

# A Comparative Assessment of Sustainable Economic Development among the G20 Countries

**Pallabi Mukherjee**

Assistant Professor, IBMR, IPS Academy, India  
pallabimukherjee@ipsacademy.org

**Kanhaiya Ahuja**

Professor Dr., School Of Economics, DAVV, India

**ABSTRACT:** The world leaders now aim at establishing an overall development scenario rather than only considering the Gross Domestic Product (GDP) a true reflection of countries well being. This paper aims to depict the recent initiation to evaluate the efficiency of a nation in converting GDP growth to well being in terms of Sustainable Economic Development Assessment scores (SEDA). SEDA measures sustainable development with the help of three broad dimensions namely Economic, sustainability and Environment. The three broad parameters are then subdivided into ten individual dimensions or sub parameters of true development namely Income, Economic Stability, Employment, Health, Education, Infrastructure, Income Inequality, Governance, Civil Society and Environment. This paper aims to compare the G20 nations in terms of their sustainable development present and progress scores. Data of 2016 has been compiled and trend analysis to compute their expected and actual scores and growth of scores have been depicted. Top four countries (G20) in terms of SEDA scores include Australia, Canada, the United States of America and the United Kingdom respectively. Moreover, the nineteen countries and the European Union have been ranked in terms of their individual dimension scores and further compared with the world median only in order to compare amongst them and to analyze their overall position in the world. Nevertheless, Analysis of variance is applied to the data to conclude that there is a significant difference in variance of individual dimension scores and individual country scores amongst the G20 countries of the world.

KEYWORDS: Sustainable Development, Gross Domestic Product, Growth, Income, Economic Stability, Employment, Health, and Environment.

## 1. Introduction

The major concern of different countries of the world is and has always been centric to the growth and development of their economy. From the evolution of the mankind growth has been the key issue of discussion and improvement has always been number one in the list of desirables of a nation. However the major concerns regarding increase and improvement of growth started from the mid twentieth century and distributed countries into different tiers establishing the super powers of the world in terms of prosperity and growth. The United States of America emerged as the strongest country with intense consumerism, manufacturing and strong Gross Domestic Product. The United Kingdom and different countries of the European Union also deserve special mention in improvement of economic growth in order to emerge powerful. Parts of South and East Asia started their robust growth process and their economies got a considerable push with fast growth, investments and trade. However the episode of economies targeting growth is somewhat not completely but partially over because now the economies are keenly looking forward to human Development. A countries growth, however, has failed to indicate the general development of the nations people and hence the world leaders are looking forward to human development as a whole.

### 1.1. Brief Background of G20 nations

Before going into details of discussion about the measurement indices and comparison of well being of a country we would like to discuss about the G20 nations to provide a base of assessments in the study. After the second world war and the worlds initiation to develop global organizations like the Bretton Woods, International Monetary Fund, the World bank or the World Trade Centre, the G20 found its path after the G8 and was established as an international forum for the governments of central bank governors of the following twenty nations namely: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, United States of America, European Union.

We have taken twenty-eight countries which comes under the European Union in our category excluding the countries which belong to the G20 category namely France, Germany, Italy and the United Kingdom. Hence twenty four countries namely Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland,

Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

This forum of nineteen individual nations and the European Union (EU) was founded in 1999 in order to discuss and promote international financial stability. These countries are accounted for eighty five percent of the Gross World's product, more than sixty six percent of the world's population and about eighty percent of the worlds trade. After the summit in 2008 the world leaders decided to replace the G8 with the G20 as the worlds top wealthiest group of nations.

**Table 1: Gross Domestic product-GDP (in Billion USD), GDP per capita in USD and Population of G20 nations**

<b>Countries</b>	<b>GDP in Billion USD (2016)</b>	<b>GDP Per Capita in USD (2016)</b>	<b>Population (2016)</b>
Argentina	872.8	21924	4,29,80,026
Australia	1584.6	43929.9	23490736
Brazil	1872	15,838	20,60,77,898
Canada	1823.3	44057	35540419
China	36928.2	13206	1,36,42,70,000
France	2060.9	38847	66206930
Germany	2736.4	45802	8,08,89,505
India	106439.8	5700.7	1295291543
Indonesia	8568115.6	10517	25,44,54,778
Italy	1535.3	34706.3	61336387
Japan	495986.2	36426.3	12,71,31,800
Mexico	13765	17107.9	125385833
Russia	12873.7	25635.9	14,38,19,569
Saudi Arabia	2431.9	51925.4	30886545
South Africa	3008.6	13046.2	5,40,01,953
South Korea	1426540.3	34335.7	50423955
Turkey	126.1	19199.5	7,59,32,348
United Kingdom	1687.8	39762	64510376
United States	16281.9	54629.5	31,88,57,056
EU	18408.8	32244	50,88,88,000

Source: Compiled from BCG Analysis

### 1.2. Background of Sustainable Economic Development Assessment (SEDA)

Wealth to Well being- The world leaders now aim at establishing an overall development scenario rather than only considering the Gross Domestic Product (GDP) a true reflection of a countries well being. In this context Sustainable Economic Development Assessment scores (SEDA) measures sustainable development with the help of three broad dimensions namely Economic, sustainability and Environment. The three broad parameters are then subdivided into ten individual dimensions or sub parameters of true development namely Income, Economic Stability, Employment, Health, Education, Infrastructure, Income Inequality, Governance, Civil Society and Environment.

This framework launched in 2012, lately established by The Boston Consulting Group, is a mechanism to evaluate the efficiency of countries in transforming Gross Domestic Product growth to 'well-being' of nations people. Without a doubt there is a strong connection between a countries growth of wealth creation and its development or well being and general prosperity. SEDA cogitates functioning by investigating three fundamental elements that are constituted by ten dimensions as pointers of overall well-being and SEDA does it for almost 163 countries in the world who are in turn also compared with their peers.

The three fundamental elements are:

1. Economics
2. Investments
3. Sustainability

The ten dimensions constituting the heads of these three fundamental elements are GDP per capita, Economic stability, Infrastructure, education, employment, income, health, inequality, governance, civil society and impact on the environment. SEDA associates progress in Gross Domestic Product per capita with erstwhile variables to find out a coefficient of transformation of Gross Domestic Product wealth into overall well-being. The element of Economics includes Income (Wealth), Economic Stability (Inflation and Instability of GDP) and Employment (Employment and Unemployment levels). The element of Investment includes Health (Approach to health care, mortality and morbidity rates), Education (education equality and access to education) and Infrastructure (water, sanitation, transportation and communication). The element of Sustainability includes Income Inequality (Income disparities), Governance (quality of government, civic freedom, accountability and stability), Environment (quality of environment) and Civil Society (Gender equality and bonds among individuals) (Mukherjee and Ahuja 2017).

**Figure 1: Ten Dimensions of SEDA**



*Source: Compiled from BCG Analysis*

The figure demonstrates the ten dimensions of sustainable economic development calculated to understand the transformation of each country from wealth to well being. The first dimension income includes wealth that is GDP per capita and Economic stability includes inflation and volatility of GDP growth. Employment includes employment and unemployment levels whereas income inequality includes income disparities across the population. The civil society parameters includes the intra and inter bond in the society, civil activism and equality in gender whereas governance includes the quality of government with efficacy and accountability incorporating civic and economic freedom. Educational quality and access constitutes to an important dimension and health includes its each and access and mortality rates of the people. The quality of environment policies and improvement along with water and transportation is also given equal weightage (Mukherjee and Ahuja 2017).

## 2. Review of available literature and Theoretical framework

Bhattari (2017) has done a detailed analysis on Economic Growth and development in India and other SAARC countries. The momentum of growth has been identified and analyzed by following and studying the trends of the economies fiscal and monetary scenario, trade, income distribution and education respectively. The study puts forward the development and growth criteria's in economies to be systematic and scientific analysis of potential and correct linkage between all the sectors moreover including regions and nations as well. Further he concluded by saying that being steady, stable and their readiness to march single minded in the path of growth will bring about the good level of growth and development in SAARC nations and India as well. Mukherjee and Ahuja (2017) in their research paper aim to depict the recent initiation

to evaluate the efficiency of a nation in converting GDP growth to well being in terms of Sustainable Economic Development Assessment scores (SEDA). A good SEDA progress score backs up India’s position in the world as one of the leading Economy and our country has shown a significant improvement in various parameters measured by the BCG to establish sustainable development. The paper also aims to compare the BRICS nations in terms of their sustainable development scores and also affirms Russia and Brazil to top the list. However India and China top in terms of progress scores giving a huge hope of amendment in converting wealth into well being so far. The authors have compiled and performed trend analysis for data of 2016 to compute their expected and actual scores and growth of scores.

### 3. Objective of The Study

- a) To compare between the indices of wellness between the G20 countries and also compare between their progress scores calculated in the year 2016.
- b) To evaluate the difference in variance of individual dimension scores and individual country scores amongst the G20 countries of the world.

### 4. Data and Interpretations

#### 4.1. Current level and Progress SEDA scores

The sustainable economic development scores calculated by the Boston Consultants Group has been compiled for the current study. The nineteen individual countries and twenty eight European countries (including the four G-20 EU countries) Current level scores and progress scores has been plotted.

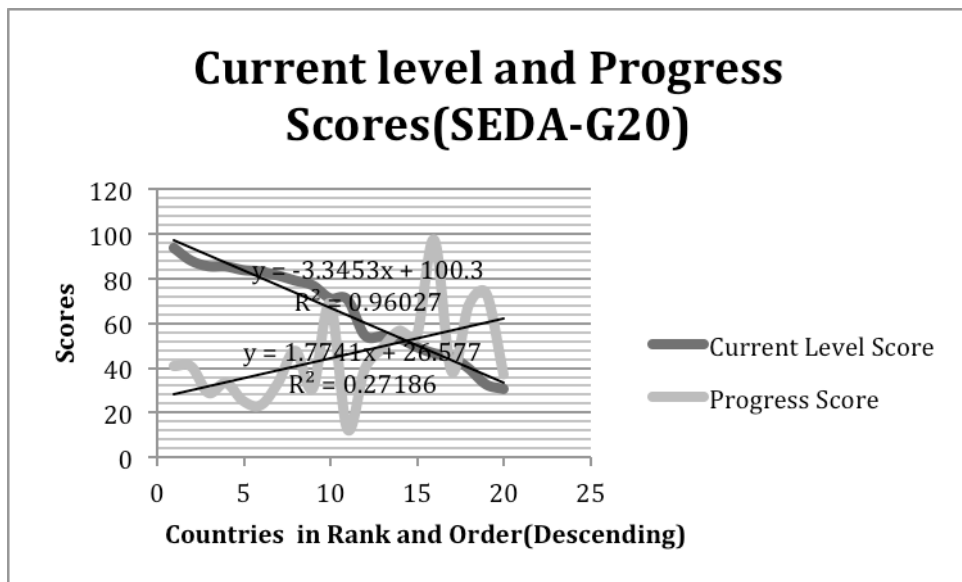
**Table 2: SEDA Current Level Scores and Progress Scores of G20 countries**

Countries	Current Level Score	Progress Score	Countries (EU)	Current Level Score	Progress Score
Germany	93.6	40.9	Austria	92.7	33.5
Australia	87.9	40.9	Netherlands	95	39
United Kingdom	85.4	29.1	Finland	94.9	23.1
Canada	85.3	33.6	Denmark	91.3	25
United States	83.7	25.5	Belgium	90	39.3

<b>France</b>	83.1	23.6	Sweden	89.6	23.8
<b>Japan</b>	81.3	33.5	Luxemburg	87.4	38.2
<b>South Korea</b>	79	47.9	Ireland	85.8	24.4
<b>EU(Average)</b>	76.9	31	Slovenia	79.3	28.3
<b>Saudi Arabia</b>	71.1	69	Estonia	78.8	37.9
<b>Italy</b>	70.6	12.9	Czech Republic	78.4	34
<b>Russia</b>	54.6	39.7	Spain	76	23.4
<b>Argentina</b>	54.1	49	Portugal	75.5	29.2
<b>Turkey</b>	53.1	56.9	Poland	74	67
<b>Brazil</b>	49.3	54.9	Lithuania	72	39
<b>China</b>	46.5	97.5	Slovakia	71.5	38.8
<b>Mexico</b>	45	38.8	Hungary	71.4	19
<b>Indonesia</b>	39.7	68.4	Malta	69.9	29.4
<b>India</b>	32.6	73.6	Latvia	68	23.7
<b>South Africa</b>	30.6	37.4	Cyprus	67.6	12.2
			Greece	62.6	0
			Croatia	61.3	37.9
			Bulgaria	57.3	34.2
			Romania	55.9	43.9

Source: Compiled from BCG Analysis

Fig 2: Current Level Scores and Progress Scores of SEDA of G20 countries



Source: Compiled from BCG Analysis

The progress has been calculated from 2004 to 2016 respectively. It can be noticed that the countries having a low current level Sustainable Economic Development score has a high progress score of SEDA. The top five ranking countries in terms of Sustainable Economic Development Assessment are Germany (Score-93.6), Australia (Score-87.9), United Kingdom (85.4), Canada (85.3), and the United States (Score-83.7). Some of the lowest scores of improvement or progress have been registered by United Kingdom, United States, and Italy. However, the countries among G20 with lowest SEDA scores are South Africa (Score-30.6), India (Score-32.6), Indonesia (Score-39.7), Mexico (Score-45) and China (46.5). Nevertheless these are few countries who have also recorded high progress scores namely China with a progress score of 97.5, India with 73.6 and Indonesia with 68.4. This can eventually mean that there is an ample scope of improvement for these countries.

**Table 3: SEDA Individual Dimension Scores of G20 Countries**

Countries	In- come	Eco- nom- ic Sta- bility	Em- ploy- ment	Hea lth	Ed- uca- tion	Infra- struc- ture	In- come Equa- lity	Civil Soci- ety	Go- ver- nan- ce	En- vir- onm- ent
<b>Argenti- na</b>	42.9	61.9	50.4	84.8	58.5	60	40.5	64.5	35.8	66.6
<b>Australia</b>	87.1	100	75.5	88.4	77.3	83.5	58	85.4	92.5	69.3
<b>Brazil</b>	30.6	85.6	61.3	75.9	45.5	57.3	15.3	56.5	50.3	80.3
<b>Canada</b>	87.3	92.8	74.3	84.5	60.3	85.2	61	92.7	93.3	67
<b>China</b>	25.3	63.4	65.5	83.8	66.1	68.4	41.1	61.5	23.1	17.6
<b>France</b>	76.8	92.8	54.1	91.8	72.5	91.7	62.4	82.7	79.4	75.3
<b>Germany</b>	90.8	88.5	78.3	96.4	85.2	91.3	69.5	86.2	91.6	77.4
<b>India</b>	10.3	78.6	33.4	52.3	25.9	45.7	60.5	44.8	44.9	12.5
<b>Indo- nesia</b>	19.9	86.8	42.5	59.6	29.9	52.4	56.5	54	38	47.7
<b>Italy</b>	68.5	93.3	32.9	87.8	57.2	79.6	57.5	77.7	62	64
<b>Japan</b>	72	76.6	86.6	96.1	60.2	94.7	64.7	79.1	84.9	57.1
<b>Mexico</b>	33.2	91.5	57.9	75.5	33.2	60.2	26.7	50.8	39.1	60.6
<b>Russia</b>	50.3	64.3	74.2	87.6	58.1	67.5	42.2	60.8	20.8	64.4
<b>Saudi Arabia</b>	100	78	48.7	75.7	77.6	82.1	62.7	47.6	32.7	66



<b>South Africa</b>	25	75.7	19.6	19	24.5	63.2	0	51.7	53.5	58.7
<b>South Korea</b>	67.8	94.7	70.1	100	91.1	87.3	55.7	73	68.2	34.9
<b>Turkey</b>	37.4	76	26.8	74.7	75	68.4	45.6	55	37.4	49.8
<b>United Kingdom</b>	78.7	92.9	72.6	84.9	78	88.9	63.7	81.7	86.7	75.7
<b>United States of America</b>	100	81	75.6	81.3	66.4	87.1	43.4	87.5	80.7	69.9
<b>EU(Average)</b>	66.5	77.4	53.4	88.6	73.2	82	66.4	80.2	76.1	67.6

Source: Compiled from BCG Analysis

Sustainable Economic Development certainly involves some important parameters, which are essential for a nation to take care and improve in order to establish as a developed nation. The first major dimension is Economics that involves sub dimensions like Income, employment and Economic Stability. Different countries of the G20 under consideration have different scores in parameters of Economics. Countries like Saudi Arabia and United States (USA) have a perfect 100 and Australia and Germany have very high scores for income. Australia has a perfect 100 score for Economic Stability followed by countries like Canada, U.K, South Korea, France and Mexico, which have a very high score in this subdivision. None of the G20 countries have a perfect 100 for employment but Japan has the highest comparative score among the rest. The second main dimension is Investment with sub dimensions like Health, Education and Infrastructure. South Korea has a perfect 100 score among the others in Health whereas France, Germany and Japan have very high scores in this dimension. South Korea has the highest score in education followed by Germany where the other countries have a lot of scope of improvement. France, Germany, Japan, U.K and USA have good scores for infrastructure development. The third major dimension of development is Sustainability, which involves sub dimensions like income inequality, Civil Society, Governance and Environment. High levels of income inequality are present in countries with high incomes as well like France, Germany, and European Union. Canada and USA has a good level of civil society whereas Turkey and Russia needs to improve the most in this front. China and India have poor scores for environment whereas Brazil and Germany are the best among the rest. China and Russia need to improve in case of Governance where countries like Australia, Germany, UK, and USA are amongst the ones scoring good points in Governance.

4.2. Comparison of G20 countries with the World Median

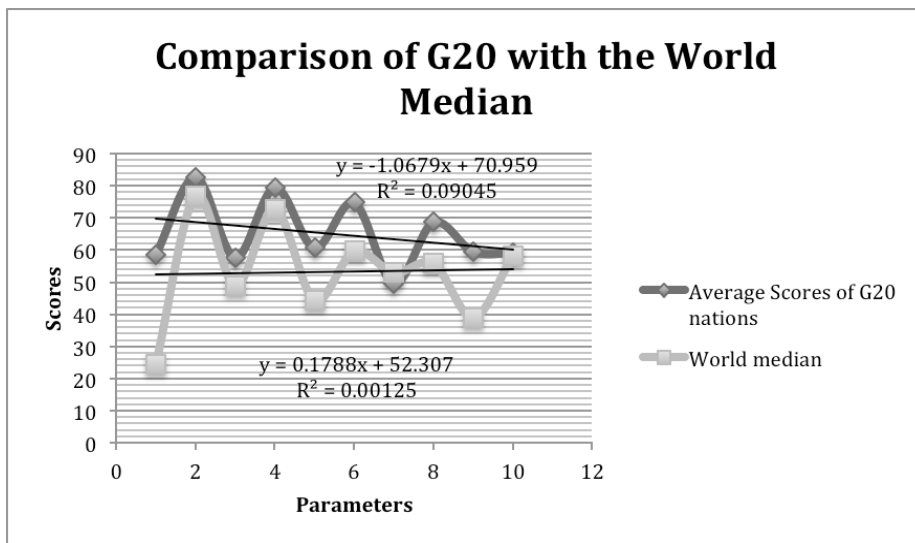
The average scores of all individual parameters of chosen countries are taken and compared with the world median.

Table 4: Comparison of G20 countries parameters with the world median

Parameters	Average Scores of G20 nations	World median	Deviation
Income	58.52	24.6	33.92
Economic Stability	82.59	76.7	5.89
Employment	57.685	48.9	8.785
Health	79.435	72.6	6.835
Education	60.785	44.4	16.385
Infrastructure	74.825	59.7	15.125
Income Equality	49.67	53	-3.33
Civil Society	68.67	55.8	12.87
Governance	59.55	39	20.55
Environment	59.12	58.2	0.92

Source: Compiled from BCG Analysis

Fig 3: Comparison of G20 countries parameters with the world median



Source: Calculated from the available data in SEDA BCG

When it comes to comparison with the world median the average scores of parameters or dimensions of all the G20 countries are more than all the dimension scores of the world as a whole.

#### 4.3. Difference in Mean Scores

To compare between the individual dimension and parameter scores of the G20 countries we have used the G20 median scores and thus performed the two-sample t test in order to evaluate the differences in the means of the chosen countries and the G20 median score. In order to understand their differences we have formulated a general Null Hypothesis.

##### **Null Hypothesis (1):**

$H_{01}$ : There is no significant difference in mean scores of individual G20 Nations (EU Average) in comparison with its G20 peers (G20 Median).

##### **Alternative Hypothesis (1):**

$H_{11}$ : There is no significant difference in mean scores of individual G20 Nations (EU Average) in comparison with its G20 peers (G20 Median)

**Table 5: t-Test: Two Sample Assuming Equal Variances-  
A comparison of chosen nations with G20 Median**

Countries	Means	T Stat	P Value	T Critical	Accept/ Reject Null Hypothesis	Decision
<b>Argentina</b>	56.59	1.39	0.178	2.1	Accept	No Significant Difference
<b>Australia</b>	81.7	3.31	.003	2.1	Reject	Significant Difference
<b>Brazil</b>	55.86	1.13	0.27	2.1	Accept	No Significant Difference
<b>Canada</b>	79.84	2.81	0.01	2.1	Reject	Significant Difference
<b>China</b>	51.58	1.62	0.12	2.1	Accept	No Significant Difference
<b>France</b>	77.95	2.49	0.022	2.1	Reject	Significant Difference
<b>Germany</b>	85.52	4.8	0.0001	2.1	Reject	Significant Difference
<b>India</b>	40.89	3.16	0.005	2.1	Reject	Significant Difference
<b>Indonesia</b>	48.73	2.3	0.02	2.1	Reject	Significant Difference

<b>Italy</b>	68.05	0.51	0.61	2.1	Accept	No Significant Difference
<b>Japan</b>	77.2	2.26	0.03	2.1	Reject	Significant Difference
<b>Mexico</b>	52.87	1.6	0.12	2.1	Accept	No Significant Difference
<b>Russia</b>	59.02	0.84	0.41	2.1	Accept	No Significant Difference
<b>Saudi Arabia</b>	67.11	0.34	0.73	2.1	Accept	No Significant Difference
<b>South Africa</b>	39.09	3.01	0.007	2.1	Reject	Significant Difference
<b>South Korea</b>	74.28	1.34	0.19	2.1	Accept	No Significant Difference
<b>Turkey</b>	54.61	1.5	0.14	2.1	Accept	No Significant Difference
<b>United Kingdom</b>	80.38	3.58	0.002	2.1	Reject	Significant Difference
<b>United States</b>	77.29	2.13	0.04	2.1	Reject	Significant Difference
<b>EU</b>	73.14	1.8	0.08	2.1	Accept	No Significant Difference

Source: Calculated from the available data in Table 3

The table has been calculated with the help of the available data and eminently the nations, which have comparatively very, high and very low scores in comparison to their own G20 peer nations have showed significant difference which has been proven with the help of performing the t test for two samples. Hypothesis taken is assumed for individual nineteen nations and EU (EU average) and is valid for all. The hypothesis that there is no significant difference is accepted in case of Brazil, Argentina, China, Italy, Mexico, Russia, Saudi Arabia, South Korea, Turkey and EU. The other countries either belong to the top or bottom list with respect to sustainable economic development assessment scores. Hence in case of Australia, Canada, France, Germany, U.K, USA, India, Japan, South Africa, Indonesia, the null hypothesis that is there is no significant difference is rejected and thus we have to accept the  $H_{11}$  (Alternative Hypothesis), there is a significant difference in scores of nations when they are compared with the total average or median Peer score.

#### 4.4. Analysis of variance

To evaluate and analyze whether there is a significant difference in variance of individual dimension scores and individual country scores amongst the G20 countries of the world we have formulated our next Null Hypothesis.

**Null Hypothesis (2 & 3):**

$H_{02}$ : There is no significant difference in variance of individual dimension (Parameter) scores amongst the G20 countries

$H_{03}$ : There is no significant difference in individual country scores amongst the G20 countries

**Alternative Hypothesis (2 & 3):**

$H_{12}$ : There is a significant difference in variance of individual dimension (Parameter) scores amongst the G20 countries.

$H_{13}$ : There is a significant difference in individual country scores amongst the G20 countries

To put the hypothesis in test we have applied the Analysis of Variance two way in order to evaluate our assumptions.

**Table 6: Analysis Of Variance (ANOVA)**

ANOVA						
Source of Variation	SS	Df	MS	F	P-value	F crit
Countries	39328.51	19	2069.92	10.91	7.54048E-21	1.65
Individual Dimensions (Parameters)	20805.13	9	2311.68	12.18	8.66476E-15	1.93
Error	32445.43	171	189.74			
<b>Total</b>	92579.08	199				

Source: Calculated from Table 3

The F value is 10.91 and 12.18 in case of countries and dimensions which is more than the F critical values (1.65 and 1.93) respectively hence the analysis compels us to reject both second and third null hypothesis that there is no significant difference in variance of individual dimensions or parameters and individual country scores amongst the G20 nations of the world. Hence we accept the alternative hypothesis that there is a considerable significant difference in both the individual dimension and country scores.

## Conclusions

It is true that the world leaders are trying to replace GDP growth with Sustainable Economic Development of countries and eminently countries with top growth are behind in terms of human development. The categories of dimensions like economic, investment and sustainability involved by the Boston Consultant group are very important parameters for countries overall human development. The factors like income, education, and health are quintessential for a country and its people whereas parameters like environment, civil society and Governance must be a global concern and indeed it is. Our study has not been able to cover the entire global scenario as the major concern was to compare between the well being of the G20 nations but we have honestly tried to put up a true picture of the top countries that contribute to a great extent to the world. Countries with very significant GDP's like India and China have a poor Sustainable development score and have enormous scope to improve.

The superpowers of the world especially the United States of America has good SEDA score when comes to comparison with the other G20 peers it has taken the fifth position but there is again a lot of scope of enhancement being the largest and the strongest economy of the world. In the Global assessment of countries it only has been able to grab the nineteenth or twentieth position. In our study, we have seen few countries have differed from the general score of parameters when compares with their peers as a whole, while other countries have not shown any significant difference in mean scores. When it comes to comparison with the world median the average G20 countries scores are definitely high than the world median with respect to all the development parameters. In the study we have also been able to evaluate that there is a significant difference in analysis of variance when it comes to individual country scores or the individual dimension scores of all the countries together.

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