on human capital & industrialization on economic growth in Pakistan.

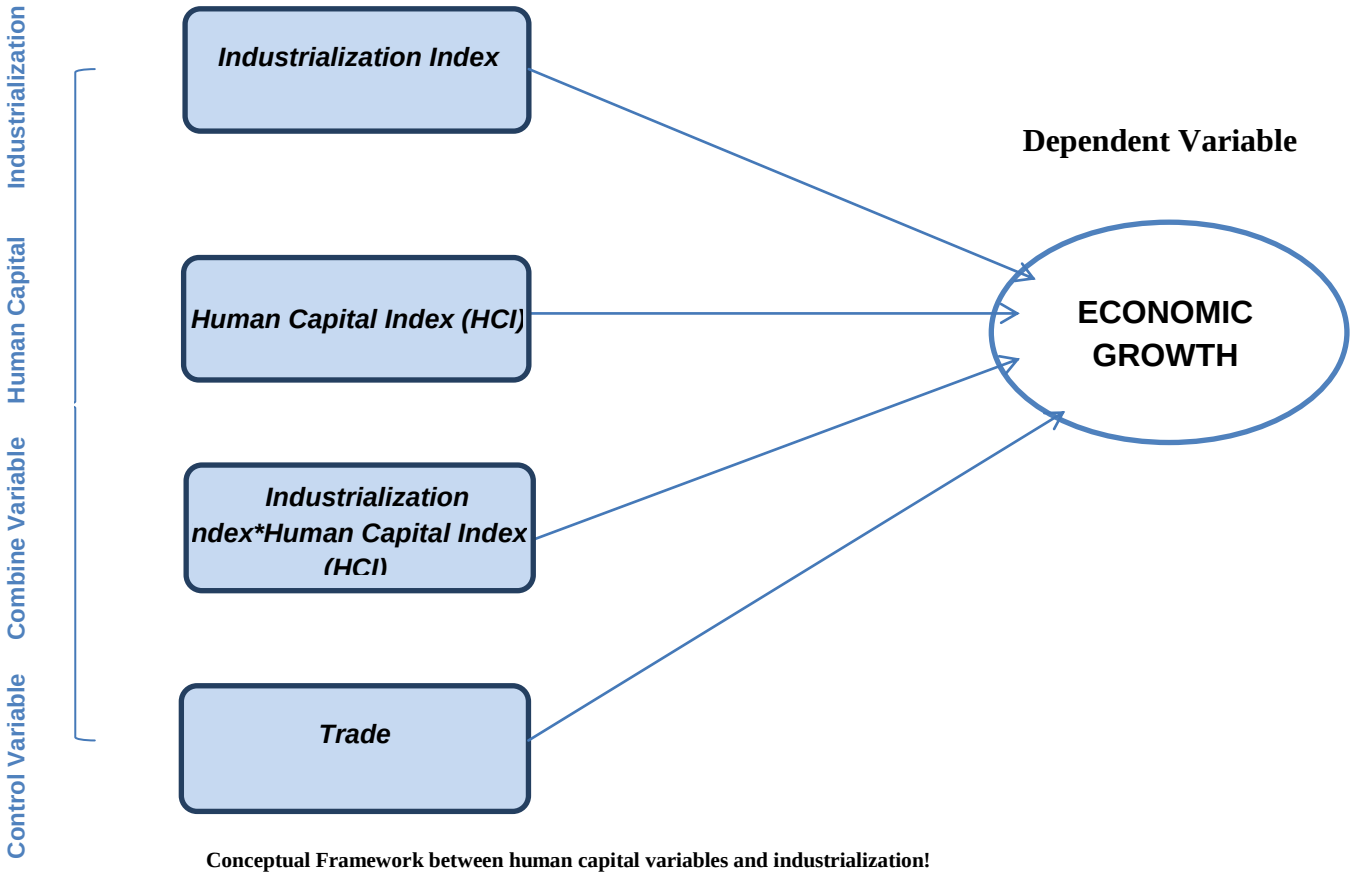
CHAPTER 3

DATA AND METHODOLOGY

This chapter's goal is to describe the study's model and procedures in detail. Any research process needs a model and methods section, which primarily consists of the research design, the study model, and any statistical techniques employed in the research. This chapter's first portion examines the significance of the chapter. This chapter's conceptual structure, section is 3.1. The 3.2 section of this chapter discusses the theory that supports the entire study. The estimating method is covered in section 3.3 of this chapter. The Methodology is covered in section 3.4. The econometric model is covered in section 3.5. The study's factors are discussed in section 3.6. The description of the variables is covered in section 3.7. GDP is the first dependent variable in section 3.7.1, and 3.7.2 describes the independent variable HCI (Human Capital Index), while 3.7.3 describes INI (Industrialization Index), the independent variable. The TR (Trade) control variable is discussed in section 3.7.4. While the data sources are discussed in section 3.8.

3.1 Conceptual Framework

Independent Variables



Conceptual Framework between human capital variables and industrialization!

3.2 Endogenous Growth Theory

Romer's, (1986) endogenous growth theory contends that internal factors, as opposed to external ones, are what essentially drive economic growth. According to the endogenous growth theory, investments in human capital, innovation, and knowledge are important factors in economic expansion. The concept also discusses the advantages and beneficial spillover effects of a knowledge-based economy, which will promote economic expansion. According to the endogenous growth theory, policies have an impact on the long-term growth rate of an economy. Subsidies for R&D or education, for instance, increase the incentive for innovation and speed up development under some endogenous growth models. Endogenous growth theory describes how industrialization and human capital are related to economic growth. In order to describe his model, (Aghion & Howitt 1992; Arrow 1962; Benhabib & Spiegel 1994; Romer, 1986) divided the workforce of an economy into two groups. While one group of employees is tasked with carrying out typical economic tasks, the other is in charge of creating novel ideas. The accumulation of novel ideas promotes the development of new technologies and inventions that advance the art of production. Theoretical formulations of the connection among human capital, industrialization, and growth suggest that human capital is essential for innovation, productivity, and growth. The creation of externalities, which results in the creation of a suitable environment for rising returns to scale, captures the full impact of investing in the discovery of new ideas while employing scientific labour. However, this association might not always hold up when put to an objective examination. As a result, the results of empirical research on the subject are uncertain. The degree of human capital in an economy at any given time is positively correlated with per capita income, but human capital growth has no bearing on per capita income growth, claim Benhabib & Spiegel, (1994). It has been established that economic growth and human capital have a very good link Cohen & Soto, (2007). It seems that the definition of the human capital variable is significant. The ambiguity of empirical data on the connection between human capital and economic growth has been attributed to a number of factors. According to Sunde & Vischer, (2015), inconsistent empirical model formulation may be the cause of irregular data. They demonstrate that when the initial level of human capital is taken into account in the regressions, conventional econometric models perform better. According to the theory of human capital, a

workforce's level of education improves competence and productivity by strengthening the smoothness of their intellectual capacities. According to the endogenous theory of economic growth, skill development is crucial for increasing economic activity productivity. Lucas (1988) created a model of economic growth that incorporates the accumulation of human capital and made the case that long-term economic growth is influenced by the rate of capital accumulation as well as the number of years spent in school and experiential learning. Raising the level of competence has a direct impact on increasing employee productivity. However, the spillovers or externalities that produce growing returns to scale are the direct result of worker education. While the direct impacts of skills on individual productivity increase returns to the workforce, indirect effects increase returns to scale, boost overall output, and benefit society as a whole. Together, the two impacts lead to better levels of production and rising returns on investment. As a result, it is suggested that a simple increase in the level of skills taught through education has long-term consequences on an economy's ability to grow. Therefore, public policy that increases spending on education can be a key tool for boosting human capital productivity and long-term economic growth.

Schultz, Jacob Mincer & Gory Bucker, (1961) put out the notion that people should invest in human capital to increase their knowledge and wellbeing. Examples of such spending include investments in dietary needs, health, on-the-job training, and education. The development of human capital demonstrates how important this factor is to a country's development. Human capital theorists have acknowledged that basic education boosts the productivity of low skill occupations. The concept of human capital, which Becker, (1962) formalized but which was essentially developed by others, aids in our understanding of how businesses engage in training. It reaffirmed the idea that investing in education and training represents an investment in future productivity rather than merely using up resources. According to this perspective, the company and its employees both rely on investments in human capital to boost productivity, profits, and pay. Despite the fact that the corporation does not acquire a property right over its investments in talent, human capital investments differ from those in physical capital in that they entail cooperation with the personnel who will be taught. This approach places a strong emphasis on how education changes people's worth, trust, and performance. The beginning of modernity Universities, the media,

and manufacturing facilities are among the institutions that teach contemporary standards and methods. The strategy includes openness to new ideas, liberation from antiquated structures, passion for imagining and estimating extra needs, and growing understanding of both personal and society effectiveness. Theorists argue that these normative and attitude differences persist throughout a person's life cycle, permanently altering their relationship to the societal structure. The more people who attend renewal institutes, the higher the level of particular innovation that is attained by the populace. Technology innovation adopted from industrialized nations is what promotes industrial growth, according to the United Nations Industrial Growth Organization (UNIDO). Education of the workforce, the distribution of human capital, and investment in research and development (R & D) are all integral to the formation of capital. Building absorptive skills is necessary for developing countries to close the technical knowledge gap. Continuous investment in human capital is one of the components of absorptive capabilities. Emerging countries are using technology more and more as their industrial growth changes. Therefore, it is crucial for a developing country to benefit from this shift in production and invest in the training of qualified personnel. A strong national innovation system heavily influences a country's capacity to absorb information and capital. According to the current study, it intends to analyze the combined collision of industrialization and human capital on economic development in Pakistan. Industrialization and human capital both contribute to economic expansion. A country's economic growth will increase if its human capital improves, and it will also increase if its industrialization levels rise. According to theoretical interpretations of the relationship among human capital, industrialization, and development, human capital is essential for innovation, productivity, and growth. All of these elements are crucial for accelerating economic expansion in both developed and developing countries. To encourage investment in the manufacturing sector and other areas of the financial system, Pakistan's government must act on a national and international level. The economic expansion will be impacted by the industrialization index. The Human Capital Index (HCI) needs to be improved, according to the government and policymakers. The same is true for the (TR) Trade and Human Capital Index, which is essential for economic growth. The government should implement measures that keep the TR, INI, and HCI constant and prevent significant fluctuations in the market or nation. Where there is a constant HCI, the country's INI will rise, which will further influence economic

growth. However, the results of this study's Industrialization Index and HCI combined are consequential. Human Capital Index has a substantial impact on the Industrialization Index's ability to accelerate economic growth.

3.3 Estimation Technique

Unit root test is used for data that are steady. The Wald test will be used to examine whether the dependent variable and the independent variables have a long-term relationship. The bound test is used to determine whether the variables have long-term cointegration. The short run analysis will be performed using the Error Correction Model (ECM). A conceptual framework illustrates how dependent and independent variables are related. If the ECM value is negative, significant, and between zero and one, then there is a short-term link among the variables. The Error Correction Model (ECM) does not apply if the coefficient value does not meet its requirements; hence there is no short-term association between the variables. Unit root tests make use of a feature known as enhanced dickey fuller (ADF) test statistics. All variables, dependent or independent, would be evaluated for the unit root test if the ADF value is stationary. ARDL model would be used if the variables are stationary at level and initial difference. The ARDL method is used to analyze the relationship among the independent variables and the GDP growth rate, which is the dependent variable. In Hafeez, (2019) (Khatoon, Javed, & Hayat, (2021), (Shah, Shabbir, & Parveen, (2022), similar techniques were employed, if the data are non-stationary. A number of non-stationary time series data are tested for co-integration associations using the Johansen test. Johansen co-integration testing is then utilized.

3.4 Methodology

The process or approach utilized in doing research is referred to as research methodology. It aids in recognizing the study methodology and general knowledge about the research issue. It supports the general validity and trustworthiness of the research topic and aids in the systematic solution of research challenges. It also includes the procedures used for data analysis and interpretation. It more precisely specifies the ways in which research is to be done. When conducting research, only one approach the quantitative approach is typically used Gounder, (2012). In his book by the same name, Kothaari, (2008) outlines research methodology as the methodical approach a researcher uses to address and comprehend the research topic and

discusses how a methodology is more comprehensive than a research method. In the research process, there is primarily one quantitative method. Through the collecting of numerical data or the use of specific statistical and mathematical methods, quantitative research aims to study the observed phenomenon. It gathers data about logical processes and numbers, then transforms that data into a set of numbers. The positivist paradigm serves as the basic foundation for quantitative research. The data are easily quantified in quantitative research, and the conclusions of the sample are extrapolated to the entire population. With the aid of various statistical techniques, this approach attempts to explain the link between the variables and their cause and effect. This strategy collects data that is easily presented as charts, tables, and graphs, and the data is of a measured and comparable type. It deals with precise information and statistics. The sample is randomly chosen from the population, and it draws conclusions through deductive reasoning. The objective methodology underlies the quantitative study. Experimental research, survey research, and causality are all examples of quantitative research Apuke, (2017).

The research process is usually based on the common assumptions about the complete data collection process. This research study uses the quantitative method. More specially studying the effect of HCI, INI on Economic Growth and the quantitative method is considered as the most effective method from the statistical point of view, where world development indicators (WDI), Federal Reserve Economic Data (FRED), Economic Survey of Pakistan have open access for data collection.

3.5 Model

The econometric model for this study is*:*

$$GDP_t = \beta_0 + \beta_1 INI_t + \beta_2 HCI_t + \beta_3 INI*HCI_t + \beta_4 TR_t + e_t$$

(GDP growth annual %) is dependent variable

Independent variables.

X_1 ***= INI [Industrialization Index]***

X_2 ***= HCI [Human Capital Index]***

X_3 ***= INI*HCI [Industrialization Index* Human Capital Index]***

X_4 = TR [Trade] is control variable

e_t= Error Term

3.6 Variables of the study

In this study we use economic growth GDP as a dependent variable. Independent Variables are Industrialization Index (INI), Human Capital Index (HCI), and combine variable INI*HCI (Industrialization index *Human Capital Index) and control variable is Trade (TR).

3.7 Description of variables

3.7.1 Gross Domestic Production (GDP) Growth Annual %

GDP calculates the monetary value of the final goods and services produced in a nation during a certain time period, such as a quarter or a year, and purchased by consumers. It considers each item wholly produced within a nation's boundaries. Each year, the GDP at market prices and using constant currency increases by a specific percentage. The amounts are computed using 2015 constant prices expressed in US dollars. The gross value produced by all producers who are part of the economy is totaled up, and this value is used to calculate GDP, along with any applicable product taxes and unrecognized subsidies. Natural resource depletion as well as the wear and tear, exhaustion, and depreciation of manufactured assets are not taken into account in the estimation. National accounts information from the World Bank and the OECD.

3.7.2 Industrialization Index

Industrialization index is based on manufacturing annual value added, growth of manufacturing small and large scale. The amounts are computed using 2015 constant prices expressed in US dollars. ISIC divisions 10-33 of the industry code are referred to as manufacturing. The sector's net output is what remains after adding up all of the outputs and deducting any intermediary inputs. The estimation doesn't account for the depletion and degradation of natural resources or the deterioration of manufactured assets. (W B & National OECD, 2021).The manufacturing sector, which is the second largest in terms of GDP contribution and creates the majority of industrial employment through technology transfer, is the foundation of Pakistan's economy. It is mostly made up of Large Scale Manufacturing (LSM), which accounts for 80% of manufacturing and 10.7% of GDP. Small-scale manufacturing (SSM)

accounts for 13.8 percent of manufacturing and 1.9 percent of GDP, in contrast. (2016–2017 Pakistan Economic of Survey)

3.7.3 Human Capital Index (HCI)

The human capital index is based on returns to education and the number of years of study. Given the dangers of poor health and inadequate education that are prevalent in the nation where she lives, the index estimates the amount of human capital that a child born today can anticipate to accomplish by the age of 18. Assuming that children born today experience over the next 18 years the educational opportunities and health risks that children in this age range currently experience, it is intended to highlight how improvements in current health and educational outcomes shape the productivity of the next generation of workers. (The World Bank)

Control Variable

3.7.4 Trade (TR)

Trade is the total of goods & service, exports & imports expressed as a percentage of gross domestic products (World Development Indicator WDI).

3.8 Data Sources

The World Development Indicators (WDI), (FRED), (Economic Survey of Pakistan), are the main data sources used in this study to analyze Pakistan's human capital and industrialization over the period from 1980 to 2021.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

In practical terms, the findings and analysis are crucial to every research project. Results might be used to support a theory or hypothesis. This chapter's Results section summarizes the study's findings; it does not include any discussion. The data analysis aims to reorganize the elements in order to produce the study's conclusions. The discussion section analyses the study's results in the context of prior research on the subject, discusses the importance of any new findings in the area under review, and makes comparisons between the complete set of results and earlier ones. It briefly describes the issue that a researcher looks for. The study's research question is also updated in this chapter. The combination of results and commentary provides a summary of the outcomes.

This Chapter organizes its several sections. Descriptive statistics, correlation analysis, and a check on the stationary behaviour of the study's dependent and independent variables are all included in the chapter's first section. The second section of this chapter examines the bound test and long run results for the ARDL analysis first, and then offers the study's and the ECM model's short run outcomes. The Wald test is included in this chapter for long-term outcomes. Heteroskedasticity and serial correlation test ramsey reset test findings are included in the third presentation of the diagnostic test. This chapter's final section contains the CUSUM exam and CUSUM SQ test.

4.2 Descriptive Statistics

The statistical characteristics of the data utilized in the study are briefly described in descriptive statistics, along with a brief synopsis of the chosen sample. The data are well-quantifiably described by descriptive statistics, which also include details about the entire population from which the sample is drawn. Simple data gathering, data summarizing, presentation, and study analysis are all provided by descriptive statistics. Mostly non-experimental research uses it. The central tendency, dispersion, and normalcy of the data are also used by the descriptive statistics to

describe the numeric type of data. The data's centre is shown by the mean and median. The standard deviation is a measurement of data variability.

Table 4.1: Descriptive Statistics

	GDP	INI	HCI	INI*HCI	TR
Mean	4.56	0.70	1.57	3.16	32.22
Median	4.83	0.66	1.57	1.38	32.92
Maximum	10.21	1.81	1.79	6.63	38.50
Minimum	-0.93	0.16	1.26	0.33	24.70
Std.Dev	2.42	0.33	0.20	2.64	3.72
Skewness	-0.28	0.87	-0.16	0.50	-0.40
Kurtosis	2.86	4.21	1.31	1.35	2.20
Jarque-Bera	0.58	7.92	5.13	6.55	2.23
Probability	0.74	0.01	0.07	0.03	0.32
Sum	191.58	29.8	66.11	132.93	1353.39
Sum Sq. Dev	241.80	4.69	1.702	287.81	567.72
Number of Observations	42	42	42	42	42

42 years of data, spanning the years 1980 to 2021, are included in the sample. For each variable in this study, the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, jarque-bera, and probability are shown. The average GDP is 4.56, which demonstrates the annual percent growth of the gross domestic product. GDP has a median value of 4.83. Their maximum positive value is 10.21, and their minimum negative value is (-0.93). The standard deviation of GDP is 2.42, which demonstrates the general dispersion of data. The value of the Kurtosis is 2.86 and the skewness is negative (-0.28). Positive 0.58 is the Jarque- Bera GDP value.

GDP has a 0.74 probability of occurring. While the Industrialization Index's mean and median values are 0.70 and 0.66, respectively. The industrialization index's fluctuation from mean and median over time may be seen by looking at the data's centre and standard deviation, which is 0.33. The Maximum and Minimum values are displayed as 1.81 and 0.16, respectively. Kurtosis is 4.21 and Industrialization Index Skewness is 0.87. Industrialization Index (INI) Jarque - Bera is worth 7.92. 0.01 is the likelihood of (INI). The Human Capital Index (HCI) has mean and median values of 1.57 and 1.57, respectively. The Human Capital Index's standard deviation value is 0.20, which indicates data dispersion. The maximum and minimum values are displayed as 1.79 and 1.26 respectively. The HCI probability is 0.07. HCI Skewness and Kurtosis have values of -0.16 and 1.31, respectively. Jarque- Bera is worth 5.13. Industrialization Index (INI) * Human Capital Index (HCI) has a mean value of 3.16, a median of 1.38, and a standard deviation of 2.64. INI *HCI combine variable has maximum and minimum values of 6.63 and 0.33, respectively. The Combine variable Industrialization Index * Human Capital Index (INI*HCI) probability value is 0.03. Industrialization Index * Human Capital Index (INI*HCI) combine variables have skewness and kurtosis values of 0.50 and 1.35, respectively. Industrialization Index * Human Capital Index (INI*HCI) has a Jarque-Bera value of 6.55. The mean value of trade is 32.22. The median of trade is 32.92. The maximum and minimum value of trade is 38.50 and 24.70. The Standard deviation is 3.72. Skewness and Kurtosis is -0.40 and 2.20. Trade has a Jarque- Bera value of 2.23. Trade probability is 0.32.The findings of the study and the broad conclusions of the preceding results are fairly similar to Hafeez, (2019) (Shah; Shabbir; Parveen; 2022).

4.3 Correlation Analysis

A straightforward statistical technique that illustrates the strength of links between two variables is correlation analysis. The strength and direction of the connection between the dependent and independent variables were also shown to be strengthened by Pearson's correlation. When two variables are properly matched, they will change in the same way. Likewise, if the two variables are combined negatively, they will change in the opposite direction. A constructive correlation indicates that a change in one variable will cause a change in another, whereas a unconstructive correlation indicates that a change in one variable will cause a change in another. In the equation, the value ranges from +1 to -1. A correlation value of close to +1

denotes a strong positive relationship among the two variables, whereas a correlation coefficient of close to -1 denotes a negative connection.

Table 4.2: Correlation Analysis

Variable	GDP	HCI	INI	INI*HCI	TR
GDP	1.00	-0.51	0.65	-0.46	0.2
HCI	-0.51	1.00	-0.26	0.81	-0.5
INI	0.65	-0.26	1.00	-0.39	-0.00
INI*HCI	-0.46	0.81	-0.39	1.00	-0.4
TR	0.20	–0.52	-0.00	-0.48	1.00

Direct interactions are indicated by two or more variables from two distinct states. According to the results presented in the table, Industrialization Index is positively influence the Gross Domestic Product annual percent growth with a correlation value of 0.65 and shows a positive association between the variables, which means that there is a 65% association between the two variables. This result confirms the initial impression of our study that there was an important association between Industrialization Index and Gross Domestic Product annual growth. The Human Capital Index (HCI) and GDP exhibit a weak negative connection with a value of -0.51 indicating this. GDP and Industrialization Index*Human Capital Index (INI*HCI) are negative correlated, with a correlation coefficient of -0.46 indicating a negative association with 46%. Trade is positively influence the Gross Domestic Product annual percent growth with a correlation value of 0.20 and shows a positive association between the variables, which means that there is a 20% association between the two variables. The aforementioned findings are strikingly comparable to those of (Hafeez, 2019) and (Shah; Shabbir; Parveen; 2022).

4.4 Stationary of Unit root and Philips Perron Test

A time series is said to be stationary if some characteristics of the data do not vary over time. The characteristics of a stationary process are consistent mean, variance, and autocorrelation structure over time. Only if a series is stationary can such statistics be used to describe how something will behave in the future. For instance, the sample mean and variance in subsequent periods will change if the series is steadily increasing over time. Stationarization may be possible by de-trending, possibly in combination with logging or deflating (for example, By deleting the time index from the model before fitting a trend line, or by incorporating it as an independent variable in an ARIMA or regression model. This is true if the series has a stable, long-term trend that tends to stabilize after a disruption. Trend-stationary series are the name for this kind of series. The series' transitions between seasons or between times periods will follow a consistent statistical pattern. This kind of sequence is referred to as difference stationary. Differentiating between a series that is trend stationary and one that is difference stationary might be difficult. One resource is the so-called unit root test.

4.4.1 ADF Test

In statistics and econometrics, the likelihood that a unit root occurs in a time series sample is investigated using the enhanced Dickey Fuller test. The alternative hypothesis can change depending on the test version being used, but it is normally stationarity or trend stationarity. The Augmented Dickey Fuller test (ADF Test) is a commonly used statistical test to evaluate whether a specific time series is stationary or not. When examining the stationary of a series, it is one of the statistical tests that is most frequently applied. The augmented Dickey Fuller ADF statistics for the test display a negative result. The assumption that there exist unit roots at some level of certainty is rejected, and the stronger the denial, the more detrimental it is. In general, the unit root null hypothesis can be disproved when the p value is less than 5%. It is possible to compare the generated DFT statistics and a tabulated critical value. If the DFT statistics is more negative than the table value, reject the unit root null hypothesis. How each test handles serial correlation is the primary difference between the ADF test and the pp unit root test. The pp test ignores any serial connection, but the ADF uses a parametric auto regression to roughly simulate the structure of errors.

The A in ADF denotes the inclusion of lags to the test, which increases its validity. Different methods can be used to choose the ADF's lag count. One typical approach is to begin with a large number of lags that were predetermined and gradually reduce the number of lags until the longest lag is statistically significant.

4.4.2 Unit root Test

To evaluate whether a time series variable is unit root-free and non-stationary, statisticians employ a unit root test. The null hypothesis is typically the absence of a unit root, while the alternative hypothesis might be either a stationary, trend stagnant, or explosive root depending on the test being done.

4.4.3 ADF Test of Unit root

This test is applied when some variables are stationary at the level and others are stationary at the first difference (Hafiz, 2019). Below is a list of the test's outcomes.

Table 4.3: ADF Test of Unit root

Variables	Level			1st Difference			Remarks
	t. stats	Critical value	P value	t. stats	Critical value	P value	
GDP	-2.78	-2.93	0.00	-6.06	-2.93	0.00	I(0),I(1)
HCI	-1.53	-2.93	0.13	-2.68	-2.93	0.00	I(1)
INI	-2.15	-2.93	0.03	-5.98	-2.93	0.00	I(0),I(1)
INI*HCI	-0.62	-2.93	0.53	-6.76	-2.93	0.00	I(1)
TR	-2.00	-2.93	0.05	-6.95	-2.93	0.00	I(0),I(1)

The ADF test additionally examines the unit root of the variables. All study variables are subjected to the ADF test. The dependent variable's yearly percent growth in the gross domestic product was stationary at level 0.00. At first difference p-value is 0.00, the GDP is stationary. The (INI) Industrialization Index's independent variable was stationary at level 0.03. The (INI) Industrialization Index was stationary at first difference; the P-value is 0.00. The Human Capital Index (HCI) had a level that was non-stationary. HCI P-value is 0.13. The (HCI) Human Capital Index is

stationary at the initial difference; the P-value is 0.00. Combining the variables yielded a non-stationary at level. The Industrialization Index*Human Capital Index (INI*HCI) is stationary at the initial difference 0.00.The control variable trade had a level that was stationary. The trade is stationary at the initial difference 0.00. The aforementioned findings are strikingly comparable to those of Hafeez, (2019) and (Shah; Shabbir; Parveen; 2022).

4.4.4 Phillips Perron Test

The unit root test known as the Phillips Perron test, after Pierre Perron and Peter C.B. Phillips, is used in statistics. In order to determine whether a time series is integrated of order, it is applied to time series analysis. Perron analyses whether a variable has a unit root using the Phillips Perron (1998) method. The null hypothesis is that the variable has a unit root; the alternative is that it was created by a stationary process. Perron employs the standard errors from Newey West 1987 to take serial correlation into consideration. The Dickey Fuller exam, also known as the augmented Dickey Fuller test, makes use of additional lags in the first differenced variable. A unit root test is Phillips Perron. This test is applied when some variables are stationary at the level and others are stationary at the first difference (Hafiz, (2019).The test's results are listed below.

Table 4.4: Phillips Perron Test of Unit root

Variables	Level			1st Difference			Remarks
	t. stats	Critical value	P value	t. stats	Critical value	P value	
GDP	-2.76	-2.93	0.00	-7.01	-2.93	0.00	I(0),I(1)
HCI	-2.68	-2.93	0.00	-1.68	-2.93	0.10	I(0)
INI	-2.15	-2.93	0.03	-5.98	-2.93	0.00	I(0),I(1)
INI*HCI	-0.62	-2.93	0.53	-6.76	-2.93	0.00	I(1)
TR	-2.00	-2.93	0.05	-6.95	-2.93	0.00	I(0),I(1)

The Phillips Perron test additionally examines the unit root of the variables. All study variables are subjected to the Phillips Perron test. The dependent variable's yearly percent growth in the gross domestic product was stationary at level 0.00. At

initial difference 0.00, the GDP is stationary. With a level of 0.03, the independent variable of the (INI) Industrialization Index was stationary. At initial difference 0.00, the INI is stationary. The Human Capital Index (HCI) had a level 0.00 that was stationary. The Human Capital Index (HCI) at initial difference 0.10, the HCI is non-stationary. The Industrialization Index*Human Capital Index (INI*HCI) Industrialization combine variables, and the Human Capital Index*Industrialization Index (HCI*INI) is stationary at the first difference. (HCI*INI) that wasn't stationary at level 0.53. First difference 0.00 indicates that the control variable trade (TR) is stationary. With a level of 0.05, the control variable of the (TR) trade was stationary. The aforementioned findings are strikingly comparable to those of Hafeez, (2019) and (Shah; Shabbir; Parveen; 2022). The aforementioned findings demonstrate that the industrialization index*human capital index, trade, and GDP growth are stationary at the first difference and some values are stationary at level. It follows that the ARDL model would be used.

4.5 ARDL Test

The Autoregressive Distributive Lag Model (ARDL) is only applied when the series are stationary, co-integrated, integrated of the same order, or co-integrated of the same order but not together with appropriate differencing. It is not applicable when the series are integrated of different orders (some being stationary, some being l(1), or fractionally integrated). The study used an established strategy developed by Pesaran et al. (2001) known as the autoregressive distributed lag (ARDL) strategy. The ARDL model is thought to be the optimum econometric strategy when the variables are stationary at l(0) or integrated of order l(1).Forecasting and separating long-run linkages from short-run dynamics are two uses for the ARDL/EC model. Long-term relationship: Despite the fact that individual time series may move significantly, some time series are connected by equilibrium forces. According to Pesaran & Shin, (1999) and Pesaran et al., (2001), the ARDL cointegration technique is used to identify the long-term link between series with various integration orders. The results of the re-parameterization show the short-run dynamics and log-run connection of the variables under consideration.

4.5.1 ARDL for Cointegration

The relationship between the dependent variable, which is the GDP growth rate and the independent factors are examined using the Autoregressive Regressive Distributed Lag (ARDL) technique. It is obvious that the ARDL values of the independent variables have a considerable impact on economic growth.

4.5.2 ARDL Bound Test

In bound testing, a development of ARDL modeling, the significance of the lagged levels of the variables in a univariate equilibrium correction system is assessed using F and t statistics when it is unclear whether the data-producing process underlying a time series is trend or first difference stationary.

The ARDL bounds test takes the variables to be either I(0) or I(1). In order to determine the order of integration of all variables prior to executing this test, the unit root tests are employed. Inaccurate findings can be avoided by making sure that the variables are not I(2). When it is unclear if a time series' underlying data-producing mechanism is a trend or a first difference In a univariate equilibrium correction system, the significance of the lagged values of the variables is evaluated using stationary, bound testing, an extension of ARDL modeling.

The ARDL limits test can only be applied if the variables are either I(0) or I(1). We use the unit root tests to determine the order of integration of all variables before executing this test.

Make sure the variables are not I(2) to prevent inaccurate results. Regardless of whether the series is I(0) or I(1), the method is initially used. The second method uses a straightforward linear transformation to produce the unrestricted error correction model (UECM) from the ARDL bounds testing. There are both short-term and long-term dynamics in this model. Thirdly, the approach's effectiveness is supported by the empirical findings, which also demonstrate that it may give reliable results for a small sample.

Table 4.5: F-Bounds Test

Test Statistic	Value	K
F-statistic	4.496593	4
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

We infer that cointegration exists if the estimated F- statistics is higher than the crucial value for the upper bound I(1). In other words, there is a lasting relationship. Dispute the null theory. Calculate the error correction model (ECM) over the long term.

We get the conclusion that there is no cointegration and, thus, no long-run relationship if the computed F-statistics is less than the crucial value for the lower bound I(0). Don't discount the null theory. Calculate the short-run autoregressive distributed lag (ARDL) model estimate.

If the F-statistics are within the range of I(0), the lower bound, and I(1), the upper bound. The test is regarded as being unreliable. F-statistics value is 4.49 over upper and lower bounds of 3.09 and 2.2, respectively. At a 10% level of significance, a long-term association is present. The null hypothesis is disproved by the F-test. The F-statistics value is 4.49 times larger than the maximum bound of 3.49. At the 5% level of significance, a long-term association is present. The null hypothesis is rejected by an F-test. The F-statistics value is 4.49 more than the lowest bound of 2.56. It is significant at the 5% level, indicating a long-term association. The null hypothesis is rejected by an F-test. The F-statistics value is 4.49 more than the 3.49 upper bound. At the 2.5% level of significance, a long-term association is present. The null hypothesis is rejected by an F-test.

The F-statistics value is 4.49, which is higher than the lower bound of 2.88 and the maximum bound of 3.87. There is a long-term association at the 2.5% level of

significance. The null hypothesis is disproved by the F-test. The F-statistics value is 4.49, which is higher than the lower bound of 3.29 and the maximum bound of 4.37. There is a strong association at the 1% level of significance. The null hypothesis is disproved by the F-test.

It is determined to be significant if the value of the F. statistics is higher than the upper bound value of the bound test table by Pesaran Shin and Smith (2001).

Pesaran et al. (2001) provided the lower bound (3.67) and upper bound (4.10). The aforementioned findings are very comparable to those of Hafiz A. (2019), Shah, Shabbir, and Parveen, (2022), Qaiser, (2020) and Singh, (2017) in terms of both theory and general and general conclusions.

4.5.3 Bound Test for Cointegration and Long Run Results

This test is used to determine whether the variables' long-term cointegration. The alternative hypothesis for this study is accepted as a result of the Bound test cointegration, which rejects the null hypothesis. It is obvious from the test's results that the study's variables have a long-term link. The results of the bound test are shown in table 4.5 below.

Table 4.6: Bound Test and Long Run Results

Variable	Coefficient	Std.error	t.statistics	Prob
HCI	1.990387	0.888286	2.24070	0.0234
INI	0.886547	0.143822	6.164196	0.0000
INI*HCI	0.242663	0.109941	2.207211	0.0381
TR	0.310764	0.152029	2.044103	0.0508
C	0.643498	0.15026	4.282563	0.0000

According to the long-term results of the ARDL BOUND TEST, the impact of the HCI on GDP is positive and p-value is 0.02. Industrialization Index (INI) has a positive and significant impact on GDP of p-value 0.0000. The GDP is positively and significantly impacted by the Industrialization Index*Human Capital Index (INI*HCI)

at p-value 0.03. Trade (TR) has a significant impact on GDP of 0.05. The findings from the aforementioned studies are strikingly comparable to those of Hafiz A. (2019) and Singh, (2017), (Shahzad 2015), (Shah & Shabbir, Parveen 2022), and Qaiser, 2020).

The HCI is significant, and the outcomes are consistent with (Afridi, 2016) theory and broad conclusions. Trade is significant, and the outcomes are consistent with (Khalid, 2016) theory and board conclusions.

Results from (Moyo, 2018) are comparable. The findings demonstrate that the continent may learn from countries that have advanced industrially, including Germany, Singapore, Japan, and Korea. These nations are supported by investments in both human and physical capital, as well as industrial and manufacturing sector growth.

4.5.4 Error Correction Model

A sort of multiple time series model called an error correction model (ECM) is widely used with data when the underlying variables show co-integration, a long-run typical stochastic tendency. The use of ECMs is a theoretically supported technique for evaluating both the short- and long-term effects of one time series on another. The term "error correction" relates to the idea that the short-run dynamics of a long-run equilibrium are affected by an error, or the most recent period's divergence from that equilibrium. Therefore, ECMs directly calculate the time it takes for a dependent variable to reach equilibrium after a change in an independent variable.

4.5.5 Results of ECM Model

The latency of the ECT must be run as an independent variable in the short run model.

Restricted Constant and No Trend ECM Regression is as under:-

Table 4.7: ECM Model

Variable	Coefficient	Std.Error	t-statistics	Prob
D(INI-HCI)	0.524257	0.287698	1.822249	0.0781
D(TR)	0.057147	0.095231	0.600090	0.5528
D(TR(-1))	0.250581	0.095564	2.622113	0.0134
CoinEq(-1)*	-0.730758	0.144956	-5.041232	0.0000
R.squared	0.461482	**Mean dependent var**	-0.208302	
Adjusted R-squared	0.416605	**S.D dependent var**	1.783746	
S.E of regression	1.362430	**Alkaline info criterion**	3.551057	
Sum squared resid	66.82378	**Schwarz criterion**	3.719945	
Log likelihood	-67.02113	**Hannan-Quinn criter**	3.612121	
Durbin-Watson stat	1.906542			

The ECT coefficient, which is -0.73, illustrates the rate of adjustment to equilibrium. There is a short run relation between the variables if the ECT value is negative, between zero and one, and significant. Since the coefficient value in this instance satisfies the requirements for ECT, the variables are related in the short term. The aforementioned findings deviate from the theory and broad conclusions of Hafeez A. & Rahim A. (2019). The findings of (Shah, Shabbir & Parveen 2022), as well as Khatoon, Javed, and Hayat, (2021), Khalid (2016) are quite comparable to the theory and overall conclusions reached above.

4.5.6 Wald Test

The Abraham Wald test, so named because it assesses limitations on statistical parameters based on the weighted difference between an estimate's unconstrained value and its value as predicted by the null hypothesis, with the precision of the estimate acting as the weight. It makes natural that this weighted distance would increase as the likelihood of the limitation being valid decreased. Although the Wald test's finite sample distributions are often unknown, its statistical significance can be determined by looking at the fact that it has an asymptotic distribution under the null hypothesis. Along with the likelihood ratio test and Lagrange multiplier test, one of the three recognized methods for evaluating a hypothesis is the Wald test. The Wald test has the advantage over the likelihood-ratio test in that it just needs the estimate of the unconstrained model, saving time on computation. Its inability to be invariant to changes in how the null hypothesis is represented (in finite samples) is one of its key drawbacks. As a result, algebraically comparable expressions of non-linear parameter restriction may produce differing values of the test statistic. This is the case because other ways of formulating comparable nonlinear expressions result in nontrivial changes in the pertinent Taylor coefficients. The Wald test statistic is obtained from a Taylor expansion. The Hauck-Donner effect is another aberration that can happen in binomial models when the estimated (unconstrained) parameter is close to the frontier of the parameter space, as is the case when a fitted probability is extremely close to zero or one. The Wald test's monotonically rising gap between the confined and unconstrained parameters stops increasing as a result.

4.5.7 Wald Test for Cointegration:

This test is used to determine whether the variables' long-term cointegration. The alternative hypothesis for this study is accepted as a result of the Wald test cointegration, which rejects the null hypothesis. The results of this test make it abundantly evident that all of the study's variables have a long-term link with one another. The Wald test validates the long-term link between the study's variables. The Wald cointegration test result is shown in table 4.8 below.

Table 4.8: Results of Wald Test

Test	Value	D.f	Probability
F. Statistic	97.44518	(1.37)	0.0000
Chi-square	97.44518	1	0.0000

The Wald test is employed to determine whether there is a long-term connection among the dependent variable and the independent factors. The results demonstrate that these factors have long-term associations among dependent and independent variables. If the Wald test's value is significant, then the variables have a long-term association. The aforementioned findings closely match the theory and broad conclusions of (Hafeez A. & Rahim A. 2019).

4.6 Diagnostic Test

Check for autocorrelation, heteroskedasticity, and incorrect definition of the functional form, among others. A diagnostic test will either produce a positive result (illness likely) or a negative result (disease unlikely). A RESET test version is frequently used to check for a non-zero mean of the error term among the several "diagnostic tests" that econometricians frequently apply. In other words, it checks implicitly to see if the regressors included in a regression model are defined appropriately.

4.6.1 Breusch Godfrey Serial Correlation LM Test

To evaluate the autocorrelation of the errors in a regression model, use the Breusch-Godfrey test. The regression analysis's residuals from the model under study are used to generate a test statistic. According to the null hypothesis, there isn't any serial correlation up to order p.

Null Hypothesis: There is no serial correlation.

Alternate Hypothesis: There is serial association.

Table 4.9: Breusch Godfrey Serial Correlation LM Test

F-statistics	5.550697	Prob. F(2,25)	0.0101
Obs *R-Squared	11.99273	Prob. Chi- Squared (2)	0.0025

The positive (0.01) is significant since the F-statistics (5.55) are higher than the p values. Accept the skewed conclusion. The aforementioned findings are strikingly comparable to the theories and broad conclusions of Khatoon R. Javed I. Hayat M. and Shah, (2021) as well as Shabbir & Parveen, (2022) and respectively.

4.6.2: Breusch pagan Test

Statistics professionals use the Breusch-Pagan test, developed in 1979 by Trevor Breusch and Adrian Pagan, to assess the heteroskedasticity of a linear regression model. It was independently proposed in 1983 by R. Dennis Cook and Sanford Weisberg, with some extension. It is used to check for heteroskedasticity in a linear regression model and assumes that the error terms are normally distributed. It establishes if the independent variable's values have any bearing on the variance of the regression's mistakes. The following alternative and null hypotheses are used in the test:

Null Hypothesis: Homoscedastic

Another hypothesis is that the residuals are not homoscedastic.

Table 4.10: Heteroskedascity Test Breusch Pagan Godfrey

F-statitic	1.495832	Prob. F(11,27)	0.1904
Obs*R-squared	14.76757	Prob.Chi.Square (11)	0.1934
Scaled explained SS	5.551242	Prob. Chi.Square(11) (10)	0.9016

The F-statistics is (1.49) and the significant p-value is positive (0.19).Because the p values are smaller than the F-statistics, there is no heterosedasticity. Accept the skewed conclusion.

The aforementioned findings are strikingly comparable to the theories and broad conclusions of Khatoon R. Javed I. Hayat M. and Ali Shah, as well as Shabbir & Parveen (2021) and 2022, respectively.

4.6.3 Ramsey Reset Test

A general specification test for the linear regression model is the Ramsey Regression Equation Specification Error Test (RESET) test in statistics. It examines if the response variable can be further explained non-linearly using the fitted values.

Because there is no relationship between the powers of the fitted values and the dependent variable y, the null hypothesis is that t=0, which denotes that there are no missing variables in the model. An alternative explanation is that the model has a problem with variables that are left out.

Null Hypothesis: Correct model description

Alternate Hypothesis: Inaccurate Model Description

Table 4.11: Ramsey Reset Test

	Value	Df	Probability
T-statistic	3.347317	26	0.0025
F-statistic	11.20453	(1,26)	0.0025
Likelihood ratio	13.97502	1	0.0002

The F-statistics is (3.34), and the significant p-value is positive (0.00).because the F-statistics are higher than the p values. Accept the skewed conclusion.

The aforementioned findings are strikingly comparable to the theories and broad conclusions of Khatoon, Javed, Hayat, & Shah, (2021) as well as Shabbir, & Parveen, (2022), respectively.

4.7 CUSUM Test

In 1954, CUSUM was published in Biometrika. A regression equation of interest's structural alterations (or structural breaks) can be found by CUSUM tests are frequently used in econometrics and statistics. A series of sums of recursive residuals that are iteratively computed from consecutive subsamples of the data serve as the foundation for inference. A CUSUM test determines if a series of values can be modeled as random by using the cumulative sum of a quantity. As an illustration, a series of binary numbers (called +1 and -1) may seem nonrandom or random, similar to tossing a coin. The capacity to detect small shifts (i.e., less than 1.5) is improved by CUSUM (Cumulative Sum) charts, which present a statistic that combines recent and past data values from the process. The cumulative sums of the sample values' departures from the target value are shown, in particular, on the CUSUM chart.

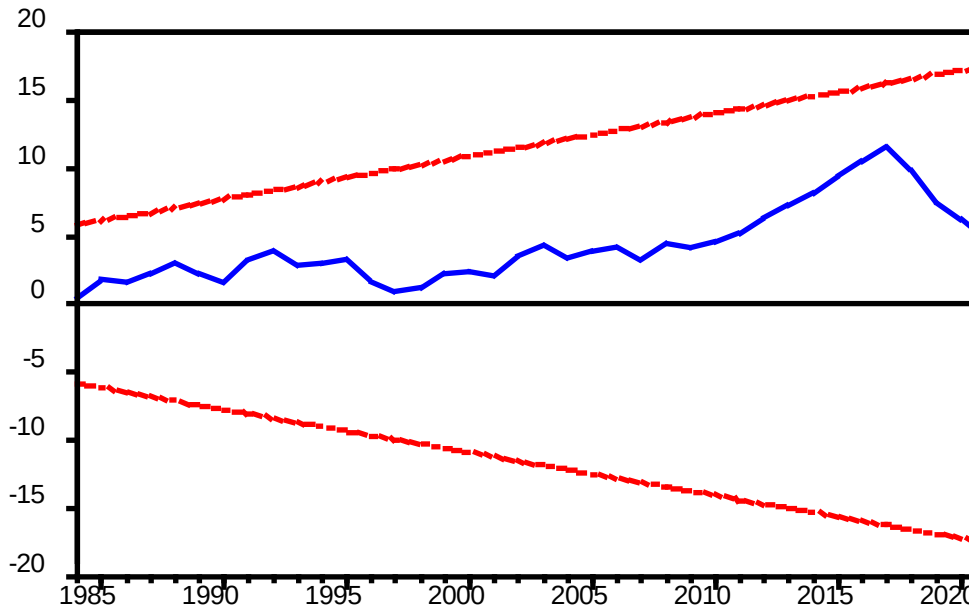


Figure 4.1 CUSUM Test Statistics

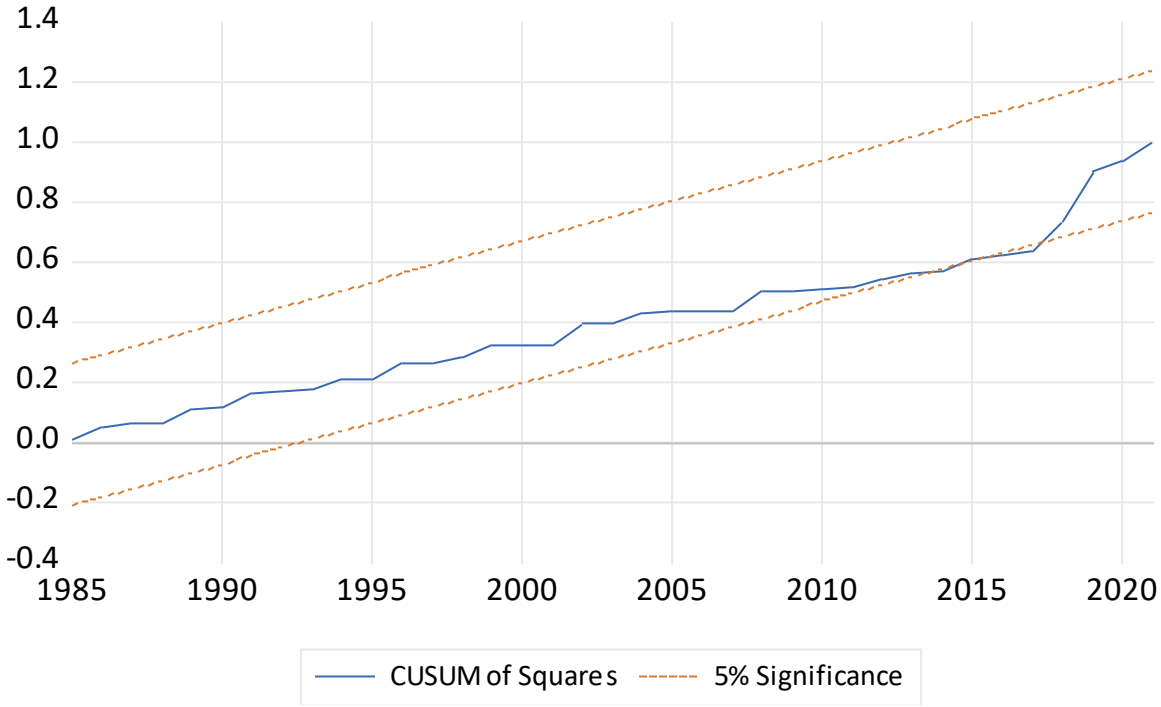
The (CUSUM) test is 5% significance.

Cumulative sum (CUSUM) is used to test the model's stability. Our model is stable if there are blue lines between two red lines. The model's red lines demonstrate its stability. The stats show that the red lines continue to be outside of the blue side. Therefore, (CUSUM) demonstrates that the model is accurately quantified and steady throughout the long and short terms. The findings of Shah, Shabbir, and Parveen (2022) and Khatoon, Javed, and Munawar (2021) are quite comparable to the results found above.

4.8 CUSUMSQ Test

The cumulative sum of squares test, or CUSUMSQ, is used to determine the stability of parameters. (CUSUMSQ) are based, respectively, on aggregate residual squares and cumulative residuals. The cumulative sum of squares test finds significant variations in the performance of the regression coefficients, whereas the cumulative total check finds systematic changes in the regression coefficients.

Figure 4.2 Cumulative Sum of Squares Test



The test's (CUSUMSQ) significance level is 5%.We used cumulative sum of squares (CUSUMSQ) to examine the model's stability. Our model is stable if there are blue lines between two red lines. The model's red lines demonstrate its stability. The stats show that the red lines continue to be outside of the blue line. CUSUMSQ demonstrates that the model is accurately quantified and steady over both the long and short terms. The findings of Shah, Shabbir R. & Parveen S. (2022) and Khatoon R. Javed I. & Javed M. (2021) are quite comparable to the results found above.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Industrialization and human capital indices are thought to be the main drivers of economic growth. More intriguingly, the expansion of the economy coincides with the desperate demand for resources in emerging countries. Industrialization and human capital both contribute significantly to the economy's growth. This study aims to investigate how industrialization and human capital affect economic expansion in Pakistan. The study makes use of Pakistan time series data. The utilization of data from 1980 to 2021. The World Development Indicator (WDI), Pakistan Economic Survey, and FRED are the sources of the data. The manufacturing value added, large scale manufacturing expansion, and small scale manufacturing expansion are the three main components of the industrialization index. The study's combination variable was the product of the human capital index and the industrialization index. After using descriptive statistics, the data's nature reveals that there is less variety when the data is subjected to the Unit Root Test and Phillips Perron Test. The stationary at level and stationary at first difference are the variables. The findings suggest that the ARDL Test should be used to examine both the short- and long-term effects of the variables. The correlation analysis is also used in the study to examine the associations between the variables. The outcome supports a high correlation between INI and Trade.

With a correlation value of 0.65, the INI positively influences the yearly percent increase of GDP and indicates a positive relationship between the variables. With a correlation value of 0.20, the trade positively influences the yearly percent of GDP and indicates a positive relationship with a score of -0.51 and a modest connection between GDP and HCI, the GDP exhibits a negative association with HCI. Insignificant negative correlation of 46%, the GDP negatively affects INI*HCI. If all variables are I(1)stationary at the first difference and the error is I(0) stationary at the level. It is obvious that the long run values of the variables under the ARDL Bound test have a major effect on economic expansion. When a short-term model is

disturbed, the ECM coefficient provides information on how much adjusting might be necessary to restore equilibrium. The Wald test is employed to determine whether there is a long-term relationship between the dependent variable and the independent factors. The findings demonstrate that these factors have long-term relationships between dependent and independent variables. If the Wald test's value is significant, then the variables have a long-term association. The aforementioned findings are strikingly comparable to Hafeez A. & Rahim's A. (2019) theory and broad conclusions. According to the long-term results of the ARDL bound test, the Human Capital Index is 0.02 and has large effect on GDP. INI is 0.0000 and has a large effect on GDP. Industrialization Index*Human Capital Index is 0.03 and has a large effect on GDP. The control variable trade is 0.05 and significant impact on economic growth. The aforementioned findings are very comparable to the theory and broad-based conclusions made by Hafiz A. (2019) & Singh, (2017). The GDP is significantly impacted by Industrialization Index and INI*HCI. The HCI has a positive impact on GDP. There is a long-term connection. The latency of the ECT must be run as an independent variable in the short run model. The ECT coefficient, which is -0.73, illustrates the rate of adjustment to equilibrium. There is a short run relation among the variables if the ECT value is negative, between zero and one, and significant. Since the coefficient value in this instance satisfies the requirements for ECT, the variables are related in the short term. The diagnostic test to look for problems with serial correlation, heteroscedasticity and ramsey reset test. The finding diagnostic test's findings Accept the null hypothesis if the F- statistics are higher than the p-values. The data is tested for stability using the (CUSUM) and (CUSUMSQ) tests. Cumulative sum (CUSUM) is used to test the model's stability. Our model is stable if there are blue lines between two red lines. The model's red lines demonstrate its stability. The stats show that the red lines continue to be outside of the blue side. Therefore, (CUSUM) demonstrates that the model is accurately quantified and steady throughout the long and short terms. .The findings of (Shah, Shabbir, & Parveen, 2022) and(Khatoon, & Javed 2021) are also confirm model stability. (CUSUMSQ) are based on accumulated residuals and aggregate residual squares, respectively, and are used to test for parameter stability. The cumulative sum of squares test finds significant variations in the performance of the regression coefficients, whereas the cumulative total check finds systematic changes in the regression coefficients. The test's (CUSUMSQ) significance level is 5%.We used cumulative sum of squares

(CUSUMSQ) to examine the model's stability. Our model is stable if there are blue lines between two red lines. The model's red lines demonstrate its stability. The stats show that the red lines continue to be outside of the blue line. CUSUMSQ demonstrates that the model is accurately quantified and steady over both the long and short terms. The findings of (Shah, Shabbir, & Parveen, 2022) and (Khatoon, Javed, & Javed, (2021) are quite comparable to the results found above. The human capital index, trade and the industrialization index all raise then it will also speed up economic growth.

5.2 Policy Recommendations

This study's main aim is to evaluate how human capital and industrialization concerned with economic growth in Pakistan. The study will assist businesses and government agencies in boosting internal Human Capital Index, Industrialization Index and Trade initiatives to boost economic growth. The study will encourage investors to put their money into the process of industrialization which leads to the economic growth. Human capital is a compulsory factor of economic growth because an institution needs a certain degree of people's skills and knowledge to achieve bigger goals. Therefore, in order to raise literacy rates and build skills of human capital, investment in nation's people could play a vital role for the country's developmental process and might be accelerated economic progress. All of these elements are crucial for boosting economic growth in both developed and developing countries. To encourage investment in the industrial sector and other areas of the economy, Pakistan's government must take steps on national and international level. The economic growth will be impacted by the industrialization index. The (Human Capital Index) needs to be improved by the government and policymakers. It is suggested to depute more funds to education sector for development of human capital. There is a need to give more attention to advanced technology, training and skills improvement for development of human capital. In a similar vein, the Human Capital Index and Industrialization Index are important indicators of economic growth. The government should implement such measures that keep the Industrialization Index, Human Capital Index, Trade steady and prevent significant fluctuations in the market or nation. The Pakistani government must seek to eradicate human capital and implement measures that maintain economic growth while also improving the country's law and order situation. The cornerstone to the country's economic prosperity is human capital. The government must allocate separate funds for human capital, as doing so will spur the development of new technologies and have an impact on the Human Capital Index and industrialization index. It will accelerate economic growth.

Limitations:

Due to methodological flaws like the use of a single theoretical lens, closed system modelling, inappropriate use of mathematical tools, and multivariate interpretation analysis, human capital theory fails the test of realism. Environmental contamination is one detrimental externality of industrialization. Labourers and those who manage capital resources earn different amounts of money as a result of the separation of capital and labour.

5.3 Further Research

The impact of import and export, human capital and industrialization on the nation's total economic growth may be further studied by the researcher. The variables of human capital and industrialization should be used to check the impact of import and export on economic expansion in Pakistan. The information should be used from 1980 to 2023 in order to examine how the imports and exports affected Pakistan's economic expansion. This research could be more significant for economic expansion in Pakistan.

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