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Study on Quality of Air and Economic Development in India: An Argument for Sustainable India[#]

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Abstract

In the last few decades, air pollution hand come as a major global conscience regarding the current impact of both air pollution and climate change on human health. Extreme climate events (heavy rainfall, high temperatures, floods, and droughts) in rapidly growing urban areas endanger human health and economic development. In this study, we find whether there is a relationship between the Quality of air and economic development which take time series data from 1990 to 2019 is used to find the link or effect between air pollution and economic development in India which is examined by Autoregressive Distributed Lag (ARDL) methodology. NO_2 (Nitrous oxide) emissions and CO_2 (carbon dioxide) emissions were employed for Quality of air (Air pollution) and the Gross Domestic Product served for economic Development (GDP). Empirical evidence indicates that emissions of CO_2 and NO_2 have an insignificant and inverse impact on the Gross domestic product, respectively, GFCF (Gross fixed capital formation) i.e., Domestic Investment has a significantly beneficial effect on economic development (GDP). Based on the results it is advised the adoption and proper execution of additional regulations like the tax on the usage of carbon dioxide for some specific industries releasing substantial levels of greenhouse emissions. Additionally, funds raised from this type of tax ought to be used to fund initiatives that would increase the employment opportunities and economic development of the country.

Keywords: Economic Development, India, Quality of Air, Sustainability

1. Introduction

Air pollution-related diseases have an unhealthy impact on economic development through decreased productivity, a reduction in the labour force, increased health care costs and lost welfare. In the literature on public health, the cost-of-illness method is the principal method used to calculate the financial impact of disease outcomes, particularly those caused by air pollution. The research of Matthew *et al*. (2020) examined the relationship between governmental policy, economic growth, and sustainable development but does not take into account the actual function that each factor, transmission medium, or moderator plays. This study has the following specific goals to assess the effects of economic growth on health and contribute to the realization of sustainable economic development determines the direct, indirect, and overall effects of economic growth on health; and the extent to which public health spending mitigates the effects of air pollution on people's health. Panayotou (1997) examined the Changes in temperature and rainfall that have an impact on the environment's quality, and their effects on a nation's economy.

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The important Goals for Sustainable Development are Goal 3-Good health and Well-being, Goal 6-Clean water and sanitation, and Goal 11-sustainable cities and communities emphasizing the need for an adequate standard of living while preserving a decent environment. The realization of green development and sustainable development is determined by the interaction between economic activities and environmental pollution in various economies.

In many nations, the use of unsustainable agricultural methods causes long-term harm to cultivation. Therefore, the Government has to consider the necessity for a healthy environment and choose appropriate solutions for sustainable development when establishing and executing policies.

According to the literature, most economies in the world have developed economically as a result of the efficient utilization of energy systems. The pollution caused by CO_2 and NO_2 emissions such as fossil fuels burning, fertilized soil, and the wastage of animals hurts the environment globally. This is because activities like production and construction, particularly the use of fossil fuels, harm the environment, which has led to environmental deterioration, worse health outcomes, and a reduced life expectancy.

What fuels economic development is productivity. Without economic expansion, progression is challenging, if not impossible. It is therefore necessary because it is linked to an increase in welfare. Over time, economic development boosts a nation's output and income by increasing the economy's productive capacity. Economic development is one of the macroeconomic priorities that cannot be abandoned in a developing nation like India. All economic sectors in a nation have to use more energy to achieve economic development.

India's transport sector contributed 286 metric tonnes of CO_2 emissions in 2021. Before India's transportation-related CO_2 emissions began to rise and are expected to peak at 286 metric tonnes in 2021, they saw a decline and hit a low of 43 metric tonnes in 1973, contributing to global warming. Fossil fuel consumption and the disposal of animal wastes both have negative effects on the environment's quality and the health of humans. The National Air Quality Monitoring Program (NAMP) is being carried out by the government of India monitors Sulphur Dioxide (SO_2), Nitrogen Oxides (NOx), Particulate Matter (PM), and Nitrogen Dioxide (NO_2) are the four principal air pollutants in 312 cities and towns of 29 states and 6 union territories of India.

In this paper, we focus on the relationship between air pollution and Economic Development and also how air pollution affects the growth and development of the country by using some relevant methodologies.

2. Review of Literature

Many Studies have looked at the relationship between environmental emissions and economic growth. Most of the literature reviewed indicates that carbon emissions are often pro-cyclical, rising during expansions and recessions, and countercyclical, falling during economic growth or development periods. To get a complete understanding various theories were analyzed and reviewed

Ngozi *et al*., (2020) claim that the linkage between income inequality and poverty's prevalence dampens economic development's beneficial effects and supports the claim that the degree of inequality diminishes the benefit of inclusion. Therefore, one of the key factors affecting poverty is income disparity.

Samuel *et al*. (2019) studied the link between environmental pollution and economic development using the ARDL model and Bounds test methodology to determine the objective of the green development of developing economies. The results show that Carbon dioxide and Suspended Particulate Matter (SPM) which implies the green development objective can be achieved in Nigeria with some attention also studies that other pollution indicators do not give a more significant effect on Economic Development. Hence, it is suggested that Nigeria have to strengthen to reduce environmental pollution for achieving economic development. And also, using time series data from 1970 to 2010 of Ghana using the same ARDL methodology (Daniel *et al*., 2016) showed that trade openness and energy use are long-term, beneficial drivers of Carbon dioxide emissions. As a result, it is suggested that trade liberalization policies be enhanced to ensure greener products and technology adoption. Likewise, investing in cleaner energy sources may help to reduce the CO_2 emissions of Ghana's economic development.

Muhammad *et al*., (2020) for Malaysia used time series data from 1980-2017 and the same methodology to show the impacts on the environment both immediately and over time. The findings demonstrate that both long-term and short-term environmental effects of energy consumption are present and that government spending is insufficient to address the issue. The study suggests switching to energy-friendly use i.e., investing in renewable energy.

However, as evidenced by the literature, numerous studies had looked at the relationships between the environment and the economic development of various nations using various variables and approaches. In this work, we use the ARDL model to analyze the relationship between air quality and economic development in India, demonstrating the country's sustainability.

2.1 Data

The secondary data from 1990 to 2019 India (time series data) are used in the study. The World Development Indicator was used to gather the information.

Variable source	
Gross Domestic Product (GDP)	World Development Indicator (WDI)
Nitrous oxide emission (NO_2)	World Development Indicator (WDI)
Carbon dioxide emission (CO_2)	World Development Indicator (WDI)
Gross Fixed Capital Formation (GFCF)	World Development Indicator (WDI)

2.2 Variables

NO_2 (Nitrous oxide) forms emissions from vehicles and CO_2 (Carbon dioxide) causes emissions greenhouse effects that occur through human activities so these air pollutants were employed for the Quality of air (Air pollution) because these are most GFCF (Gross fixed capital formation) i.e., Domestic Investment has a significantly beneficial effect on economic development (GDP). Alege *et al*., (2016).

3. Methodology

3.1 Calculation Method

This study uses autoregressive distributed lag to identify the type of association between India's economic development and air quality. The accompanying section briefly discusses the econometric methodologies to be used.

3.1.1 Augmented Dickey-Fuller (ADF) unit root test

ADF unit root test with enhanced dickey fuller Economic data is frequently non-stationary and might produce false regression results when analyzed. Therefore, it is necessary to check the data for stationarity before estimating the model. To identify stationarity or the presence of a unit root in a time series of data at a level of significance (1%, 5%, or 10%) between variables, apply the Augmented Dickey-Fuller (ADF) unit root test.

3.1.2 Model Estimation for ARDL

The non-stationary phase will not always follow a pattern. The mean is permanently impacted by the unit root phase in the presence of a shock (that is, it does not converge over time). The process is said to be explosive when the root of the process characteristics is more than one. Numerous techniques can be used to test a unit root. Two of these are the Philips Perron test procedure and the Augmented Dickey-Fuller unit root test method used in this work. The following model is estimated using the ADF unit root test:

The following model is estimated using the ADF unit root test:

$$\Delta y_t = \beta + \delta t + \theta Y_{t-1} + \sum_{i=1}^{q} y_i \Delta Y_{t-1} + e_t \quad (1)$$

Where,

Δ = First-order Difference
Δy_t = the time the series variable(t)of current period
β = Estimation of Drift
δ = One-time trend co-efficient, t
θ = test parameter
q = AI (Akaike information criterion) is used to check the maximum time lag empirically

It is empirically questionable whether or not to include β or δ. Thus, three scenarios can appear from the ADF test:

- The model includes the series that has drift but still no trend (β can be included but no δ).
- The model includes both trend and drift (including both β or δ).
- The model does not have both drift and trend (exclude both β and δ).

ADF test with the null hypothesis θ = 0 (which means is stationary) as opposed to the alternative: θ < 0. (s stationary). If we reject the null hypothesis, it means the absence of a unit root. The test will be administered in cases where not rejected in it.

$$\Delta\Delta y_t = \beta + \delta t + \theta \Delta y_t + \sum_{i=1}^{q} y_i \Delta y_{t-1} + e_i \quad (2)$$

Here variables remain as previously obtained, but at this time the series is twice differentiated which is indicated as the second-order difference, ΔΔ and the test parameter is the coefficient on the first-order difference one lag of y, Δyt−1.

The link between Economic Development and environmental sustainability is captured by the ARDL model, according to its specifications the functional form is shown by the mathematical formula:

$$LGDP = f\,(LCO_2, LGFCF, LNO_2) \quad (3)$$

Where,

LGDP = Log of GDP (Gross Domestic Product)
LCO_2 = Log of CO_2 (Carbon dioxide) emissions
LGFCF = Log of GFCF (Gross Fixed Capital Formation)
NO_2 = Log of NO_2 (Nitrous Oxide) emissions.

From Equation (1) in the Autoregressive Distributed Lag equation:

$$LGDP = b_0 + \sum_{j=0}^{r} b_1 \Delta LCO_{2_{t-j}} + \sum_{j=0}^{s} b_1 \Delta LGFCF_{t-K} + \sum_{j=0}^{v} b_2 \Delta LNO_{2_{t-1}} + \varphi_1 LGDP_{t-1} + \varphi_2 LCO_{2_{t-1}} + \varphi_3 LGFCF_{t-1} + \varphi_4 LNO_{2_{t-1}} + e_2 \quad (4)$$

Here, the lag components of the second half of Equation (2) are present in the long run, and the various variables in Equation (4) will be present in the short run. Error code is used. The parameters for the variables are b_i (i = 1,2,3) in the long run and φ_1 (i = 1,2,3,4) in the short run. The ideal lag time will be obtained by using Akaike knowledge-gathering criteria. Equation (4) accounts for the error correction equation;

$$DP = b_0 + \sum_{j=0}^{r} b_1 \Delta LCO_{2_{t-j}} + \sum_{j=0}^{s} b_1 \Delta GFCF_{t-K} + \sum_{j=0}^{v} b_2 \Delta NO_{2_{t-1}} + b_5 ECM_{2_{t-1}} + e_2 \quad \textbf{(5)}$$

Where, $ECM_{2_{t-1}}$ = *Error correction term*

4. Results

4.1 Descriptive Statistics

The variables analysis and presentation of the summary (Descriptive statistics) are presented in below Table 1. All the variables around the mean values are specified by their small Standard Deviation (SD) values less than the mean value. Once more, the minimum values

Table 1. The mean, standard deviation, maximum and minimum values of the variables

variables	Observation	mean	Standard Deviation	Minimum value	Maximum value
Log GDP	30	4.714723	0.18127	4.455015	5.026262
logCO2emission	30	6.07741	0.204914	5.750956	6.390281
LogGFCF	30	13.19106	0.31435	12.7199	13.6638
LogNo2 emission	30	5.305017	0.826799	5.161907	5.419146

Source: Author's Calculation

of the variables are lower than their mean values. On the other hand, the maximum values of several of the variables are more important than their corresponding means.

In the level form of a log, GDP is stationary, and the results of the Augmented Dickey-Fuller test give the corresponding t statistics at the level that is more than the 5% critical value in absolute terms. The level forms of the variables for logging all independent variables are not stationary i.e., the level which should be lower than the 5% critical value. The unit root null hypothesis is not rejected for all the independent variables. In this instance, these variables were initially differentiated before being put to the test in a model with two-lag length drift. The independent at first difference were stationary which was 5%. The ADF test was more significant at 5% at the first difference than the absolute values. The log of CO_2, NO_2, and GFCF with order 1 are formed using with ADF unit root model, whereas the log of GDP with order 0 is also formed.

The optimal lag lengths were determined by Akaike's Final Prediction Error (FPE) and Akaike's knowledge criterion, where * denotes a 5% significance level and the rejecting null hypothesis that a unit root exists. The 5% critical level of ADF values is -1.714 and -1.319 at the 10% critical value. The ADF model includes a drift model.

4.2 The Link Between India's Economic Development and Air Pollution

The error correction model was computed to examine the Link between air quality and India's economic progress (Equation (5)). However, to corroborate the variables' level effect, a test for the level form Link between the variables in Equation (4) is first carried out using cointegration

4.3 Evaluating the variables through the ARDL Model for level form relationships (level effects)

It was determined using Pesaran, Shin, and Smith. (2001) Bounds test is used to know the variables in ARDL Equation (4) exhibit connection (cointegration)

Table 2. The ADF (Unit Root Test)

DICKEY-FULLER	AUGMENTED DICKEY-FULLER LEVELS		MODEL USED	LAGS ORDER	~I(d)
	Levels	1st order difference			
LogGDP	-0.1403*	-	Drift	2	I(0)
LCO2	-0.00696	0.510998*	Drift	2	I(1)
LNO2	0.253966	0.1085649*	Drift	2	I(1)
LGFCF	-0.00933	-0.182023*	Drift	2	I(1)

Source: Author's Calculation

Table 3. Results of Bounds test for relationship (effects on the level form) of the variables from Equation (6)

Critical Values (0.1-0.01), F-statistic, case 3							
90%		95%		97.50%		99%	
I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
2.72	3.77	3.23	4.35	3.69	4.89	4.29	5.61
Critical Values (0.1-0.01), t-statistic, case 3							
I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
-2.57	-3.46	-2.86	-3.78	-3.13	-4.05	-3.43	-4.37
F=4.885							
t=-2.833							
K=3							

Source: Author's Calculation

The test statistic found the Bounds value of 4.885 at the 5% level by the F-test which is outside the upper bound. If the Independent variables are I (0), and I (1) which are jointly cointegrated, the null hypothesis with zero level link for the variables in eq.(4.6) with 5% CV will be rejected. likewise, the t-statistic at 5%. Bounds crucial value is below the upper bound in this test the t-statistic surpasses the highest critical value of the 5% Bounds, suggesting that the no levels of association hypothesis is rejected. This finding demonstrates that I(0) and I(1) variables are cointegrated. The variables of the Autoregressive Distributed Lag model are long-term (level form) and have a long-term relationship.

4.4 Autoregressive Distributed Lag Model for Error Correction

Estimates were made for the EC model is demonstrated through Akaike Information Criterion. Because the combination of the variable is of the set I (0) and I (1) series and they do not comprise the I (2) series, so Autoregressive Distributed lag Model is best suited for the present research. Since no variable is I (2), not even one variable is susceptible have this structural break. Therefore, a structural break variable does not need to be included in the model. In short-run and long-run coefficients, EC estimates are shown in Table 4, using the ARDL model of Equation (5).

All the variables used in the test are logged variables (GDP, CO_2 Emissions, NO_2 emissions, and Gross fixed expenditure)

The adjustment coefficient also known as the error correction coefficient, is significant, which has a negative sign, and the range between the values 0 and 1. The technology automatically corrects around -2.29% of the errors produced annually in succeeding years at an adjustment pace of -0.2295173 per year. That translates to a shift to equilibrium at a rate of -2.29% annually. Convergence is a typical process.

The outcome demonstrated a long-term t-statistic of -3.28 and a nitrous oxide emission coefficient of 1.862448. Since the t-value of -3.28 > 2 (greater) with a probability value of 0.006 which is less p-value at the 5% level that is (0.05). Hence it has a significant impact. From the estimation, we can know that in the short run, the p-value of 0.02 and the t-value of 3.17 of NO_2 emissions in the short run is significant effects of NO_2 on India's gross domestic product.

Similar results were found in the coefficient of CO_2 in the long run, with a t-value of 4.59 and coefficient of 1.838732, indicating the long-term economic impact of carbon dioxide emissions is positive. Specifically, rising carbon dioxide emissions cause a 1.83% long-

Table 4. Estimation of the autoregressive distributed lag model for error correction

The dependent variable is GDP - the log of gross domestic product				
GDP	coefficient	Standard Errors	t-Statistics	P-value
Adjustment	-0.2295173	0.0801201	-2.83	0.01
Long-Run				
Log CO_2 emissions	1.838732	0.4006364	4.59	0
Log GFCF	-0.967433	0.1870575	-0.52	0.611
Log NO_2 emissions	-1.862448	0.605116	-3.08	0.006
Short-Run				
Log GDP	0.1334842	0.63469	2.1	0.048
Log GFCF	0.876182	0.056834	1.54	0.139
Log NO_2 emissions	0.6627966	0.2091573	3.17	0.005
Constant	1.080421	0.4556161	2.37	0.028
R^2	0.6032			
Adjusted R^2	0.4644			
F-statistics	4.885			
Durbin-Watson d-statistics (8, 28) =2.188987				

Source: Author's Calculation

term increase in the country's GDP. Additionally, the outcome showed that CO_2 with a t-value of 4.59 > 2, indicating an impact on Gross Domestic Product in the long run. Further evidence of the impacts comes from the p-value of 0.000 which is > (0.05) crucial value of 5% hence, we can say that the gross domestic product of India is significantly impacted by CO_2 emissions.

In long run, the coefficient of GFCF creation had a considerable inverse impact on the GDP, with a coefficient of -0.0967433 and t-values of -0.52. This indicates that gain in GFCF output results in a long-term decline of 9.6% in GDP. Whereas in the short run, GFCF (domestic investment) has a considerable positive impact on GDP, as indicated by the coefficient of 0.1334842, t-value of 2.10, and p-value of 0.048. The proportion or percentage of the dependent variable's total variation, which is explained by independent variables, is called the coefficient of determination (R2). It also measures the goodness of fit of the data, i.e., how well the model fits the data. With the R2 value of 0.4955, the variables explained 49.55% of the variation in India's GDP. The relevance of the "F" value of 4.885 is significant thus, the null hypothesis, in which the variables taken as a whole have an insignificant impact on GDP, is thus rejected, which is supported by the p-value of 0.004. Because of this variable has a large effect on India's GDP. The Durbin-Watson statistic of 2.188987 indicates the absence of autocorrelation.

This study demonstrated the link between the Quality of air (air pollution) and economic development in India. The ARDL technique was used to examine this connection. While NO_2 and CO_2 emissions have an insignificant and inverse impact on India's economic development, GFCF positively and significantly impacts economic development. As a result, GDP grows together with gross fixed capital formation.

4.5 The Residuals of Regression

The Residuals were detected through the Recursive and OLS of the Dependent variable in the regression

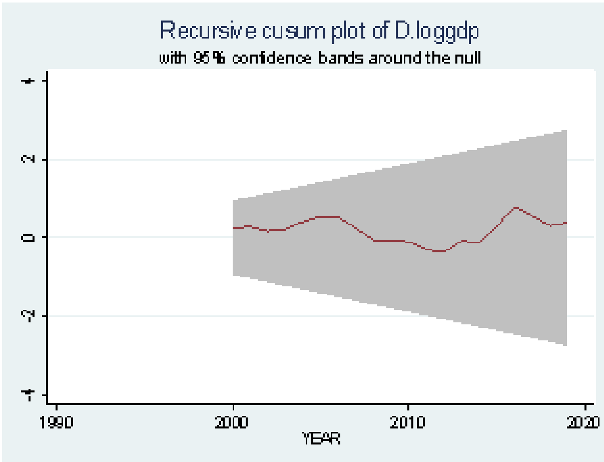

Figure 1. Recursive of LGDP.

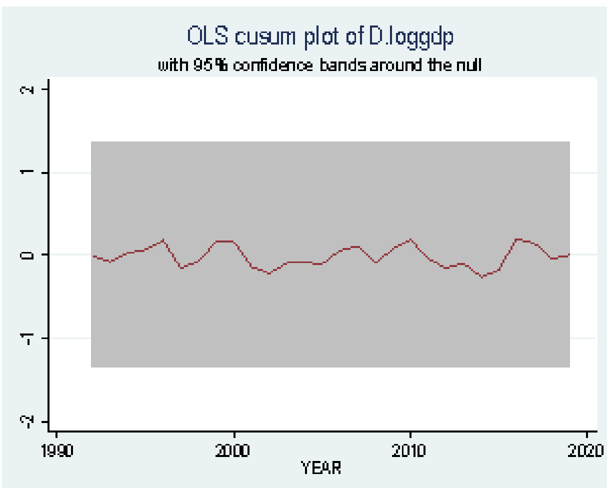

Figure 2. OLS of LGDP.

and were also observed and plotted are shown in Figure 1 and Figure 2.

This is to verify that the residuals are in line with the model's random error. As seen in Figures (1 and 2), the residuals have a consistent distribution across the range and follow a symmetrical pattern. A good match is shown by the residuals' asymmetrical and unpredictable structure, which regularly extends down the 0-horizontal axis. As a result, the model is regarded as being accurate for all fitted values. The presence of nonlinearity and structural change was also examined using the recursive residuals (CUSUM) method. The

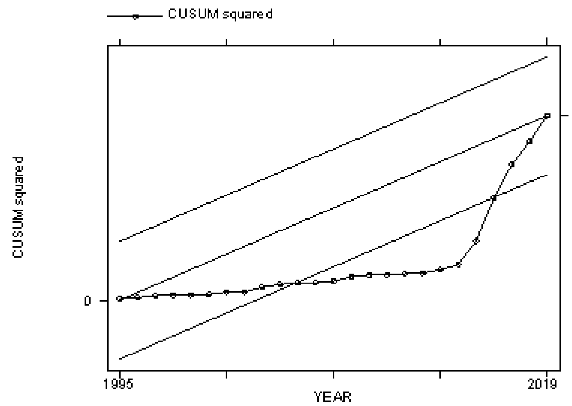

Figure 3. The CUSUM test (Cumulative sum of the square test) of recursive).

CUSUM test plots the total of the recursive residuals. If there is any moment where the sum exceeded the bound if the sum crosses a critical bound there will be a structural break in the model.

The CUSUM-OF-SQUARES test measures how many numbers of squares are present. It displays the overall sum of the square of residuals as a proportion of the entire squared residual value shown in Figure (3).

According to Figure 3's CUSUM-OF-SQUARES, parameter constancy may have persisted throughout the study period. Except for the CUSUM of recursive residual which occurred slightly outside critical line boundaries, thus the calculated parameters are stable so the recursive mistakes are inside them.

5. Conclusion and Discussions

The objective of the paper was to examine the linkage between Air pollution and economic development using the ARDL technique the study results that NO_2 and CO_2 emissions have an insignificant and inverse impact on India's economic development, and GFCF is positively and significantly impacting economic development. As a result, GDP grows together with gross fixed capital formation whereas, in past literature, we can see that the authors have researched the paper with the relationship between air pollution and health issues, and industrial effects using other methods such as the Kuznets curve.

It is critical to talk about the consequences for India's industrial and environmental policies of sustainable economic growth, particularly concerning achieving SDGs 3, 6, and. Infrastructure for energy supply is a significant opportunity for raising India's gross capital formation. India must exert more effort in this area to experience sustained economic development and meet its Nationally Determined Contributions (NDCs) to combating climate change. India's primary sources of air pollution are energy consumption, transportation, and production. Therefore, it is advised that the government push the development of green infrastructure, such as hydrogen projects, and adopt pertinent laws to encourage such investments in India.

As suggested, Sustainable practices must be incorporated into the control measures used to combat air pollution. For instance, air pollution control's primary focus should be on environmentally friendly transportation options like BRTs, metros, trams, cycle lanes, and well-connected pedestrian facilities. These options can further ensure that private vehicles are used as little as possible, lowering air pollution levels. To encourage people to choose an effective public transportation system over-reliance on private vehicles. Similar to how tough policies like congestion pricing and pollution trading, which have significantly lower emissions should be implemented. In addition to this, the government needs to encourage the usage of e-cars, e-bikes, and hybrid vehicle types will automatically reduce dangerous emissions. Further studies can focus on the Industrial pollutant's effects on the health of the working labour and also their impact on trade in the country.

6. References

Anderson, J., Fergusson, M., Valsecchi, C. (2008). An overview of global greenhouse emissions and emission reduction scenarios for the future policy, Department of Economics and Science Policy. Brussels, Belgium.

Alege O. P., Oluwasogo. S. A., Ogundipe, A., (2016). Pollutant Emissions, Energy Consumption and Economic Growth in Nigeria. International Journal of Energy Economics and Policy, 6(2). ISSN: 2146-4553.

Apoorva, P., Chandra, V. (2014). Estimating emissions from the Indian transport sector with on-road fleet composition and traffic volume.

Behera, S.R., Dash, D.P. (2017). Economic development and greenhouse gas emissions, Ecological Economics, 40(1), 23-37. https://doi.org/10.1016/S0921-8009(01)00272-5

B.R. Gujar., Khaiwal, R., Ajay, N. (2016). Air pollution trends over Indian megacities and their local-to-global implications. Science, Technology and Environment Journal. https://doi.org/10.1016/j.atmosenv.2016.06.030

Daniel. S. (2011). Trade openness, foreign aid and economic growth in post-liberalisation Ghana: An application of ARDL bounds test. Journal of Economics and International Finance, 3(3), 146-156.

Lingaraj, M., Ummalla, M., Jaganath, B. (2016). Does tourism affect economic development in Indian states? Evidence from panel ARDL model. Theoretical and Applied Economics, XXIII (2016)(1(606)), Spring, 183-194.

Matthew, O.A., Owolabi, O.A., Osabohien, R., Urhie, E., Ogunbiyi, T., Olawande, T.I., Edafe, O.D., & Daramola, P.J. (2020). Carbon emissions, agricultural output and life expectancy in West Africa. International Journal of Energy Economics and Policy, 10(3), 489-496. https://doi.org/10.32479/ijeep.9177

Muhammad. A., Mahmood. S. (2018). Impact of Energy Consumption and Environmental Pollution in Malaysia. Energy Economics Letters, 5(1), 31-43. https://doi.org/10.18488/journal.82.2018.51.31.43.

Neenavath, S. (2022). Impact of FDI, crude oil price and economic development on CO_2 emission in India: Symmetric and asymmetric analysis through ARDL and non-linear ARDL approach. Environmental Science and Pollution Research, 29, 42452-42465. https://doi.

Ngozi, B.O., Gershon, O., Ogundipe, A., Owolabi, O., Ogunrinola, I., Adediran. O. (2020). Comparative investigation of the growth-poverty-inequality trilemma in Sub-Saharan Africa and Latin American and Caribbean Countries. Heliyon cell press. 6(12), e05631. https://doi.org/10.1016/j.heliyon.2020.e05631

Oluwatoyin, M., Romanus, O., Fasina, F., Afolake, F. (2018). Greenhouse gas emissions and health outcomes in Nigeria-ARDL technique. International Journal of Energy Economics- Economics and Policy.

Panayotou. T. (1997). Economic Growth and the Environment. Harvard University and Cyprus International Institute of Management. Paper prepared for and presented at the Spring Seminar of the United Nations Economic Commission for Europe. Geneva.

Paresh Kumar, N., Seema, N. (2008). Does environmental quality influence health expenditures? Empirical evidence from a panel of selected OECD countries. Ecological Economics, Elsevier, 65(2), 367-374. https://doi.org/10.1016/j.ecolecon.2007.07.005

Sameul, O.E., Evas, O., Temidayo. A., Victoria. O. (2019). Environmental pollution, economic growth and institutional quality: exploring the nexus in Nigeria. HYPERLINK "https://www.researchgate.net/journal/Management-of-Environmental-Quality-An-International-Journal-1477-7835" Management of Environmental Quality: An International Journal. https://doi.org/ 10.1108/MEQ-02-2019-0050"10.1108/MEQ-02-2019-0050.

Smruti Ranjan, B., Deviprasad, D. (2017). The effect of urbanization, energy consumption, and foreign direct investment on the carbon dioxide emission in the SSEA (South and Southeast Asia) region. Renewable and Sustainable Energy Reviews, 70, 96-106. https://doi.org/10.1016/j.rser.2016.11.201

Theodore, P. (1997). Economic growth and the environment, Harvard University and Cyprus International Institute of Management.