

# Impact Of Economic Growth On Sustainable Development- Through The Relation Between GDP And CO<sub>2</sub> Emissions

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## **Abstract:**

*Whether a country is developed or developing creates environmental pressure in the world. Developing countries have desire to achieve social and economic growth and therefore give importance on growth over environment. On the other hand, the economic growth of the developed countries comes at the cost of environmental degradation. Growth is the major economic goal of many nations (McConnell 2002, p.137). But more rapid growth involves more use of natural resources, more consumption of goods and more production of wastage, causing environmental degradation. The paper reflects the relation between CO<sub>2</sub> emission and GDP of the country and its impact on Sustainable development. Statistical tool is used to analyze the relation.*

**Key-words:** GDP, CO<sub>2</sub>emission, Growth, Sustainable development.

## **INTRODUCTION:**

Economic growth simply means yearly increase in the country's GDP in percentage terms. Economic growth raises the standard of living; improve the health care facility, reduce poverty, increase wealth. But Economic growth has adverse impact on the environment. Rapid increase in the standard of living means increase in consumption of goods leads to more wastage, increase greenhouse gases and CO<sub>2</sub> in the atmosphere. However every problem has a solution. Sustainable development is the solution to the problem of environmental degradation.

Sustainable development is a way to use the natural resources so that it will remain available for the future generation. Sustainable development is development that meets the need of the present without compromising the ability of future generations to meet their own needs (Brundtland Commission 1987). That means we should take care of our natural resources as because these resources are non-renewable.

## A BRIEF HISTORY OF SUSTAINABLE DEVELOPMENT:

Sustainable forest management were developed in Europe during 17<sup>th</sup> and 18<sup>th</sup> centuries, from which sustainable development get its roots. In 1962, the publication of Rachel Carson's Silent Spring was able to draw attention to the relationship between economic growth and development and environmental degradation. The Club of Rome in 1972 first used the term sustainable in contemporary sense in its classic report on the Limits to Growth. In the report the authors described the desirable "state of global equilibrium" where they wrote "we are searching for a model output that represents a world system that is sustainable without sudden and uncontrolled collapse and capable of satisfying the basic material requirements of all of its people."<sup>(1)</sup>

International Union for the Conservation of Nature in 1980 published a world conservation strategy in which first preference as a global priority was given to sustainable development.<sup>(2)</sup>After two years, in order to judge nature affecting human activities the United Nations World Charter for Nature raised five principles of conservation.<sup>(3)</sup>the United Nations World Commission on Environment and Development in 1987 released the famous Brundtland Report, the report Our Common Future. One of the most widely accepted definitions of Sustainable development was included in the report.<sup>(4)(5)</sup>

"Sustainable development is development that meets the needs of the present without compromising the ability of future generation to meet their own needs. It contains within it two key concepts:

- The concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and
- The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs."

*-World Commission on Environment and Development, Our Common Future (1987)*

The concept of Sustainable development has developed beyond the initial intergenerational frame work to focus more on "socially inclusive and environmentally sustainable economic growth"<sup>(6)</sup> since the Brundtland Report. The Millennium Declaration recognized principles and treaties on Sustainable development including social development, environmental protection and economic development under the principles of the United Nations Charter.

Improvement in quality of life but necessitate a decrease in resource consumption may be included in Sustainable development.<sup>(7)</sup> The economist Edward Barbier in the study The Concept of Sustainable Economic Development recognized that goals of environmental conservation and economic development are not conflicting and can be reinforcing each other which was published in 1987.<sup>(8)</sup>Therefore it is clear that economic development and sustainable development are related to each other.

## CARBON DIOXIDE (CO<sub>2</sub>) EMISSION:

CO<sub>2</sub> is a gas which a large share of Greenhouse gases (Nitrogen, Methane and CO<sub>2</sub>). CO<sub>2</sub> is an essential gas for life. Animals and human exhale it, plants sequester it. Greenhouse gases including CO<sub>2</sub> are necessary to maintain the temperature of our Earth. It was estimated that the average Earth's surface temperature be about 18 degrees Celsius without these greenhouse gases.<sup>(9)</sup> But excess of these gases increases the surface temperature of Earth and create Global warming. It has been seen a rapid increase in CO<sub>2</sub> emission since the Industrial Revolution due heavy energy-driven consumption of fossil fuels. Burning oil, coal, gas for energy use and burning wood and waste materials for some industrial production like cement production contribute to the contribute to global CO<sub>2</sub> emission. Since 1971 global CO<sub>2</sub> emission has risen by 99%, on an average 2.0% per year. In India CO<sub>2</sub> emission is increasing day by day. Economic growth increases the industrial sector and the standard of living of the people which raises the CO<sub>2</sub> emission ultimately contribute to environmental degradation.

## OBJECTIVE OF THE STUDY:

Main objective of the study is to analyze the relation between CO<sub>2</sub> emissions and GDP and its impact on sustainable development.

## METHODOLOGY:

The necessary data for the study has been collected from secondary sources for the period 2011 to 2015. The required data for the study are yearly CO<sub>2</sub> emissions and GDP of India. GDP of the country have sourced from RBI publications and CO<sub>2</sub> emissions have collected from TRENDS IN GLOBAL CO<sub>2</sub> EMISSIONS 2016 REPORT.

## LIMITATIONS:

1. The study considered only the effect of GDP growth on sustainable development through the relation of CO<sub>2</sub> emissions and GDP only.
2. The relation between GDP and CO<sub>2</sub> emissions studied only for the period 2011 to 2015 which may not be applicable for other periods.

## HYPOTHESIS:

According to Ken Black<sup>3</sup>, a "hypothesis is a statement of what the researcher believes will be the outcome of an experiment or a study." A structured approach is adopted to test the hypothesis. Two phases are there in statistical hypothesis- one is null hypothesis and the other is alternative hypothesis.

Following are the stages of hypothesis testing

Stage 1: Construct a hypothesis.

Stage 2: Select a level of significance.

Stage 3: Compute the standard error.

Stage 4: Compare the computed value to critical value (tabled value) and interpret the result.

Based on the available parameters, t-distribution is used in this study.

### ***T-distribution***

Generally, for small sample (sample size less than 30) t-testing hypothesis technology is used.

Critical value can be determined by applying the degree of freedom and the level of significance. From tables these standard values can be collected. Either to accept or reject the null hypothesis these values are used.

By comparing the calculated value of t with the critical we will be to determine whether the value fall in rejected or accepted region. If the calculated t value is less than critical value we will accept the null hypothesis. We will reject the null hypothesis if the calculated t value is more than critical value.

Here in this paper, comparison is made between the effect of GDP and CO<sub>2</sub> emissions. Both the factors are independent. For independent sample with population variances unknown and assumed to be normal distribution the formula to calculate t-value is:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2(n_1 - 1) + s_2^2(n_2 - 1)}{n_1 + n_2 - 2} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}}$$

### **DISCUSSION AND ANALYSIS:**

Hypothesis for the study are below:

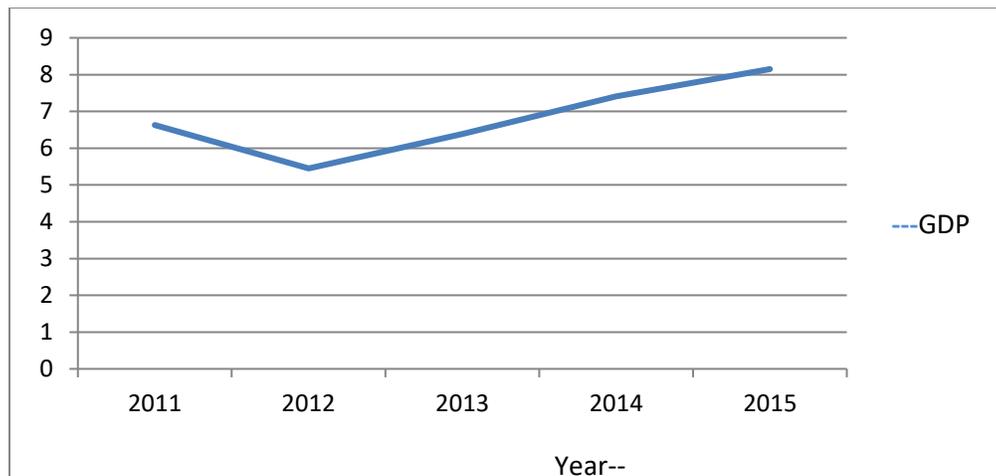
H<sub>0</sub>: there is no change in CO<sub>2</sub> emission due to ride in GDP

H<sub>a</sub>: growing GDP contributes to raise CO<sub>2</sub> emission

The significance level taken for the study either to accept or reject null hypothesis is 0.05. It is a two tailed test as it is hypothesizing that there is no change in CO<sub>2</sub> emissions.

GDP of India is shown in figure below:

Figure: 1

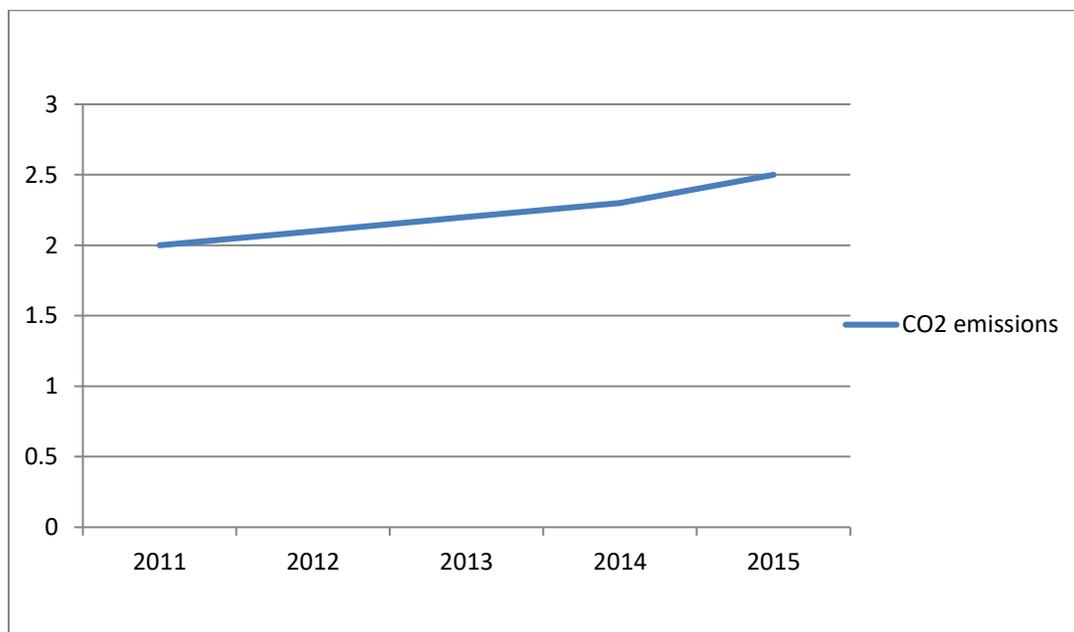


Source: RBI

GDP of India reduced a bit in 2012 and thereafter it showed increasing trend. From 5.45 in 2012 GDP increased to 8.15 in 2015. Increase or decrease in GDP depends on various factors.

CO<sub>2</sub> Emissions of India is represent diagrammatically below:

Figure2.

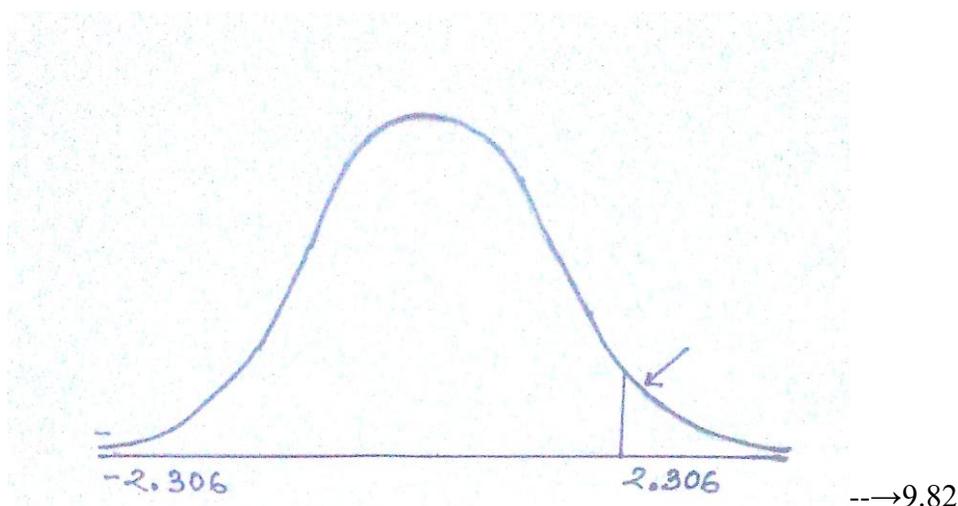


Source: Trends in Global CO<sub>2</sub> emissions 2016 report.

Panel Data:

Year	GDP (%)	CO <sub>2</sub> Emissions (%)
2011	6.63	2
2012	5.45	2.1
2013	6.39	2.2
2014	7.41	2.3
2015	8.15	2.5
Mean	6.81	2.22
Variance	4.21	0.15

The critical value of t at 95% confidence level and 8 DF is 2.306. The computed value of t is 9.82. Therefore it means that the computed value falls beyond the critical value consequently in the rejection region.



**CONCLUSION:**

Here in this study an attempt has been made to analyze the impact of Economic growth on Sustainable development through the relation between GDP growth and CO<sub>2</sub> emissions of the country. To analyze the relation statistically t-test was used by established a null hypothesis stating that there is no change in CO<sub>2</sub> emissions due to rise in GDP.

The computed value of t is higher that the critical value therefore null hypothesis is rejected. Statistically there is no evidence to accept that no relation is exist between GDP and CO<sub>2</sub> emissions and therefore Economic growth has no impact on Sustainable development. On the other hand there is strong statistical reason to believe that GDP and CO<sub>2</sub> emissions have relation and Economic growth has adverse impact on Sustainable development.

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