Green Development Performance Evaluation in the Era of Climate Change: A novel perspective for BRICS

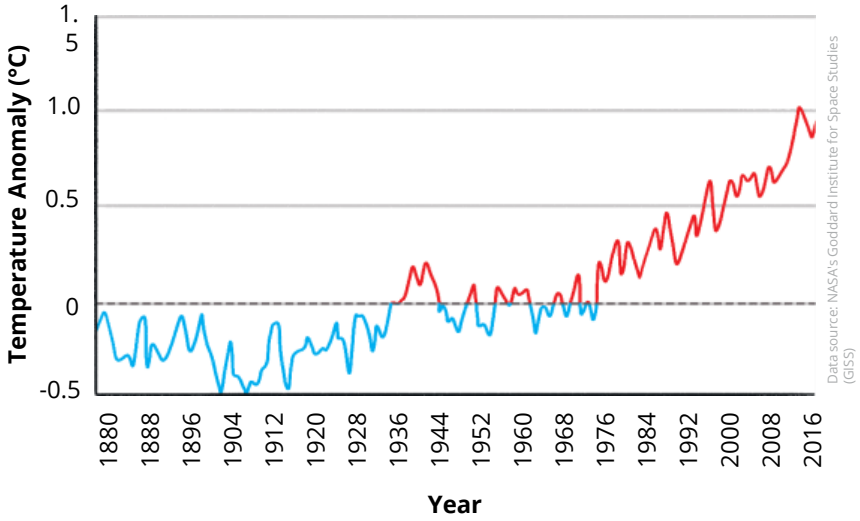
Name: Nafeesa Mughal
Status: Ph.D. Scholar
Publications: 11 Publications
Expert Area: Environmental Degradation

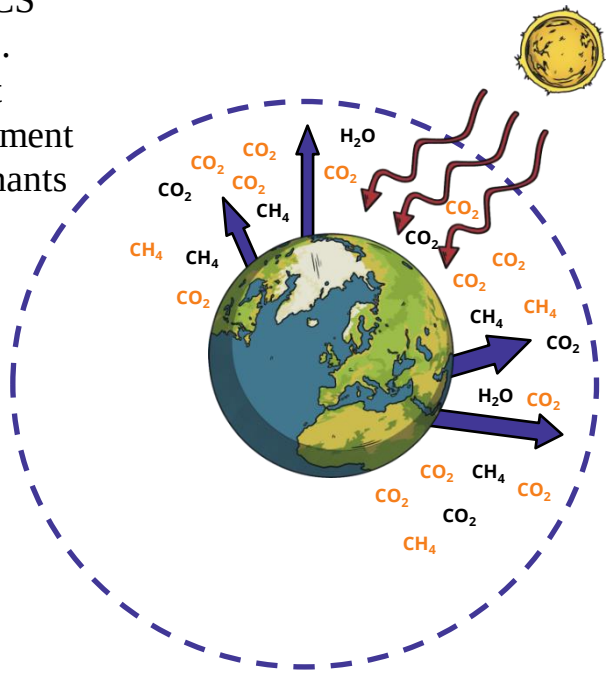
Xian Jiao tong University

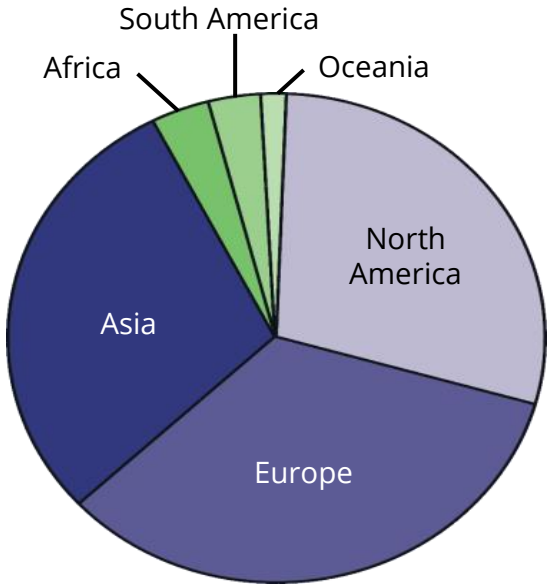
Background and Problem Statement

- Warming of the global climate has been more noticeable since the beginning of the twenty-first century. The concept of "green development" has gained attention, especially in industrialized countries. (Sun, Tong, & Zou, 2018).
- Developed economies in Europe and Asia have upgraded their technology, transformed their industrial structures, and enacted legislations to keep energy prices and under control. Gradually reduce energy dependency, and reduce carbon emissions, developing countries are also creating climate change remedial strategies comparable with that of developed ones (Sun, Tong, & Zou, 2018).
- However, the evaluation of green development in BRICS countries did not get attention in the previous literature.
- The goal of this research is to use a green development performance index to show how BRICS green development has progressed. We also put the impact of key determinants on green development performance to the test.

World First Effort:	1880
Significant Effort:	1989







Green Development Index

- Many variables should be addressed in evaluating green development because it is a complex system involving economic, social, and ecological settings.
- To assess the level of green development performance or efficiency, many researchers have devised complicated and multi-target integrated index systems.
- Our study proposes a novel green development evaluation system by using non-radial directional distance (DDF) function based on data envelopment analysis as measure for green development performance of BRICS countries.
- The DEA method is a non-parametric, multi-factor productivity analysis tool that estimates the relative effectiveness of multiple inputs and multiple outputs
- The DEA analysis method is evaluated from the perspective of the most favorable decision-making unit (DMU), focusing on the optimization of the indicators of each decision-making unit, and indicating the adjustment direction of the relevant metrics. Therefore, we used DEA principle to construct an analytical model for the evaluation of green economic efficiency. Non radial DDF is defined as

$$D\left(l^k,\ k^k, e^k\ y^k\ b^k; g \middle| CSR\right) = \rho^k = \max w_e\beta^e + w_y\beta^y + w_b\beta^b$$

- Where $l^k,\ k^k, e^k\ y^k\ b^k$ represents labour force, capital stock, consumption of energy , economic output, and undesirable output of decision making units CRS represents constant returns to scale; β^e and β^b are the reduction ratios of energy consumption and environmental emissions; β^y is the rising ratio of economic output .

Model for the study

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The objective of the study is to estimate the factors that influence the green development in BRICS countries. The model of the study is:

$$GDPI_{it} = \beta_0 + \beta_1 Y_{it} + \beta_2 EC_{it} + \beta_3 alt_{it} + \beta_4 ep_{it} + \beta_5 CO2_{it} + u_{it}$$

Where, GDPI is green performance index, Y is the economic growth measured by GDP. EC is the ecological carrying capacity measured by ratio of the forest area over regional territorial area. alt represents the proportion of population whose living altitude is lower than 5 metres. ep is energy price. CO2 is carbon dioxide emission and u is the error term.

Proposed Methodology

- The Tobit model is applicable to analyze the action mechanism of influencing factors, and it can analyze performance or efficiency of green development scientifically and reasonably. Based on the conversion of a qualitative problem into quantitative calculation, the action routes of influencing factors on sustainable green efficiency can be concluded. The Tobit model shows relatively good universality and feasibility.

- This research method provides a new idea and method to control air pollution, improves measurement of green development efficiency comprehensively, and explores influencing factors. To our knowledge, this methodology is rarely used in the previous literature to evaluate green development, but has never been used to evaluate green development and climate change nexus in BRICS context.

Conclusion &Policy Implementation

- We recommend that government of BRICS should take some steps to promote green growth, which would ultimately minimize global warming and climate change. To begin, the BRICS countries government should build a mechanism for assessing and motivating green development.
- As a result, a shift in economic growth mode as well as environmental sustainability, are required. In order to achieve quick economic growth, coastal underdeveloped communities should take use of their advantageous geographical location while also protecting the environment. The government of BRICS countries should enhance spending on basic infrastructure and environmental repair.
- The government of BRICS countries should take steps to support businesses to adopt less resource consuming and environmentally benign development policies. Simultaneously, economically prosperous places should have a radiating impact, promoting development of underdeveloped ones. These should work to decrease disparities and gain more consistent growth. All of these initiatives will increase green development level in BRICS countries that will be helpful in mitigating the rising level of GHG gases and climate changes

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- Dong, Dong, & Ren, 2020
- Dong, Sun, Jiang, & Zeng, 2018
- Ren, Shao, & Zhong, 2020
- Zhang & Wang, 2021
- Feng, Wang, Liu, & Huang, 2017
- Yuan & Xiang, 2018
- Sun, Tong, & Zou, 2018
- Shen et al., 2020
- Sun et al., 2018
- Wu, Li, Hao, Ren, & Zhang, 2020
- Li, Du, & Long, 2018

THANKS