



### TRENDS ASSOCIATED WITH STRENGTH OF KNOWLEDGE ECONOMY CORRELATING TO GROWTH

**Ujjwal Sharma**

Billabong High International School, Malad (IN677)

#### **Abstract**

The paper aims to analyze the link, if one exists, between the strength of the knowledge economy, that uses the Global Knowledge Index as the identifying index, and the growth rate of an economy. It indirectly evaluates the function and importance of having a healthy knowledge economy system in the country, and how it can be leveraged to grow.

The working hypothesis used for the basis of this paper is that there must be a positive correlation between economic growth rates and the knowledge economy's strength. Despite the knowledge economy having existed as a term and concept for over 50 years, the quantification of the Knowledge economy has been recent, and the links between the metrics have yet to be explored in detail. The paper discusses the data aspect of these metrics, the links, as well as the possible reasons for the trends existing.

**Keywords:** *GKI (Global Knowledge Index), HumanCapital, Production Efficiency, Emerging Economies, Economic Welfare*

#### **INTRODUCTION**

The knowledge economy is the most crucial and critical part in analyzing human capital in a country, and therefore the potential of any nation in the 21st century. First coined by Peter Drucker in 1966, the knowledge economy looks at the use of knowledge to maximize economic welfare. It can be used to look at the effects of advancement in understanding, technology, and research in a country on the economic system. Measuring the knowledge economy is of extreme importance when the increasing reliance on intellectual capital by countries to grow economically in the last decade is scrutinized.

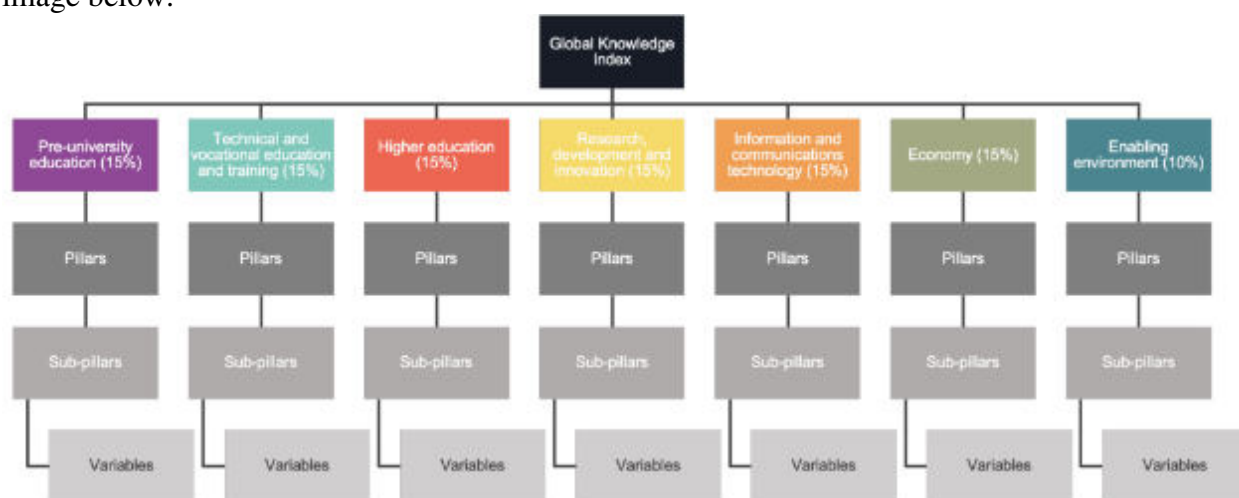
A challenge for social science has been to find metrics to gauge the extent to which society has become more dependent on knowledge production (Powell & Snellman, 2004). The scope of this paper to a large degree is to do just this: to measure how knowledge empowers a country and affects economic growth.

#### **Theory**

Economic growth aims to measure how much better off an economy is now, compared with the past and aims to measure the change in the value for a country's goods and services over a set period. Various indices can be utilized in measuring the economic growth of a country, dependent on the importance and weightage placed on a particular metric or factor, however, changes in GDP and GNP are generally universally accepted as measures of the annual economic growth of a country. GDP per capita is used throughout this paper to measure the growth of an economy due to the ability to being able to place value on the output that is given by every

individual person on average in the country (comparing the knowledge distribution across a country at the same time). This is balanced for inflation and measured in the current values of USD to give a more complete analysis.

While economic growth can be measured in monetary aspects, embodying the knowledge economy of a nation numerically is a larger and more complex task. Quantifying something that is a qualitative factor is extremely difficult, since knowledge is subjective. However, there is an index that measured the strength of knowledge economies of countries based on a variety of different existing factors, which is the Global Knowledge Index. It standardizes the strength of knowledge economies and has various domains to help understand the performance of an economy's knowledge economy. The seven main factors that constitute the GKI are shown in the image below.



**Fig. 1** Pillars and GKI Calculation Methodology (Source: UNDP)

Originally, the GKI was developed as a replacement for the Knowledge Index and has been updated annually starting from 2017. The GKI values used through this paper reflect on the 2020 values for each country as a basis for comparison. Some countries may have a seemingly strong knowledge economies (especially those in the Asian Tiger and emerging economies categories) but may not score as high on the GKI, mainly because they may not be strong in all the pillars used in the measurement of the GKI.

HDI is also used as a secondary index in this paper to measure the strength of the knowledge economy due to the importance of the human capital's strength which reflects the knowledge in an economy. The capability of the HDI to encapsulate the strength of a knowledge economy can be proven by the fact that knowledge is a dimension used to calculate the HDI. The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living (UNDP, 2022).

This paper works on the hypothesis that a positive correlation and trend must exist in the knowledge economy's strength and the GDP- with the assumption that when a country gets better at applying knowledge to benefit the economy, they will likely be able to maximize the economic efficiency of a country and slowly grow the value of the goods and services it produces over time.



The process followed by this paper makes use of linking and categorizing countries into three main different sections based on their knowledge economy strengths:

1. Bottom 5 (B5) Countries: These countries score the lowest in the GKI ranking and have generally weak knowledge economies.
2. Mid 5 (M5) Countries: These countries are in the 71-75 ranking of the GKI and generally score average to slightly below average GKIs. While they are relatively strong knowledge economies compared to the B5 group, they do not score as high as the top performers in the GKI.
3. Top 5 (T5) Countries: These are those that top the GKI rankings. They have high scores, ranging in the early 70s to the late 60s.

These different sections are analyzed separately after a general trend is established to determine a specific link in economic growth rates and knowledge economy positions, and how different amounts of knowledge can lead to differing trends in the GDP per capita. Each segment will be used to provide a general trend and collectively used in the end to compare how it stands against the original hypothesis at the start of the paper.

For static trend generation, 14 different countries have been considered from different positions on the GKI. The table below lists the countries, and the key metrics used for analysis.

**Table 1** UNDP and World Bank data used to build chart

| Country     | GKI  | HDI   | GDP per capita |
|-------------|------|-------|----------------|
| Switzerland | 73.6 | 0.955 | 87100.4        |
| US          | 71.1 | 0.926 | 63206.5        |
| Germany     | 66.2 | 0.947 | 46252.7        |
| Norway      | 66.1 | 0.957 | 67329.7        |
| Ireland     | 66.1 | 0.955 | 85422.5        |
| UAE         | 66.1 | 0.890 | 36284.6        |
| New Zealand | 63.2 | 0.931 | 41441.5        |
| China       | 57.4 | 0.761 | 10434.8        |
| Latvia      | 55.1 | 0.866 | 17736.5        |
| Mexico      | 47.5 | 0.779 | 8329.3         |
| Brazil      | 45.4 | 0.765 | 6796.8         |
| India       | 44.4 | 0.645 | 1927.7         |
| Algeria     | 37.5 | 0.748 | 3306.9         |
| Nepal       | 36.2 | 0.602 | 1155.1         |

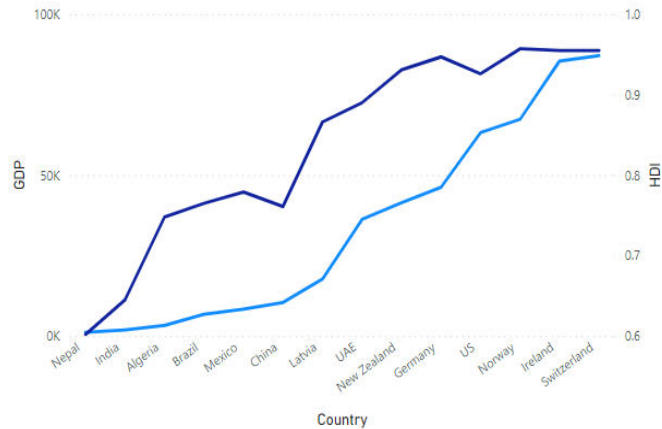
### DISCUSSION

As shown above, there is a positive trend that links GKI and HDI. This matches the expected relationship as knowledge is a part of the HDI trend and analyses human capital as a whole, which in itself has a direct link with training and R&D, which increases the net knowledge of an economy. This means the two can be used interchangeably to cross-reference any pattern generated from any one metric.

At any given point in time, using static measures, a positive link also exists in the GKI and GDP of countries. However, this does not signify a link in economic growth in itself, despite showing a higher living standard in countries with a high GKI. The graph below analyzes the 14 countries

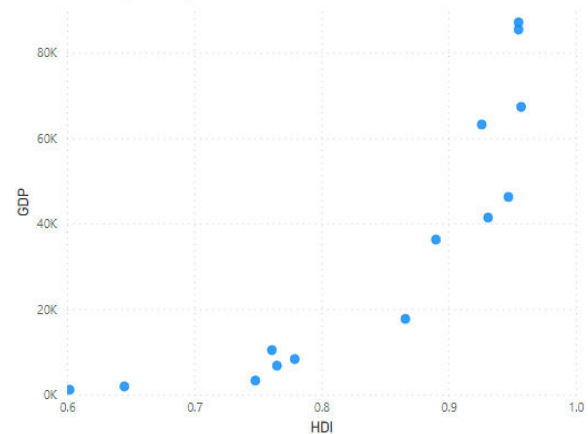


chosen to strongly support a positive quadratic interconnection between the GKI and GDP of a country. This trend is not a chance occurrence- the same relation is obtained even when HDI is charted against GDP. **Fig.4** Line graph showcasing general trend and link in HDI and GDP

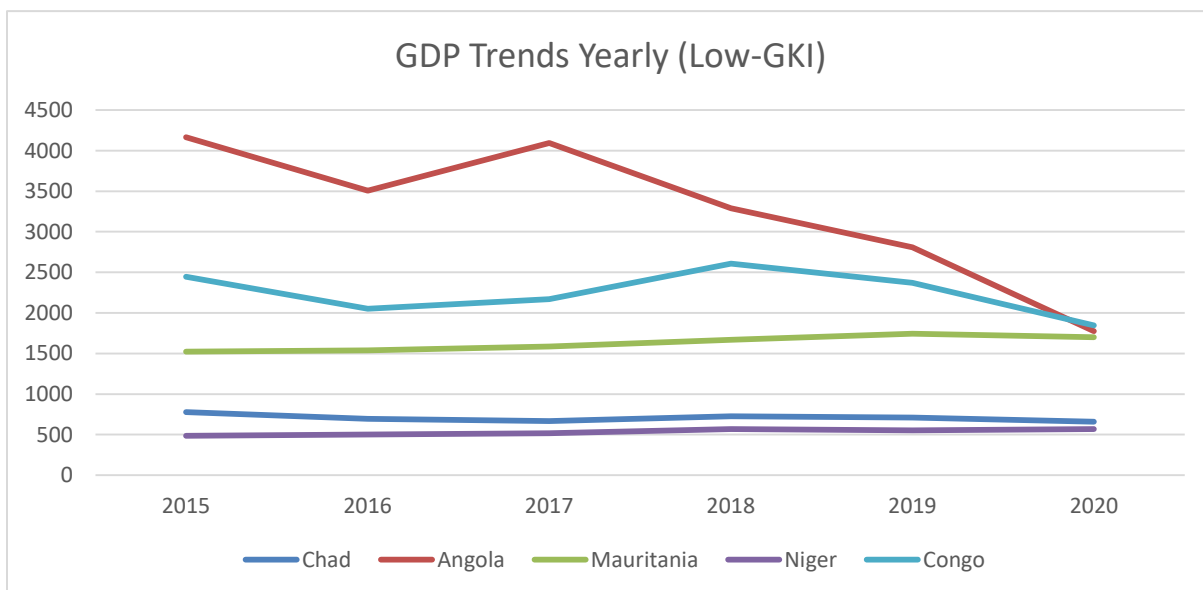


**Fig.5** Scatter Graph trend charted GDP by HDI

While the trend of GDP and knowledge in a static model is now established, the knowledge categories and the economic growth rate will now be analyzed to test the hypothesis of the original link. The procedure followed in this paper analyses the B5, T5 and M5 categorical relationships to do this over a 5-year period. This has been taken to be from 2015 to 2020, owing to the recency of the values of the GKI used.



The B5 countries, when graphed, showed a negative correlation to economic growth over time. The general trend was one reflecting fall in GDP per year, with an approximate fall by 13.6% per year. This corresponds to the initial hypothesis, that when one group of countries is low in the knowledge segment, they will generally adopt less efficient production methods, leading to losses in the long run. However, not all countries have experienced a fall in the GDP. Two countries have managed to maintain a small standard rise in

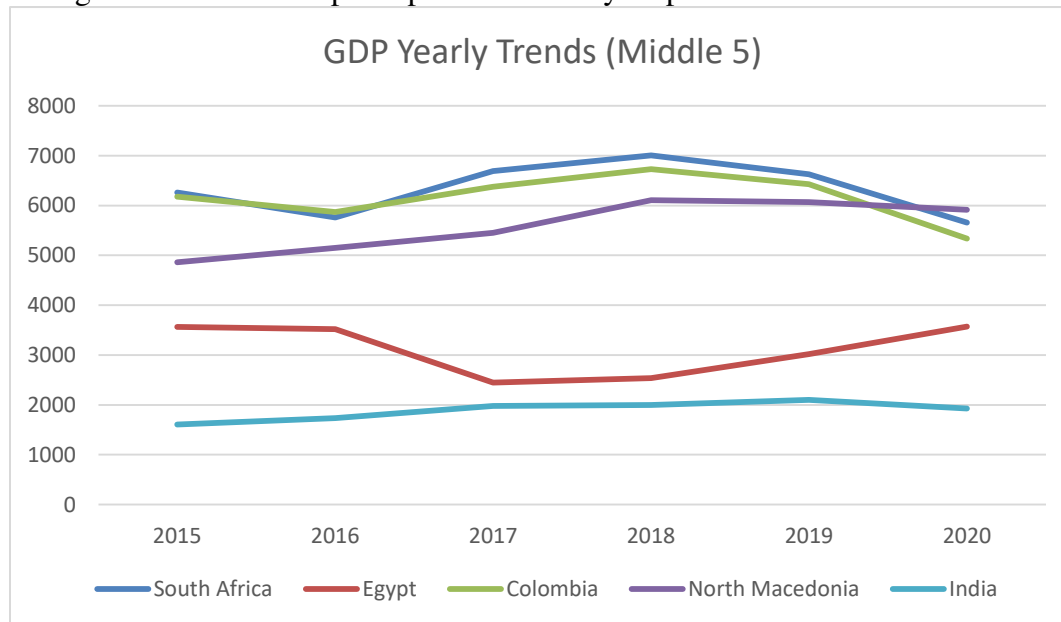




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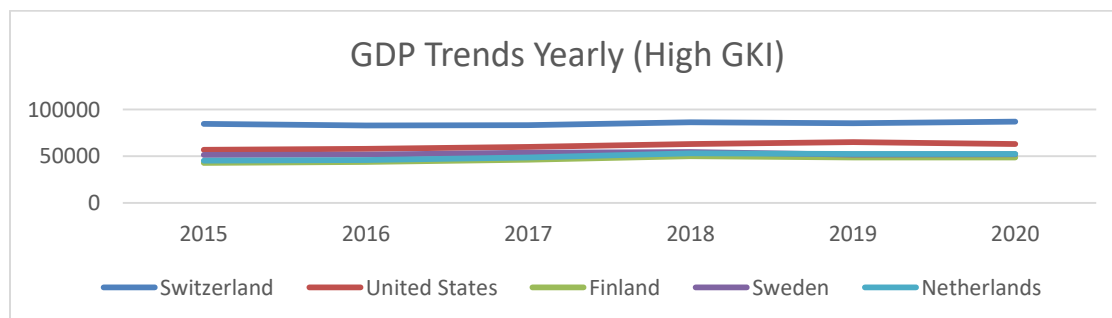
the GDP per capita, which goes on to demonstrate that knowledge in an economy is not the sole factor effecting economic growth rate.

It is also likely that both the countries-Mauritia and Niger-have significantly low GDP per capita in monetary terms to most countries investigated, which shows a scope for rise in GDP per capita to match the others with even lower GKI values, along with HDI over 0.5 in contrast to the rest, which all fall under the 0.5 benchmark. This may reflect a rising GKI in future forecasts (due to a well-trained population with adequate knowledge) and may act as the basis to justify the slight average increase in GDP per capita over the 5-year period.



The countries in the middle of the area show no predictable relationships via analysis over five years, as seen above. There is an average change by a 3.73% rise in the midsection data relating to GDP, which stands to show that even small amounts of knowledge can lead to considerable growth rates. Middle-level knowledge economies, even those under the 50% mark, are still able to be successful, especially if they can ensure stability and invest into growing the knowledge economy sectors.

The top segment of the knowledge economy is the one showing the strongest link between the knowledge economy and GDP per capita growth rates.





The top segment shows a rise in the GDP per capita rates over time, with an extremely slight fall being recorded only in 2019-20, when the impact of the Covid-19 pandemic. Nevertheless, even with the fall, the 5-year analysis for the high GKI countries reveals that on average, the countries have risen in GDP per capita by 9% on average. This is an immensely significant contrast to the low and middle GKI ranked countries and may be grounds for suggesting a parabolic relation between the growth rates too (in addition to the already established static relation between monetary values of GDP per capita and GKI values).

### Conclusion

The aim of this paper was to analyze the relation between the knowledge economy of a country, and the effect it has on the growth rates of a country. As expected, the graphs produced do suggest that the initial hypothesis generated was correct in terms of the positive relation between GKI and economic growth rates of a country. While the knowledge economy isn't the sole factor affecting the GDP per capita increase over time, it is certainly an aspect that holds value in predicting the trend of a country's economic condition. When countries experience a rise in their GKI, it is likely that the predicted outcome of a rise in GDP per capita be true. Logically, this is backed by the fact that the more knowledge you have, the better the work you can produce in terms of quality and efficiency.

Identification of other such important factors which have a link to economic growth is a crucial area of study for economists, especially to ensure the growth of an economy stays at an optimal level, which can lead to better performance of national economies, helping to increase the pace of development in emerging economies by helping them understand the focus points based on their rankings.

The strong trend that a high GKI has with economic growth suggests that having a strong knowledge economy is a sure way to increase the growth rate of an economy. If countries invest in strengthening the knowledge-based economy based on the pillar of the knowledge economy in which they see potential for growth, they may be able to grow their GDP per capita exponentially in the interest of the citizens.

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