Impact of education and economy to global human capital

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Abstract

This study determined the education and economic factors that influence the human capital which is the collective knowledge and skills of individuals to create economic value. Data gathered were from the World Economic Forum 2017. Top thirty (30) and bottom (30) ranking countries were utilized in this exploratory study. Bipolar analysis through forced clustering of data, and formal testing of statistical hypotheses through t-tests and regression analysis were used in the study. Results showed that top ranking countries in terms of human capital have higher income, more tertiary education graduates, more employment, have very good educational system and more secondary education graduates than the bottom ranking countries. The five (5) variables are statistically significant on the total development of the human capital. However, further analysis revealed that being a secondary and tertiary graduate from a well establish educational system with employment influenced the human capital of a country. Thus, acquiring knowledge and skills through well establish education can produce higher human capital of a country which in turns increase its economy.

Keywords: human capital, education, economy, bipolar analysis, regression analysis

1. Introduction

Global human capital index (GHCI) is designed to show the economic growth of different countries through talents of its people. Human capital signifies the person's shared knowledge and skills expended for the creation of economic wealth among individuals, their employers and the community to which they partake (Cruz-Cunha, 2013). According to Pelinescu (2015), an increase in human capital is the means of higher productivity of the economy. Developing human capital contributes to the country's economic growth (Abocejo, 2014).

The GHCI was developed by Schwab in 1979 to provide the quantifiable elements of the world's talent potential to foster education which is geared to meet the needs of the future workforce. GHCI is a measure of labor education, abilities, ability and attributes that affect the productive capacity of individuals and earn potential income (Pettinger, 2017). A developing

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human capital of a country indicates a more important determinant of its long-term success than any other factors (World Economic Forum, 2017).

By calculating the human capital index, the potential knowledge and skills used for productivity of individuals in a country is strongly affected and determined by changes of the economy. To clearly comprehend the drivers of economic growth, it is necessary to quantify and understand human capital in order to have a sound assessment of the long-term development of a country's whose sustainability can be a reflective measure of the productivity performance of its educational sector (United Nations, 2016).

Human capital can be enhanced through formal education and is further developed through applying and acquiring skills in work from what was learned in formal education (Popescu and Diaconu, 2008). This study looked into how education and enhanced benefits contribute to national economic development. Kwon (2009) explained that the "Organization for Economic Co-operation and Development (OECD)" has its goals of playing a new role in education through the human capital development as impetus to globalized institutions.

In social and political terms, establishing how human capital associates economic performance is viewed as a prerequisite to precisely derive human capital measure (Ashton and Green, 1996). As the United Nations (2016) stated, "life expectancy at birth, adult literacy rate, gross enrollment ratio and per capita GDP" are among the factors which affect human capital formation. The International Monetary Fund [IMF] (2009) stated that budgets allotted on education and staff training is not to be considered an investment in human capital. However, the IMF (2009) research agenda mentioned that human capital is still an issue that needs to be further considered.

In this paper, human capital and education are considered as major determinants of economic growth. There is a limited literature which shed light on education and economic factors as determinants of human capital. As human capital is dynamic, several countries endeavored to measure their human capital towards better understanding of the crucial role that human capital plays in nation building.

1.1 Study objectives

This study focuses on the determinants that affect human capital development. Among the 130 countries ranked by the World Economic Forum 2017, sixty (60) countries - top thirty (30) and bottom thirty (30) were selected based on the availability of the data. This research is based on the interrelated determinants; (i) Gross Domestic Product (GDP) per Capita (PPP in US$); (ii) Tertiary Education Attainment Rate; (iii) Labor force Participation Rate; (iv) Quality of Education System; and (v) Medium-Skilled Employment Share. The main focus of this study is to examine the determinants of human capital as indicators of the global human capital index across selected countries all over the world that influence the economic development of the country.

2. Literature Review

There are factors, when combined, gives a significant effect on the human capital development. Considering that the one responsible for this development is the human being who is complex creature, but whose knowledge and skills are developed through endogenous and exogenous factors (Popescu and Diaconu, 2008). Frank and Bernanke (2007) described the human capital as a collection of factors influencing the marginal product of a worker like "education, experience, training, intellect, energy, work habits, trustworthiness and initiative"

Becker (2009) emphasized the role of education and training as significant factors for consideration in the investment of human capital formation whereby better-educated and trained human resource (Abocejo and Padua, 2010) translate to above average wage index in general. Investing in people results to more tangible economic benefits (Sweetland, 1996) at the individual and society levels (Pamatong and Abocejo (2017). Moreover, pouring investment in "education, in-service training and development, and other knowledge" based resources provide direct impact on income augmentation (Sweetland, 1996) and productivity (Abocejo, 2014) beneficial to both the individuals and society.

In the economic literature, economic growth in its simplest form, is characterized as an upsurge in the output of goods and services of a country driven by a continuous per capita increase in Gross Domestic Product [GDP] (Boztosun, Aksoylu and Ulucak, 2016). The favorable attributes of human capital and the use and application of knowledge and technology drive economic growth and opulence of the human capital (Genç, Değer and Berber, 2009). According to OECD (2018), GDP reflects the aggregate value, in monetary term, of the production of goods and services within the border's or a country in a specific period of time. The GDP can be interpreted to indicate the economic health and to measure the country's standard of living.

For sustainable economic development to come by, it is vital to invest in human capital (Krasniqi and Topxhiu, 2016). According to the Global Human Capital Index formal education enhances human capacity (Samans, Zahidi and Leopold, 2017). Applying and acquiring skills through work further improves human capital (Rodriguez and Abocejo, 2018). Tertiary education has been the reason for a country's success (Trazo and Abocejo, 2019) in building human capital. The bigger the number of educated people a country has (Jolejole-Caube, Dumlao and Abocejo, 2019), the more it can adapt to new technologies, innovate and compete globally (Abocejo, 2015). Moreover, in collaboration with industry, government and third sector organizations, higher education enables workers to adapt to changes and help businesses and other organizations improve productivity (Peña-López, 2016).

Human capital is further developed through hands-on learning, implicit knowledge, and interaction with colleagues in the workplace (Samans, Zahidi and Leopold, 2017). One of the more common determinants of human capital is the average years of education of the labor force (Tuicu, and Simko, 2015; Fernandez and Abocejo, 2014). The rate of labor force participation influences the size and composition of a country's human capital, which formulates employment policies, defines training needs and measures the economic status of the country's population (International Labor Organization, 2015). Spender and Marr (2006) posited that aggregate human capital is the amount of the quality adjustment of the labor force of each person which provides the stock of human capital using the income of each individual. Percentage of labor force participation rate gives off good human capital which drives off along with economic growth.

Educational quality greatly affects a person's earnings (Abcoejo and Padua, 2010) and the economic growth of a country (Abocejo, 2014). Hanushek and Wößmann (2007) argued that previous researches are more focused on the effects of schooling on the economic growth rather than the quality of education- ensuring that the students actually learn. Also, ignoring the quality distorts the connection of the quality of education (Fernandez and Abocejo, 2014) and economic outcomes and when comparing quantity and quality of education, quality gives to be more significant to developed economy. Quality education can only be achieved if equity is achieved within the education system (Canadian Council of Ministers of Education, 2018).

Azariadis and Drazen (1990) emphasized that economic development goes through the successive process rather than a linear process in which the stock of physical and human capital

enables a country to achieve a higher level of development. The developing countries need medium skilled labor force to have workers who are able to reproduce the technology of developed country. Emerging countries do not have enough financial and technological capacity to sustain innovative fields with a highly skilled worker who would in later years migrate in need of proper compensation of their contribution to the production system (Popescu and Diaconu, 2008). Investing to attain high-skilled workers often lead to the decline of focus on the medium-skilled workers (Abocejo, 2015) which could be of better use if they are in large amount.

3. Research Methodology

This study made use of the bipolar analysis where the top 30 ranking countries in Global Human Capital Index were contrasted with the lowest 30 ranking countries among the 130 countries in terms of the determinants on the global human capital. The measurement of the determinants is defined in the table below.

Table 1. Definition of variables under the determinants of human capital

Variable	Code	Measurement
Human Capital Score	Human Capital	Percent of every hundred
Gross Domestic Product (GDP)	Economic Condition	GDP per Capita (US$, PPP)
Tertiary Education Attainment Rate	Tertiary Education Graduates	Percent of every hundred
Labor Force Participation Rate	Employment	Percent of every hundred
Quality of Education System	Education System	Percent of every hundred
Medium-skilled Employment Share	Secondary Graduate Share	Percent of every hundred

The data used for this study were based on the Global Human Capital Index 2017 from the published report of the World Economic Forum. In order to obtain the comparison of each determinant on the human capital of the top ranking countries and bottom ranking countries, we presented an exploratory analysis that includes finding the profiles of these countries in terms of the determinants of the human capital. For brevity, we referred to this technique as "forced cluster analysis" although, technically speaking we have not performed real cluster analysis.

Using the profile exploration, the researchers proceeded to compare the two groups in terms of these variables by using a simple t-test for independent samples. Finally, for those variables found to be significant as a differentiating characteristic between the top ranking countries and the bottom ranking countries, we performed a multiple regression analysis in order to ascertain their joint relative contribution in the human capital scores of these countries.

4.0 Results and Discussions

For the preliminary data exploration, cluster analysis was performed in such a way that the top 30 countries are clustered as one and the bottom 30 countries are clustered as another. The different variables of each cluster are analyzed and the results are shown in Table 2. The finding showed that the top 30 ranking countries in terms of human capital have have higher income, more tertiary education graduates, more employment, have very good educational system and more secondary education graduates than the bottom ranking countries.

After clustering the data, we proceeded to statistical testing of the variables. The results of the comparison between the human capital scores as it relates to its determinants are shown in Table 3. The finding revealed that all five (5) variables are found to be statistically significant on the total development of the human capital. To ascertain the joint of all the determinants found to be individually significant of the human capital, data are shown in Table 4.

Human Capital Scores = 16.6 + 0.000089 Economic Condition + 0.417 Tertiary Education Graduates + 0.282 Employment + 0.150 Education System + 0.0478 Secondary Ed Graduate Share

Of the five (5) human capital determinants analyzed, tertiary education graduates turned out to have the highest influence on the final outcome as measured by the human capital scores, followed by the employment, next, by the education system, then, by secondary education graduate share and last, by the economic condition. However, economic condition and secondary education graduate share are found not significant in the final regression analysis results. Together, all the variables explained about 86.6 percent of the variance in the human capital score observed under the Global Human Capital Index (2017) results.

Table 2. Cluster analysis of top and bottom performing countries

Variable	Cluster 1 (Top 30)	Cluster 2 (Bottom 30)	Grand centroid
Human Capital	72.6137	49.6637	61.1387
Economic Condition	42,334.1667	4,518.0667	23,426.1167
Tertiary Education Graduates	30.6633	6.2833	18.4733
Employment	86.4900	77.2300	81.8600
Education System	63.2900	35.7467	49.5183
Secondary Ed Graduate Share	91.1500	85.1567	88.1533

The finding reflects that a strong relationship of the determinants of human capital development greatly influenced the economic growth of countries under review. As discussed in the literature review, there are studies that have supported and denied the variables as determinant that effectively influenced the human capital development.

The rate of tertiary education attainment came out to be the most influential determinant of the development of human capital. Tertiary education has been the reason for a country's success in building human capital (Rodriguez and Abocejo, 2018). The bigger the number of educated people a country has, the more it can adapt to new technologies, innovation and become globally competitive (Abocejo, 2015). As supported by Attach, Reisberg and Rumbley, 2009) and Sanyal and Johnstone (2011), tertiary education has become a valuable asset to meet the economic need in the global setting.

Labor force participation rate (economic condition) turned out to be the second most influential determinant of the development of the global human capital. Considering that labor force contains the graduates of formal education and outcomes of their studies are often justified in the way they work and their productivity. The determinant of the labor force participation rate affects the magnitude and configuration of a country's human capital, which formulates job policies, determines training needs and measures the anticipated working life of the population (International Labor Organization, 2015). High labor productivity is also concerned with high

levels of particular forms of human capital related to specific education and training processes. Good labor productivity rates provide positive human capital formation, which in turn enhances economic development.

Table 3. Comparison of the global human capital scores based on its determinants

Variable	t-value	p-value
Tertiary education	13.36**	0.000
Economic condition	11.31**	0.000
Education system	11.14**	0.000
Employment	3.71**	0.000
Secondary graduate Share	2.73*	0.011

* - significant at α <0.05 ** - highly significant at α < 0.001

Quality of educational system is associated with tertiary education attainment rate since the educational system is how the education is being run by certain government agencies or private sectors down to the respective universities and learning institutions. The educational system impacts the quality of tertiary education (Cuñado and Abocejo, 2018) along with labor force since it is one of the defining characteristics of how the future workforce of the economy (Abocejo, 2017) will be and on whether it will give better or worse results on the human capital. Educational system becomes more effective when it focuses on development of students from early elementary and high school years (Abocejo and Padua, 2010; Fernandez and Abocejo, 2014) and applies teaching skills thus making quality of education system an effective indicator of human capital (Garcia and Weiss, 2017).

GDP per capita is a major determinant of human capital, yet certainly does not influence the shift in human capital formation. Advocates for the use of GDP as an economic measure emphasized its ability to be broken down whereby act as an indicator of economic policy failure or progress (Costanza, Hart, Kubiszewski, and Talberth, 2014). High or low GDP does not necessarily guarantee the human capital development of a country.

Table 4. Regression analysis with human capital scores as the dependent variable

Predictor	**Coefficient**	**SE Coefficient**	**t-value**	**p-value**
Constant	16.569	7.563	2.19*	0.033
Economic Condition	0.00008936	0.00005200	1.72^{ns}	0.091
Tertiary Education Graduates	0.41722	0.07367	5.66**	0.000
Employment	0.28237	0.06163	4.58**	0.000
Education System	0.15020	0.06036	2.49*	0.016
Secondary Graduate Share	0.04782	0.06886	0.69^{ns}	0.490

ns – not significant * - significant at α <0.05 ** - highly significant at α < 0.001
R-Sq = 86.6% R-Sq(adj) = 85.3%

Medium-skilled employee share is a significant determinant of human capital but does not give a strong relation in the development of human capital. The initial share of medium-skilled workers substantially increases the overall growth of city jobs (Abocejo, 2015), but the effect is significantly lower than for high-skilled workers. There is a positive and direct influence on overall job development, guided by the effects on medium-skilled employment (Suedekum, 2006).

5.0 Conclusion and Recommendations

In conclusion, secondary and tertiary graduates from a well establish educational system strongly influence the human capital of a country. Low human capital countries need to strengthen their education system in order to produce more tertiary graduates with enough skills for more employment so that their economic development will increase which is also an increase in their human capital to show the competency globally. Therefore, acquiring knowledge and skills through well establish education system improve the capital of a country which ultimately drives economic growth and development.

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