

A Comparison of Progress of Developing Countries in Achieving Sustainable Development
Muhammad Babar¹, Rana Khalid Mehmood², Saria Hameed³, Nadeem Ayub Bhutta⁴, Abid Rasheed⁵
University of Central Punjab^{1,4,5}, University of Management and Technology² University of Punjab³

Corresponding author e-mail: ranakhalid39@gmail.com

Cite this paper: Muhammad, B., Mehmood, R. K., Hameed, S., Bhutta, N. A., & Rasheed, A. (2020). A comparison of progress of developing countries in achieving sustainable development. *Paradigms*, 14(1), 87-93.

Sustainable development is a widely utilized term which has been speedily emerging and portraying the planning and development of most of the countries across the world. One of the biggest challenges for all nations, development institutions, and policymakers of today's world is to ensure, now and in future, sustainable development across the globe. The basic idea of this study is developed from Agenda 2030. There are three main objectives of this study: first, to highlight and spread the knowledge about sustainable development; second, quantitative measurement of sustainable development and its dimensions; and finally, make comparison of progress of selected developing countries in attaining sustainable development. The 48 developing countries from various regions (according to distribution by World Bank) are selected in this study and time period of data is chosen from 1996 to 2017.

Keywords: Agenda 2030, Sustainable Development, Quantitative Measurement of Sustainable Development.

INTRODUCTION

Sustainable development has multidisciplinary nature and it is difficult to recognize its meaning, hence, there is a need to develop and use single indicators (Basiago, 1995). Since, it has three major dimensions which are economic, social and environmental, and integrated frameworks are necessary to monitor the interdependence of its dimensions (Devuyt, 2000). In order to make a comparison of performance in these three dimensions, the indices of sustainable development aggregate national information on performance in three sustainability dimensions for each country.

There is not any type of unanimity among policymakers and researchers to form a unique nature of index of sustainable development across the world, so, there are different opinions in the literature about the nature of indicator of sustainable development (Bossel, 2001; Rydin, 2007). Like, for local sustainable development, Valentin and Spangenberg (2000) emphasized on developing such indicators which consider the specific local context that a community needs to achieve public policy goals. For a certain place/country, in order to make a comparative and analysis of progress towards sustainable development, Spangenberg, Pfahl, and Deller, 2002 described key features of suitable sustainability indicators. There are available different composite indicators with different features and names like indicators of sustainability (Pastille, 2002), SD indicators (Cartwright, 2000), indicators of SD (Bossel, 1996)

A composite indicator or an index is an aggregate of all dimensions, objectives, individual indicators and variables used. Composite indicators (CIs) which compare country performance are increasingly recognised as a useful tool in policy analysis and public communication. Such composite indicators provide simple comparisons of countries that can be used to illustrate complex and sometimes elusive issues in wide-ranging fields, e.g., environment, economy, society or technological development (Bandura 2006). It often seems easier for the general public to interpret composite indicators than to identify common trends across many separate indicators, and they have also proven useful

in benchmarking country performance. However, composite indicators can send misleading policy messages if they are poorly constructed or misinterpreted (Saltelli, 2007).

An aggregate structure of indicators can be utilized for the two purposes, as, to create singular policy results in particular areas and to give huge data relating to the degree of progress of the program in an entire territory (Mascarenhas, Coelho, Subtil, and Ramos, 2010). Comparable indicators are an extraordinary help in supporting praxis of local SD, improving the capability of public policy, and possibly resolving social problems existing all through a country. In Japan, various local organizations have considered utilizing an aggregate set of indicators to gauge policy progress and to assess policy results toward local sustainable development. Though, because of the absence of adequate data or the constraint of accessible measurable data with respect to local information for further development of powerful indicators, a lot of relative indicators have not been brought into exercise yet (Kurasaka, 2013; Shirai, Tasaki, and Tanaka, 2013)

METHODOLOGY

Sustainable development is a major global challenge, gaining popularity in the last two decades. In 1992 the main issue at the World Earth Meeting in Rio de Janeiro focused on the importance of using indicators as a fruitful analytical tool for making decisions that contribute to worldwide sustainable development. This is clearly articulated in Chapter 40 of Agenda 21, which calls on both governmental and non-governmental organisations at a national and international level to identify and develop indicators of sustainable development, which can provide a solid basis for decision making on all levels (Ivanov & Dobрева, 2011).

The economic literature on sustainable development has been mainly concerned with finding proper means and methods for measuring the achieved sustainability levels within a given economy or globally. Moffat et al. (2001) suggested a model for measuring sustainable development through the introduction of the green net national product (GNNP), which simultaneously measures economic impacts on the environment and environmental restrictions on the economy.

Other methods for quantitative analysis of sustainable development are Beltratti's social welfare function, the level of living index and the human development index, introduced by the UN in 1990, which includes a number of components that measure the development of a given nation, for example, gross national product (GNP), health and literacy. Some of the recent measuring systems also include the index of sustainable economic welfare, which according to Daly (2002) will gradually substitute for the GNP and gross domestic product (GDP) indicators. Another indicator is the genuine progress index (GPI) (Talbert et al, 2006), which focuses on the discrepancies between GDP and a given country's development progress.

In this paper, we present a three-dimensional model of sustainable development, first introduced by Ivanov and Dobreva (2011)

Table 1.1: Components of Index of Sustainable Development

| A. Rapid and Sustainable Economic Growth | |
|--|--|
| Infrastructure and transportation | |
| Growth in labour productivity | |
| Affordable and renewable energy | |
| Natural Resources | |
| Youth Participation rate of youth in national production | |
| Resources for personal consumption | |
| B. Social Dimension of Sustainable Development | |
| Education | |
| Health | |
| Gender equality | |
| Income Inequality | |
| Poverty | |
| Social protection and labour | |
| C. Sustainability of Environment | |
| i. CO2 emissions (metric tons per capita) | |
| ii. Forest area (% of land area) | |
| iii. People using at least basic drinking water services (% of population) | |
| iv. People using at least basic sanitation services (% of population) | |
| v. Urban population growth (annual %) | |

Source: Authors Own Description based on Relevant Literature
Type and Sources of Data

The panel data is used for empirically analysis in this study and it is collected from Organization of Economic Cooperation and Development (OECD), United Nation Development Programme (UNDP), World Development Indicator (WDI), World Governance Indicator (WGI), World Income Inequality Database (WIID). The time period range from 1996 to 2017.

The 48 developing countries from various regions (According to distribution by World Bank) are selected in this study. These are China, Indonesia, Malaysia, Mongolia, Thailand, and Vietnam from East Asia and Pacific; Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Tajikistan, Turkey, and, Ukraine from Europe and Central Asia; Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Moldova, Montenegro, Paraguay, Peru, Uruguay from Latin America and Caribbean; Egypt, Arab Rep., and Morocco from Middle East and North Africa; Bangladesh, India, Nepal, Pakistan, and Sri Lanka from South Asia; Burkina Faso, Ghana, Kenya, Madagascar, Mauritania, Mozambique, Nigeria, South Africa, Tanzania, and Uganda from Sub Sahara.

Max-min procedure to convert indicators into indices

In order to construct indices whose values can range between 0 and 100 or 0 to 1, the minimum and maximum admissible values (also known as lower and upper bounds) must first be determined.

However, in order to reduce the impact of extreme outliers on the distribution of index values, the bounds may be set higher (lower) than the actual minimum (maximum) value of the indicator's data set. The bounds are generally kept constant across triennial reviews.

The basic formula for converting an indicator value (V) into an index score (I) is:

$$I = (V - MinValue) \div (MaxValue - MinValue) \dots\dots\dots 1.1$$

Where

MinValue = The minimum admissible value (lower bound)

MaxValue = The maximum admissible value (upper bound)

In a few cases, indicator and criteria point in opposite directions. For example, emissions of greenhouse gases, urban population, poverty, income inequality, and youth unemployment. In these cases, the following alternative formula is used:

$$I^* = 1 - I = 1 - [(V - MinValue) \div (MaxValue - MinValue)] \dots\dots\dots 1.2$$

Where

MinValue = The minimum admissible value (lower bound)

MaxValue = The maximum admissible value (upper bound)

Sustainable and Rapid Economic Growth

East Asia and Pacific

The economic growth rate in East Asia and Pacific region remains highest among all other regions of the world. The growth rate of GDP in East Asia and Pacific (EAP) is expecting to grow an average rate of 6 per cent in 2019. The factors like tight financial conditions at the global level, price stabilization in commodity market, broad-based global recovery and solid domestic demands support this uplift view of economies. All things considered, rising dangers to stability and sustained growth require close consideration.

Indicator of Sustainable Rapid Economic Growth

| Ra nk | Country | 199 6 | 201 7 | Δ 2017-- 1996 | Mea n | S. D | Ma x | Mi n |
|-------|-----------|-------|-------|---------------|-------|------|------|------|
| 1 | China | 0.6 | 0.7 | 0.2 | 0.7 | 0.1 | 0.8 | 0.6 |
| 2 | Thailand | 0.7 | 0.7 | 0.0 | 0.6 | 0.1 | 0.8 | 0.5 |
| 3 | Malaysia | 0.7 | 0.6 | -0.1 | 0.7 | 0.0 | 0.7 | 0.6 |
| 4 | Vietnam | 0.6 | 0.6 | 0.0 | 0.6 | 0.0 | 0.6 | 0.5 |
| 5 | Indonesia | 0.5 | 0.6 | 0.0 | 0.5 | 0.0 | 0.6 | 0.4 |
| 6 | Mongolia | 0.4 | 0.5 | 0.1 | 0.5 | 0.1 | 0.7 | 0.3 |

Source: Author's Own Work

As shown in above chart and table that China is on top position in indicator of sustainable rapid economic growth during 2017, and also improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Mongolia obtain least score in this indicator.

Europe and Central Asia

Development in Europe and Central Asia has been more grounded than whenever since the worldwide monetary emergency. In 2017, GDP rose 2.7 per cent and yearly private utilization rose 2.5 per cent. Development is a figure to direct to 2.3 per cent in 2018. In any case, expanded limit use, joblessness rates near their 2007 dimensions, and normal swelling currently surpassing 2 per cent are for the most part flags that local development is probably going to moderate further.

Indicator of Sustainable Rapid Economic Growth

Table 5.2: Europe and Central Asia

| Rank | Country Name | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|------------------------|------|------|-------------|------|------|------|------|
| 1 | Belarus | 0.63 | 0.75 | 0.11 | 0.64 | 0.07 | 0.75 | 0.55 |
| 2 | Kazakhstan | 0.44 | 0.74 | 0.31 | 0.66 | 0.15 | 0.85 | 0.37 |
| 3 | Turkey | 0.49 | 0.58 | 0.09 | 0.51 | 0.05 | 0.59 | 0.44 |
| 4 | Azerbaijan | 0.35 | 0.55 | 0.19 | 0.56 | 0.17 | 0.77 | 0.21 |
| 5 | Uzbekistan | 0.43 | 0.49 | 0.06 | 0.53 | 0.08 | 0.66 | 0.38 |
| 6 | Georgia | 0.18 | 0.36 | 0.18 | 0.29 | 0.05 | 0.36 | 0.16 |
| 7 | Ukraine | 0.36 | 0.36 | 0.00 | 0.39 | 0.05 | 0.55 | 0.33 |
| 8 | Tajikistan | 0.38 | 0.35 | -0.03 | 0.33 | 0.03 | 0.39 | 0.27 |
| 9 | Albania | 0.19 | 0.31 | 0.12 | 0.31 | 0.06 | 0.41 | 0.19 |
| 10 | Armenia | 0.21 | 0.18 | -0.03 | 0.21 | 0.04 | 0.27 | 0.14 |
| 11 | Bosnia and Herzegovina | 0.15 | 0.09 | -0.06 | 0.13 | 0.04 | 0.17 | 0.03 |

Source: Author's Own Work

As shown in above chart and table that Belarus is on top position in indicator of sustainable rapid economic growth during 2017, and Kazakhstan improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Bosnia and Herzegovina obtain least score in this indicator.

Latin America and Caribbean

The prospects for economic growth for 2018 are missing the mark regarding beginning desires as difficulties looked by a portion of the nations in this region, especially in South America. The GDP growth rate for this region is presently expected to grow at 1.6 per cent in 2019. The fundamental factors for the more fragile development are the market disturbance that begun in Argentina in last year, the economic development log jam in Brazil, the proceeded with the weakening of the circumstance in Venezuela, and a turn for the poorer in the external sector.

Indicator of Sustainable Rapid Economic Growth

Table 5.3: Latin America and Caribbean

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|-------------|------|------|-------------|------|------|------|------|
| 1 | Mexico | 0.59 | 0.64 | 0.04 | 0.59 | 0.07 | 0.68 | 0.50 |
| 2 | Colombia | 0.57 | 0.62 | 0.06 | 0.62 | 0.03 | 0.70 | 0.55 |
| 3 | Peru | 0.51 | 0.62 | 0.11 | 0.57 | 0.05 | 0.65 | 0.48 |
| 4 | Ecuador | 0.49 | 0.62 | 0.13 | 0.56 | 0.08 | 0.67 | 0.43 |
| 5 | Brazil | 0.67 | 0.58 | -0.10 | 0.66 | 0.04 | 0.72 | 0.58 |
| 6 | Bolivia | 0.47 | 0.57 | 0.10 | 0.56 | 0.07 | 0.72 | 0.45 |
| 7 | Costa Rica | 0.54 | 0.55 | 0.01 | 0.55 | 0.02 | 0.59 | 0.51 |
| 8 | Paraguay | 0.48 | 0.49 | 0.01 | 0.52 | 0.03 | 0.57 | 0.47 |
| 9 | Guatemala | 0.52 | 0.48 | -0.04 | 0.50 | 0.04 | 0.58 | 0.44 |
| 10 | Argentina | 0.39 | 0.48 | 0.09 | 0.43 | 0.04 | 0.50 | 0.37 |
| 11 | Uruguay | 0.38 | 0.47 | 0.08 | 0.46 | 0.04 | 0.51 | 0.39 |
| 12 | El Salvador | 0.38 | 0.44 | 0.06 | 0.40 | 0.04 | 0.46 | 0.34 |
| 13 | Montenegro | 0.12 | 0.32 | 0.20 | 0.22 | 0.08 | 0.32 | 0.12 |
| 14 | Moldova | 0.18 | 0.27 | 0.09 | 0.18 | 0.06 | 0.29 | 0.07 |

Source: Author's Own Work

As shown in above chart and table that Mexico is on top position in indicator of sustainable rapid economic growth during 2017, and Ecuador improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Moldova obtain least score in this indicator.

Middle East and North Africa

Economic growth in this region is a gauge to improve unassumingly, achieving a growth rate at 2.6 per cent in 2019. Oil exporters will essentially profit by higher oil costs and outside oil request that will probably stay high, just as local changes. Oil merchants are relied upon to profit by changes, rising exchange with the Europe and China, and money related inflows from MENA oil exporters.

Indicator of Sustainable Rapid Economic Growth

Table 5.4: Middle East and North Africa

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|------------------|------|------|-------------|------|------|------|------|
| 1 | Morocco | 0.30 | 0.44 | 0.14 | 0.39 | 0.04 | 0.44 | 0.30 |
| 2 | Egypt, Arab Rep. | 0.41 | 0.33 | -0.08 | 0.40 | 0.04 | 0.49 | 0.33 |

Source: Author's Own Work

As shown in above chart and table that sample of only two countries is selected for this region. And, Morocco is on top position in indicator of sustainable rapid economic growth during 2017, and improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Egypt, Arab Rep obtain least score in this indicator.

South Asia

The GDP growth rate in South Asia is expected 7.1 per cent by in 2019, mirroring a wide-based improvement crosswise over most of the area. South Asia ought to keep up its situation as the quickest developing. Even though this measure is extensively unaltered from January 2018, the normal development rate is somewhat lower, basically because of a downward correction for Pakistan in 2019.

Indicator of Sustainable Rapid Economic Growth

Table 5.5: South Asia

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|------------|------|------|-------------|------|------|------|------|
| 1 | India | 0.47 | 0.58 | 0.11 | 0.53 | 0.05 | 0.59 | 0.47 |
| 2 | Nepal | 0.45 | 0.53 | 0.08 | 0.51 | 0.03 | 0.57 | 0.45 |
| 3 | Pakistan | 0.48 | 0.47 | -0.01 | 0.47 | 0.07 | 0.67 | 0.40 |
| 4 | Sri Lanka | 0.33 | 0.46 | 0.14 | 0.38 | 0.06 | 0.47 | 0.30 |
| 5 | Bangladesh | 0.32 | 0.39 | 0.07 | 0.33 | 0.04 | 0.39 | 0.27 |

Source: Author's Own Work

As shown in above chart and table that India is on top position in indicator of sustainable rapid economic growth during 2017, and also improve its score, from year 1996 to year 2017, more effectively than any other country in this region. Pakistan is on third position among 5 selected countries of this region. On the other side, Bangladesh obtain least score in this indicator due to less share of affordable and renewable energy, natural resources, and resources for personal consumption

Sub Saharan Africa

Economic development in this region keeps on recuperating relentlessly and is estimated to get a normal rate of 3.6 per cent in 2019. However, it will be uneven among countries of this region.

Indicator of Sustainable Rapid Economic Growth

Table 5.6: Sub Saharan Africa

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D |
|------|--------------|------|------|-------------|------|------|
| 1 | Uganda | 0.60 | 0.65 | 0.06 | 0.54 | 0.08 |
| 2 | Ghana | 0.45 | 0.60 | 0.15 | 0.46 | 0.09 |
| 3 | Tanzania | 0.47 | 0.60 | 0.12 | 0.51 | 0.06 |
| 4 | Mauritania | 0.27 | 0.56 | 0.29 | 0.46 | 0.08 |
| | Madagascar | 0.40 | 0.53 | 0.13 | 0.44 | 0.06 |
| 6 | Burkina Faso | 0.47 | 0.52 | 0.04 | 0.45 | 0.15 |
| 7 | Kenya | 0.43 | 0.44 | 0.01 | 0.41 | 0.02 |
| 8 | Nigeria | 0.60 | 0.43 | -0.17 | 0.56 | 0.07 |
| 9 | South Africa | 0.36 | 0.38 | 0.02 | 0.37 | 0.03 |
| 10 | Mozambique | 0.21 | 0.34 | 0.13 | 0.29 | 0.05 |

Source: Author's Own Work

As shown in above chart and table that Uganda is on top position in indicator of sustainable rapid economic growth during 2017, and Mauritania improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Mozambique obtain least score in this indicator.

The Social Dimension of Sustainable Development East Asia and Pacific

During the most recent two decades, poverty has diminished drastically crosswise over a large portion of growing East Asia. The number of extremely poor individuals in the region living fell by more than 920 million from 1990 to 2013. This decline is due to: the quick development in labour earnings among poor people, alongside low unemployment, social protection transfers (for example, pensions, direct money transfer to poor, and unemployment insurance, among others), structural changes in the economy, and Govt development expenditures.

Indicator of Social Dimensions of Sustainable Development

Table 5.8: East Asia and Pacific

| Rank | Country | 1996 | 2017 | Δ2017--1996 | Mean | S.D | Max | Min |
|------|-----------|------|------|-------------|------|------|------|------|
| 1 | China | 0.68 | 0.79 | 0.11 | 0.74 | 0.05 | 0.80 | 0.67 |
| 2 | Malaysia | 0.72 | 0.78 | 0.06 | 0.75 | 0.02 | 0.78 | 0.72 |
| 3 | Vietnam | 0.55 | 0.76 | 0.21 | 0.67 | 0.07 | 0.76 | 0.55 |
| 4 | Thailand | 0.69 | 0.76 | 0.06 | 0.73 | 0.02 | 0.76 | 0.69 |
| 5 | Mongolia | 0.63 | 0.74 | 0.11 | 0.68 | 0.04 | 0.74 | 0.62 |
| 6 | Indonesia | 0.58 | 0.70 | 0.13 | 0.63 | 0.05 | 0.70 | 0.55 |

Source: Author's Own Work

As shown in above chart and table that China is on top position in indicator of social dimensions of sustainable development during 2017, and Vietnam improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Indonesia is on bottom in this indicator.

Europe and Central Asia

Extreme poverty in the area fell from 24.5 per cent to 9.9 from the period 2003 to 2016. From that point forward, in any case, the rate of decreasing extreme and development of the white-collar people have slowed down. However, in the education sector, the performance of this region is also not up to a level because 33 per cent of children is not able to complete their high school education.

Indicator of Social Dimensions of Sustainable Development

Table 5.9: Europe and Central Asia

| Rank | Country | 1996 | 2017 | Δ2017--1996 | Mean | S.D | Max | Min |
|------|------------------------|------|------|-------------|------|------|------|------|
| 1 | Belarus | 0.81 | 0.87 | 0.06 | 0.84 | 0.02 | 0.87 | 0.80 |
| 2 | Kazakhstan | 0.75 | 0.85 | 0.10 | 0.80 | 0.04 | 0.85 | 0.75 |
| 3 | Ukraine | 0.77 | 0.81 | 0.03 | 0.79 | 0.02 | 0.81 | 0.76 |
| 4 | Armenia | 0.65 | 0.75 | 0.10 | 0.70 | 0.05 | 0.76 | 0.64 |
| 5 | Bosnia and Herzegovina | 0.60 | 0.73 | 0.13 | 0.71 | 0.03 | 0.74 | 0.60 |
| 6 | Georgia | 0.68 | 0.72 | 0.04 | 0.68 | 0.03 | 0.73 | 0.64 |
| 7 | Azerbaijan | 0.64 | 0.72 | 0.08 | 0.69 | 0.03 | 0.73 | 0.64 |
| 8 | Albania | 0.64 | 0.71 | 0.07 | 0.70 | 0.04 | 0.78 | 0.64 |
| 9 | Turkey | 0.53 | 0.69 | 0.15 | 0.61 | 0.05 | 0.69 | 0.53 |
| 10 | Uzbekistan | 0.66 | 0.69 | 0.03 | 0.67 | 0.01 | 0.69 | 0.64 |
| 11 | Tajikistan | 0.62 | 0.69 | 0.07 | 0.66 | 0.03 | 0.69 | 0.61 |

As shown in above chart and table that Belarus is on top position in indicator of social dimensions of sustainable development during 2017, and Turkey improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, Tajikistan is on bottom in this indicator.

Latin America and Caribbean

As shown by report of UN in 2015, Participation rate is 90 per cent in organized learning one year before the official age of entry into primary school in Latin America and Caribbean. The selected countries are ranked in descending order according to their performance in indicator of social dimensions of sustainable development in following figure and table

Indicator of Social Dimensions of Sustainable Development

Table 5.10: Latin America and Caribbean

| Rank | Country | 1996 | 2017 | Δ2017--1996 | Mean | S.D | Max | Min |
|------|-------------|------|------|-------------|------|------|------|------|
| 1 | Uruguay | 0.76 | 0.81 | 0.05 | 0.79 | 0.02 | 0.81 | 0.76 |
| 2 | Argentina | 0.74 | 0.79 | 0.05 | 0.77 | 0.02 | 0.79 | 0.74 |
| 3 | Montenegro | 0.72 | 0.78 | 0.06 | 0.76 | 0.02 | 0.79 | 0.72 |
| 4 | Costa Rica | 0.67 | 0.77 | 0.10 | 0.74 | 0.03 | 0.78 | 0.67 |
| 5 | Brazil | 0.68 | 0.77 | 0.09 | 0.74 | 0.03 | 0.77 | 0.68 |
| 6 | Peru | 0.63 | 0.76 | 0.12 | 0.71 | 0.04 | 0.76 | 0.63 |
| 7 | Bolivia | 0.67 | 0.75 | 0.08 | 0.72 | 0.03 | 0.76 | 0.67 |
| 8 | Mexico | 0.65 | 0.74 | 0.10 | 0.70 | 0.03 | 0.74 | 0.65 |
| 9 | Ecuador | 0.67 | 0.74 | 0.07 | 0.71 | 0.02 | 0.74 | 0.67 |
| 10 | Paraguay | 0.66 | 0.74 | 0.08 | 0.70 | 0.03 | 0.74 | 0.66 |
| 11 | Moldova | 0.69 | 0.73 | 0.03 | 0.71 | 0.02 | 0.74 | 0.68 |
| 12 | Colombia | 0.58 | 0.73 | 0.15 | 0.67 | 0.05 | 0.73 | 0.58 |
| 13 | Guatemala | 0.51 | 0.67 | 0.16 | 0.61 | 0.06 | 0.67 | 0.51 |
| 14 | El Salvador | 0.51 | 0.45 | -0.06 | 0.51 | 0.04 | 0.57 | 0.44 |

Source: Author's Own Work

As shown in above chart and table that Uruguay is on top position in indicator of social dimensions of sustainable development during 2017, and Guatemala improve its score, from year 1996 to year 2017, more effectively than any other country in this region. On the other side, El Salvador is on bottom in this indicator.

Middle East and North Africa

Between 1990 and 2000, the enrolment rate in the developing regions increased from 80 per cent to just 83 per cent. In 2015, a threshold of at least 97 per cent is frequently used to determine whether universal enrolment has been attained. Based on this threshold, enrolment in primary education is now universal or nearly universal in Middle Asia and Northern Africa (the millennium development goals report by UN)

Indicator of Social Dimensions of Sustainable Development

Table 5.11: Middle East and North Africa

| Rank | Country | 1996 | 2017 | Δ2017--1996 | Mean |
|------|------------------|------|------|-------------|------|
| 1 | Egypt, Arab Rep. | 0.55 | 0.62 | 0.07 | 0.58 |
| 2 | Morocco | 0.50 | 0.58 | 0.08 | 0.54 |

Source: Author's Own Work

Contrary to the indicator of sustainable and rapid economic growth, as shown in above chart and table that Egypt, Arab Rep is on top position in indicator of social dimensions of sustainable development during 2017. However, Morocco improve its score, from year 1996 to year 2017, more effectively than Egypt, Arab Rep.

South Asia

According to the millennium development goals report 2015 by UN, poverty rate decline from 52 per cent to 17 per cent in South Asia from 1990 to 2015, this decline was speedy after 2008. The following table and graph show the performance of this region in indicator of social dimensions of sustainable development

Indicator of Social Dimensions of Sustainable Development

Table 5.12: South Asia

| Rank | Country | 1996 | 2017 | Δ2017--1996 | Mean | S.D | Max | Min |
|------|------------|------|------|-------------|------|------|------|------|
| 1 | Sri Lanka | 0.66 | 0.68 | 0.02 | 0.67 | 0.01 | 0.68 | 0.65 |
| 2 | Nepal | 0.57 | 0.64 | 0.07 | 0.59 | 0.04 | 0.64 | 0.52 |
| 3 | Bangladesh | 0.41 | 0.58 | 0.17 | 0.50 | 0.05 | 0.58 | 0.41 |
| 4 | Pakistan | 0.32 | 0.51 | 0.19 | 0.42 | 0.07 | 0.51 | 0.32 |
| 5 | India | 0.36 | 0.43 | 0.07 | 0.38 | 0.03 | 0.43 | 0.33 |

Dissimilar to the indicator of sustainable and rapid economic growth, as shown in above chart and table that Sri Lanka is on top position in indicator of social dimensions of sustainable development during 2017. However, Pakistan improve its score,

from year 1996 to year 2017, more effectively than all other countries in this region. India is at bottom in this index.

Sub Saharan Africa

According to report of World bank “The Sustainable Development Goals Report, 2017”, In sub-Saharan Africa, 34 per cent of workers and their families continued to live in extreme poverty in 2016.

Indicator of Social Dimensions of Sustainable Development

Table 5.13: Sub Saharan Africa

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|--------------|------|------|-------------|------|------|------|------|
| 1 | South Africa | 0.65 | 0.70 | 0.05 | 0.66 | 0.03 | 0.70 | 0.61 |
| 2 | Ghana | 0.48 | 0.64 | 0.16 | 0.55 | 0.07 | 0.64 | 0.47 |
| 3 | Kenya | 0.57 | 0.64 | 0.07 | 0.59 | 0.03 | 0.64 | 0.55 |
| 4 | Mauritania | 0.48 | 0.58 | 0.09 | 0.53 | 0.03 | 0.58 | 0.48 |
| 5 | Uganda | 0.31 | 0.54 | 0.23 | 0.46 | 0.08 | 0.54 | 0.31 |
| 6 | Tanzania | 0.22 | 0.49 | 0.27 | 0.40 | 0.10 | 0.52 | 0.22 |
| 7 | Madagascar | 0.45 | 0.43 | -0.02 | 0.43 | 0.02 | 0.47 | 0.39 |
| 8 | Mozambique | 0.23 | 0.42 | 0.19 | 0.36 | 0.06 | 0.42 | 0.23 |
| 9 | Nigeria | 0.31 | 0.41 | 0.11 | 0.37 | 0.04 | 0.42 | 0.31 |
| 10 | Burkina Faso | 0.24 | 0.41 | 0.18 | 0.32 | 0.06 | 0.41 | 0.22 |

Far removed from the indicator of sustainable and rapid economic growth, as shown in above chart and table that South Africa is on top position in indicator of social dimensions of sustainable development during 2017. However, Tanzania improve its score, from year 1996 to year 2017, more effectively than all other countries in this region. Burkina Faso is at bottom in this index.

The Indicator of Environment Sustainability for Sustainable Development East Asia and Pacific

The East Asia and Pacific (EAP) region have been experienced rapid economic growth, urbanization industrialization unsustainable usage of natural resources since the last few decades. These experienced became the cause of air pollution, land logging, stress on drinking water, and other problems related to the ecosystem.

Indicator of Environment Sustainability

Table 5.14: East Asia and Pacific

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|-----------|------|------|-------------|------|------|------|------|
| 1 | Malaysia | 0.53 | 0.63 | 0.10 | 0.58 | 0.03 | 0.63 | 0.53 |
| 2 | Indonesia | 0.56 | 0.59 | 0.03 | 0.57 | 0.01 | 0.59 | 0.54 |
| 3 | Vietnam | 0.52 | 0.55 | 0.03 | 0.53 | 0.01 | 0.55 | 0.51 |
| 4 | Thailand | 0.44 | 0.41 | -0.03 | 0.38 | 0.05 | 0.46 | 0.32 |
| 5 | China | 0.20 | 0.23 | 0.03 | 0.22 | 0.01 | 0.23 | 0.20 |
| 6 | Mongolia | 0.23 | 0.13 | -0.10 | 0.15 | 0.05 | 0.24 | 0.08 |

Source: Author's Own Work

Europe and Central Asia

Since economic development is highest in Europe and Central Asia (ECA) region, so the emission of CO2 is also an alarming level as compare to the level of other regions. Now, there are two main problems for the ECA region, one is to maintain the supply of energy and other is to maximize the share of renewable energy.

Indicator of Environment Sustainability

Table 5.15: Europe and Central Asia

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|------------------------|------|------|-------------|------|------|------|------|
| 1 | Georgia | 0.83 | 0.59 | -0.24 | 0.69 | 0.06 | 0.83 | 0.58 |
| 2 | Bosnia and Herzegovina | 0.74 | 0.53 | -0.21 | 0.57 | 0.04 | 0.74 | 0.53 |
| 3 | Belarus | 0.52 | 0.51 | -0.01 | 0.53 | 0.01 | 0.55 | 0.51 |
| 4 | Albania | 0.59 | 0.47 | -0.12 | 0.50 | 0.05 | 0.61 | 0.46 |
| 5 | Armenia | 0.57 | 0.39 | -0.17 | 0.46 | 0.05 | 0.57 | 0.39 |
| 6 | Ukraine | 0.35 | 0.36 | 0.01 | 0.36 | 0.01 | 0.38 | 0.34 |
| 7 | Tajikistan | 0.44 | 0.32 | -0.12 | 0.38 | 0.05 | 0.47 | 0.31 |
| 8 | Azerbaijan | 0.28 | 0.27 | -0.01 | 0.26 | 0.02 | 0.29 | 0.21 |
| 9 | Turkey | 0.25 | 0.26 | 0.01 | 0.26 | 0.00 | 0.27 | 0.25 |
| 10 | Uzbekistan | 0.15 | 0.25 | 0.10 | 0.20 | 0.04 | 0.26 | 0.15 |
| 11 | Kazakhstan | 0.24 | 0.07 | -0.17 | 0.12 | 0.07 | 0.26 | 0.02 |

Source: Author's Own Work

Latin America and Caribbean

The Latin America and Caribbean (LAC) region has rich and unique resources of biodiversity however these resources are under threat due to lack of adequate management of these areas, unsystematic agriculture sector, logging and mining, and settlements. The problems related to human health also exist in the LAC region because of urban and indoor air pollution, lack of access to drinking water and sanitation system.

Indicator of Environment Sustainability

Table 5.16: Latin America and Caribbean

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|-------------|------|------|-------------|------|------|------|------|
| 1 | Montenegro | 0.54 | 0.72 | 0.18 | 0.63 | 0.08 | 0.72 | 0.53 |
| 2 | Brazil | 0.70 | 0.71 | 0.00 | 0.71 | 0.01 | 0.72 | 0.69 |
| 3 | Peru | 0.72 | 0.69 | -0.03 | 0.71 | 0.01 | 0.74 | 0.69 |
| 4 | Colombia | 0.67 | 0.68 | 0.01 | 0.67 | 0.01 | 0.69 | 0.66 |
| 5 | Costa Rica | 0.55 | 0.67 | 0.12 | 0.59 | 0.05 | 0.67 | 0.53 |
| 6 | Paraguay | 0.61 | 0.62 | 0.00 | 0.63 | 0.02 | 0.66 | 0.60 |
| 7 | Ecuador | 0.56 | 0.61 | 0.05 | 0.61 | 0.02 | 0.63 | 0.56 |
| 8 | Bolivia | 0.61 | 0.60 | -0.02 | 0.61 | 0.01 | 0.63 | 0.59 |
| 9 | Guatemala | 0.58 | 0.49 | -0.08 | 0.52 | 0.02 | 0.58 | 0.48 |
| 10 | Mexico | 0.43 | 0.44 | 0.02 | 0.43 | 0.01 | 0.44 | 0.42 |
| 11 | Moldova | 0.34 | 0.42 | 0.08 | 0.43 | 0.03 | 0.48 | 0.34 |
| 12 | El Salvador | 0.35 | 0.40 | 0.04 | 0.39 | 0.02 | 0.41 | 0.34 |
| 13 | Uruguay | 0.33 | 0.37 | 0.04 | 0.36 | 0.02 | 0.40 | 0.33 |
| 14 | Argentina | 0.28 | 0.27 | -0.08 | 0.28 | 0.01 | 0.30 | 0.26 |

Source: Author's Own Work

Middle East and North Africa

The consistent maximum utilization of natural resources for economic benefit is the main challenge for the Middle East and North Africa (MENA) region. While increasingly degradation of drinking water is causing water stress for poor people of this region. The factors of high population density, economic activities, sea transportation, and urbanization bring out compression on natural resources, the resilience of the ecosystem, drinking water, and land. On the other hand, marine-based pollution increasing sea level and threatening to coastal cities of the region.

Indicator of Environment Sustainability

Table 5.17: Middle East and North Africa

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|------------------|------|------|-------------|------|------|------|------|
| 1 | Morocco | 0.32 | 0.31 | -0.01 | 0.31 | 0.01 | 0.33 | 0.29 |
| 2 | Egypt, Arab Rep. | 0.26 | 0.21 | -0.05 | 0.22 | 0.02 | 0.26 | 0.20 |

Source: Author's Own Work

South Asia

When a score of the environmental index of countries in South Asia Region (SAR) is compared with the score of the countries of other regions with similar income per capita, it is shown that performance of this region is lag from these regions.

Indicator of Environment Sustainability

Table 5.18: South Asia

| Rank | Country | 1996 | 2017 | Δ1996--2017 | Mean | S.D | Max | Min |
|------|------------|------|------|-------------|------|------|------|------|
| 1 | Sri Lanka | 0.69 | 0.58 | -0.12 | 0.64 | 0.03 | 0.69 | 0.58 |
| 2 | Nepal | 0.42 | 0.51 | 0.09 | 0.50 | 0.05 | 0.57 | 0.41 |
| 3 | India | 0.35 | 0.36 | 0.01 | 0.35 | 0.01 | 0.36 | 0.34 |
| 4 | Bangladesh | 0.37 | 0.35 | -0.02 | 0.34 | 0.02 | 0.38 | 0.32 |
| 5 | Pakistan | 0.21 | 0.25 | 0.04 | 0.23 | 0.01 | 0.25 | 0.21 |

Source: Author's Own Work

Sub Saharan Africa

The improvement in the quality of governance is a big challenge for African countries, and this issue is becoming a hurdle in the management of its forests and the utilization of external aid. The

coastal line is yet less developed in Africa which harbour intact ecosystems that protect coastal cities and infrastructure from flooding and provide protection for fisheries, however, its seascapes are gradually endangered by both the population pressure and decrease in coastal forests. These dangers have increased the helplessness of coastal settlements. There is likewise a long history of mining in this region which has been caused by air pollution, and this region has also the issue of managing the waste of its urban areas. To end, this region similarly needs to tackle the problems of degradation of both the land and the soil as these problems affected more than 425 million population as well as water scarcity.

Indicator of Environment Sustainability

Table 5.19: Sub Saharan Africa

| Rank | Country | 1996 | 2017 | Δ1996-2017 | Mean | S.D | Max | Min |
|------|--------------|------|------|------------|------|------|------|------|
| 1 | Ghana | 0.86 | 0.64 | -0.22 | 0.76 | 0.06 | 0.86 | 0.64 |
| 2 | Mozambique | 0.63 | 0.58 | -0.05 | 0.64 | 0.04 | 0.70 | 0.54 |
| 3 | Tanzania | 0.65 | 0.57 | -0.08 | 0.61 | 0.04 | 0.69 | 0.56 |
| 4 | Madagascar | 0.36 | 0.36 | 0.00 | 0.36 | 0.01 | 0.39 | 0.34 |
| 5 | Burkina Faso | 0.43 | 0.35 | -0.08 | 0.34 | 0.03 | 0.43 | 0.31 |
| 6 | Kenya | 0.22 | 0.26 | 0.04 | 0.25 | 0.02 | 0.27 | 0.22 |
| 7 | Uganda | 0.38 | 0.24 | -0.13 | 0.29 | 0.05 | 0.38 | 0.23 |
| 8 | Nigeria | 0.31 | 0.22 | -0.10 | 0.23 | 0.04 | 0.32 | 0.19 |
| 9 | Mauritania | 0.22 | 0.15 | -0.07 | 0.15 | 0.04 | 0.22 | 0.11 |

Source: Author's Own Work

Conclusion

This paper describes the theory to measure sustainable development and its dimensions, process of measurement, and presents the score in these constructed indices of each individual country of this study. These are distinguished composite indicators comprising environmental, social and economic wellbeing dimensions. It is observed that score, of a same country, in the index of sustainable development is different from that of its dimensions i.e. rapid and sustainable economic growth, environmental sustainability, and social dimension of sustainable development.

This study also highlights in detail the situation of the economy, ecosystem, and society in each selected country as well as region of the world. The countries in each selected region are arranged in descending order according to their performance in these dimensions of sustainable development. This analysis is helpful to grab the relative intensity of issues related to each indicator of each dimension in these countries and regions and make some remedies to solve these issues.

References

Alexander, E. (2006). Institutional Design for Sustainable Development. *The Town Planning Review*, 77(1), 1-27.

Ayres, R. U. (2004). On the life cycle metaphor: where ecology and economics diverge. *Ecological Economics*, 48(4), 425-438.

Bandura, R. (2006). A Survey of Composite Indices Measuring Country Performance. United Nations Development Programme

Barbiroli G, Candela G, Raggi A. 2008. Implementing a new model to measure and assess eco-effectiveness as an indicator of sustainability. *Int J Sustain Dev World Ecol*. 15(3): 222-230.

Basiago, A. D. (1995). Methods of defining "Sustainability". *Sustainable Development*, 3(3), 155-162.

Bossel, H. (1996). Deriving indicators of sustainable development. *Environmental Modeling and Assessment*, 1(4), 193-218. <https://doi.org/10.1007/BF01872150>

Bossel, H. (2001). Assessing viability and sustainability: A systems-based approach for deriving comprehensive indicator sets. *Conservation Ecology*, 5(2), 12. DOI: 10.5751/ES-00332-050212

Cartwright, L. E. (2000). Selecting local sustainable development indicators: Does consensus exist in their choice and purpose? *Planning Practice and Research*, 15(1-2), 65-78. DOI: 10.1080/713691874

Chan, S. (2009). Partnerships for Sustainable Development in China: Adaptation of a Global Governance Instrument. *European Journal of East Asian Studies*, 8(1), 121-134.

Daly HE. 2002. Sustainable development: definition, principles, policies [Internet]. [cited 2010 Jun 20].

Declaration, R. (1992). Rio declaration on environment and development. The United Nations Conference on Environment and Development

Devuyst, D. (2000). Linking impact assessment and sustainable development at the local level: The introduction of sustainability assessment systems. *Sustainable Development*, 8(2), 67-78. [https://doi.org/10.1002/\(SICI\)1099-1719\(200005\)8:2%3C67::AID-SD131%3E3.0.CO;2-X](https://doi.org/10.1002/(SICI)1099-1719(200005)8:2%3C67::AID-SD131%3E3.0.CO;2-X)

Easterly, W., Ritzen, J., & Woolcock, M. (2006). Social cohesion, institutions, and growth. *Economics and Politics*, 18(2), 103-120. <https://doi.org/10.1111/j.1468-0343.2006.00165.x>

Gallopín, G. C. (1996). Environmental and sustainability indicators and the concept of situational indicators. A systems approach. *Environmental Modeling and Assessment*, 1(3), 101-117. <https://doi.org/10.1007/BF01874899>

Ivanov, I., & Dobрева, J. (2011). Measuring sustainable governance in the European Union. *International Journal of Sustainable Development & World Ecology*, 18(5), 412-423.

Kurasaka, H. (2013). Tokusyu1/Chikijizukukanouseisihyou ni kansuru wa- ku syop-pu Chiikijizokukanouseisihyou no kentou ni tuite 2 kai no wa- ku syoppu nokirokukara. *Chiba University Kokyo Kenkyu*, 9(1). (in Japanese)

Mascarenhas, A., Coelho, P., Subtil, E., & Ramos, T. B. (2010). The role of common local indicators in regional sustainability assessment. *ecological Indicators*, 10(3), 646-656. <https://doi.org/10.1016/j.ecolind.2009.11.003>

Moffat I, Hanley N, Wilson MD. 2001. Measuring and modeling sustainable development. *New York (NY): Parthenon Publishing Group*

PASTILLE (2002). Indicator into action: A practitioners guide for improving their use at the local level: a product of pastille for local authorities. Retrieved from <http://www.ocs.polito.it/alpcityruo/en/dwd/indicatori/6.pdf>

Pearce, D., Hamilton, K., & Atkinson, G. (1996). Measuring sustainable development: Progress on indicators. *Environment and Development Economics*, 1(1), 85-101.

- Ridaura SL. 2002. Evaluating the sustainability of complex socioenvironmental systems: the MESMIS framework. *Ecol Indic.* 2(1–2):135–148
- Rydin, Y. (2007). Indicators as a governmental technology? The lessons of community-based sustainability indicator projects. *Environmental Planning D: Society and Space*, 25, 610–624.
- Saltelli A. (2007). Composite indicators between analysis and advocacy. *Social Indicators Research*, 81: 65-77.
- Shiau TA, Jhang JS. 2010. An integration model of DEA and RST for measuring transport sustainability. *Int J Sustain Dev World Ecol.* 17(1):76–83
- Shirai, N., Tasaki, T., & Tanaka, M. (2013). Design of indicators of regional sustainable development and analysis of relationship between regional sustainability and happiness. *Journal of Japan Society of Civil Engineering, Ser G (Environmental Research)*, 69(6), 1159–1170. (in Japanese)
- Spangenberg, J. H. (2002). Institutional sustainability indicators: An analysis of the institutions in Agenda 21 and a draft set of indicators for monitoring their effectivity. *Sustainable Development*, 10(2), 103–115. <https://doi.org/10.1002/sd.184>
- Talbertn J, Cobb C, Slattery N. 2006 The genuine progress indicator [Internet]. [cited 2011 Jul 2]
- UNCED (1992). Agenda21. United Nations Conference on Environment and Development
- UNDP (2012). Governance for peace: Securing the social contract. New York: United Nations Publications.
- United Nations, (2003). Integrated environmental and economic accounting. United Nations, New York.
- Valentin, A., & Spangenberg, J. H. (2000). A guide to community sustainability indicators. *Environmental Impact Assessment Review*, 20(3), 381–392. [https://doi.org/10.1016/S0195-9255\(00\)00049-4](https://doi.org/10.1016/S0195-9255(00)00049-4)
- World Bank (1993). The East Asian miracle: Economic growth and public policy. *New York: Oxford University Press.*
- World Bank (1997). World development report 1997: The state in a changing world. Oxford University Press.
- World Bank (2011). World development report 2011: Conflict, security, and development. Washington, D.C.: World Bank.
- World Bank (2019). Global Economic prospects. World Bank, Washington, D World Bank Group, Daniel Kaufmann, Aart Kraay, and Massimo Mastruzzi. *Worldwide governance indicators. World Bank Group, 2010.*
- World Bank, (1997). Expanding the measure of wealth: indicators of environmentally sustainable development. World Bank, Washington, DC.
- World Bank. Africa Regional Office. Office of the Chief Economist, World Bank. Africa Regional Office. Operational Quality, Knowledge Services, & World Bank. Development Data Group. (2006). *Africa development indicators. World Bank Publications.*
- World Bank's latest Migration and Development Brief. Washington World Bank's Remittance Prices Worldwide database World Economic Forum Global Shapers Annual Survey 2017. Available online: <https://www.bespacific.com/world-economic-forums-global-shapers-annual-survey-2017/>
- World Health Organisation (WHO). (1997). City Planning for Health and Sustainable Development. WHO Regional Office Europe: Copenhagen