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The Effect of Tourism and Foreign Direct Investment on Environment: Time Series Evidence from Pakistan

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ABSTRACT

The chief focus of the existing research work is to scrutinize the effects of Tourism and Foreign Direct Investment (FDI) on Environment in case of Pakistan. For this motive, the research work put to use data of annual time series since 1990 till 2021. In the affairs of dependent and independent variables, the make use of CO_2 Emission as dependent and Tourism, Foreign Direct Investment, GDP, GDP2, Renewable and Non-Renewable Energy are utilized as independent variables. The study used Ordinary Least Square (OLS) procedure. The experiential outcomes illustration the optimistic and statistically important effect of Tourism, GDP and Non-Renewable on the CO_2 Emissions in Pakistan. Other independent variables like Foreign Direct Investment, Renewable Energy and GDP^2 have an adverse and significant effect on CO_2 Emissions in Pakistan. The study also supports the presence of Environmental Kuznets Curve Hypothesis (EKC) in Pakistan. The results of Granger Causality Test Indicate that Bidirectional or Two way Causality among Tourism and CO_2, while no Causal relationship between FDI and CO_2.

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Introduction

Environmental pollution is among the most pressing topics now being argued in policy circles all over the world. According to the IPCC (Intergovernmental Panel on Climate Change) carbon emissions are a major human-induced factor to environmental deterioration. There are many factors that subsidize to universal warming but CO_2 emission is the major factor. A CO_2 emission (Carbon Emission) emancipates in atmosphere by burning of carbon flues and decomposes of wood and other plant matters. The rise in CO_2 emissions is mostly responsible for unanticipated economic and population expansion. During the years 1970–2010, industrialization and fossil fuel combustion were answerable for greater than three-quarters of all greenhouse gas (GHG) emissions.

It has been observed that the global temperature is rising these days; the cause of this rise in global temperature is global warming. Many causes contribute to global warming, but CO_2 emissions are the most significant. A

Carbon Emission also called CO_2 emission happen when carbon flues are burned and wood and other plant matter putrefy in the atmosphere. CO_2 emissions are an interchangeable and odorless gas that is removed from plants to the atmosphere, which collect CO_2 to construct their tissues, and to the seas, where CO_2 dissolves. since people started burning plenty of coal and petroleum, in the 19th century, the quantity of CO_2 released into the atmosphere has increased. In recent years, forest deforestation has become a leading basis of CO_2 emissions. Environmental deterioration is another term for CO_2 emissions.

The EKC (Environmental Kuznets Curve) is a non-linear connection among income and environmental deterioration (EKC). According to the EKC theory, when capital is expended during the initial stages of economic development, the environment suffers as a result of increased economic growth. This suggests that when one's money rises, the environment suffers as a result. However, as income levels rise and people and governments become more concerned about environmental and public health concerns, the environment quality improves in the latter stages of economic growth. As a result, the EKC hypothesis portrays a U-shaped link among wealth and environmental deterioration. There are many various sorts of environmental pollutions, and one of them is CO_2 emissions. CO_2 emissions are a severe issue that many developing, developed, and developing poor nations throughout the world are dealing with.

Contradictory opinions about the FDI role in the degradation of environment of many nations may be found along with a number of good contributions to economic growth. One school of thought contends that foreign direct investment(FDI) lowers CO_2 emissions by bringing fresher technologies to speed up industrial processes through funds in the R&D industry. Rahman et al (2021), Jalil and Feridun (2011) and Stretesky and Lynch (2009). Others reject this assertion by asserting that FDI contributes to air pollution through the importation of harmful technologies. They advocate for the notion that FDI promotes economic growth by employing non-green practices. Sabir and Gorus (2019). According to the Pollution Haven Hypothesis (PHH), the acceptance of nonrenewable energy-intensive technology in manufacturing sectors might worsen local environmental conditions as a result of FDI inflows into a country via increasing emissions.

Tourism is defined as short-term travel for the purpose of pleasure, recreation, exploration, religious, familial, or business. In today's globe, tourism is a major source of revenue for many countries, benefiting both the tourist and host economies. Tourism contributes a significant amount of money to the local economy in the form of payments made by visitors for products and services. It also creates job opportunities in the tourism-related service industry. The importance of tourism in motivating economic growth can only be recognized if CO_2 emissions, climate change, and environmental issues are taken into account while promoting tourism development. As a result, the growing importance of tourism presents questions for policymakers regarding the best way to boost economic development while reducing CO_2 emissions.

One of South Asia's developing countries is Pakistan. Its economy is expanding rapidly, and It is expected that this pattern will persist in the next years. Farm is the primary dominant industry in Pakistan and the backbone of its economy. However, as the manufacturing sector has expanded, agriculture land is being lost as a result. Furthermore, deforestation is accelerated by a fast expanding population; Pakistan is the Asian country most severely affected. Pakistan, the world's sixth most populous country, is confronted with a number of economic difficulties, including expanding fiscal and external inequities, declining foreign currency reserves, and increased dangers to Pakistan's economic and financial prospects. One of the major routes that the government sees to overcome economic issues is motivating foreign investors to increase their FDI in the nation. Both FDI and environmental contamination have increased in Pakistan in recent decades. This study scrutinizes the role of FDI and Tourism on the Environmental Degradation. It is also critical to determine if both FDI and Tourism

causes an increase in CO_2 emission in Pakistan. So that, In Pakistan, necessary regulations can be implemented to limit emissions.

Literature Reviews

Ahmad et al(2022), scrutinizes the effect of human capital, institutional quality and financial development, on rising countries' environmental footprint. The study analysed panel data from 17 rising nations from 1984 to 2017 for this aim. The study utilized several variables like, Ecological Footprint, Financial Development, Institutional Quality, Economic Growth, Human Capital, Energy Consumption, and Fossil Fuel Energy. The short-run and long-run empirical analyses were conducted using the Cross-Sectional AutoregressiveDistributed Lag (CS-ARDL) technique. Financial development drops ecological reliability by growing the EF, according to the empirical findings. Human capital and institutional quality, according to the research, minimise the EF. Furthermore, through the channel of human capital, financial development promotes environmental sustainability. Furthermore, the environmental implications of financial development are reduced when institutions are of high quality.

Khan, et al (2022), on the worldwide panel, the influence of institutional quality in FDI information and carbon emission lessening is examined. The study examined panel data from 107 emerging nations and 39 Belt and Road Initiative nations from 2002 to 2019. Equally Static and Dynamic Panel Models are used in this study. The study used different variables including, CO_2, FDI, Institutional Quality, Economic Growth, Energy Consumption, Trade, and Urbanization. Governance variables are critical for FDI inflows, according to the findings. Institutional Quality has a momentous and favourable influence on FDI information, but energy usage has a negative impact. The environmental Kuznets curve is evidenced by the square of GDP, which is positively related with carbon emissions. FDI and trade raise international and emerging country emissions, whereas Belt and Road nations reduce emissions. Individual indicators of institutional quality, rule of law, regulatory quality and political stability are establish to be unfortunate governance indicators in all panels, while voice and accountability, as well as corruption control, are fragile indicators in Belt and Road countries; though, the interaction term shows that FDI controls the quality of institutions in all panels that reduce carbon emissions.

Javaid et al (2022), investigates the institutions role in reducing climate change risk by reducing the influence of environmental quality. Based on the availability of data, an analysis was conducted on Panel data of 114 nations from 1998 – 2013. The study used different variables including, CO_2, Economic Growth, Institutional Quality, Renewable Energy, Climate Risk Index and Urbanization. The findings were estimated using correlation analysis, change effects, and a Panel Feasible Generalized Least Squares (FGLS) model. According to the worldwide assessment, CO_2 emissions escalation climate risk, but the effect may be mitigated by improving institutional quality. Furthermore, increased renewable energy usage and economic growth lessen climate risk.

Islam, et al (2021), scrutinize how Bangladesh's CO_2 emissions were affected by trade, urbanization, innovation, globalization, foreign direct investment, economic growth, and energy consumption between 1972 and 2016 in the context of institutional quality. For this purpose the study utilized Annual Time Series Data since 1972 – 2016 by utilizing Dynamic ARDL technique. The study used different variables including, CO_2, Globalisation, FDI, Trade, Economic Growth, Urbanisation, Innovation, and Energy Consumption. Globalization, FDI, and innovation all have an adverse effect on CO_2 emissions, according to the findings. CO_2 emissions are influenced favourably by economic development, commerce, energy use, and urbanisation.

Khan et al (2021), In the global panel of 188 nations, investigate the link between environmental parameters by

taking into account the effect of institutional quality and technological advancement. Panel data from 2002 to 2018 was used, and static and dynamic models such as OLS, fixed effect, GMM, and system GMM models were employed. The study used different variables including, CO_2, Renewable Energy Consumption, Energy Consumption, Financial Development, Population, Innovation, FDI, Labor Force, Institutional Quality and GDP per capita. The findings show that using renewable energy from renewable sources is good for the environment, but using non-renewable energy increases carbon emissions, according to our findings. Financial development has a favourable influence on carbon emissions, however FDI has a negative impact. Technological advancement has a beneficial influence on carbon emissions, with the majority of institutional quality indicators being determined to be significant.

Nadeem et al (2020), uses the autoregressive distributed lag (ARDL) bounds test on annual data since 1971 till 2014 for inflow of FDI and four pollutants, namely CO_2 emissions, CO_2 from solid fuels, SO_2, and GHG emissions, to investigate the existence of the pollution haven hypothesis in Pakistan. In each case, eight different models are analyzed by combining different explanatory factors with the FDI flow. The study's findings suggest that there is a positive long-term association among FDI inflow and CO_2, CO_2 emissions from solid fuels, and GHG emissions in some of the models and a negative long-term relationship between FDI inflow and SO_2 emissions in others. Overall, we were unable to find any solid data supporting the pollution haven theory for Pakistan. It is crucial to implement proper environmental policies and institutional reforms that do not impede FDI inflows as Pakistan actively works to attract more FDI.

Sabir et al (2020), focuses on the importance of institutional quality in the South Asian region as it studies the effects of FDI on environmental degradation. Crosssectional dependency is addressed with a second-generation unit root test. We were able to analyse short-run and long-run associations using the panel autoregressive distributed lag (ARDL) method thanks to mixed order of integration. Additionally, the Granger causality test is used in this study to investigate the relationships between the chosen variables. According to empirical findings, FDI has a favourable and statistically significant impact on environmental deterioration. Rule of law has a negligible long-term and short-term impact on the ecological footprint, which is how institutions are judged to be of high quality. However, whereas corruption greatly increases environmental threats, political stability reduces environmental deterioration. The environmental Kuznets curve (EKC) for the nations of South Asia is also supported by this study. This study focused on how political institutions contribute to environmental deterioration. To attain the goal of sustainable development, South Asian nations must concentrate on implementing environmental laws and regulations through raising the standard of institutions.

Theoretical Background

The link between several environmental degradation indices and per-capita income is theorised to follow the EKC(Environmental Kuznets Curve). This theory was renowned by Grossman and Kruger in 1991 during their experiential study. They found that there was an Inverted U-shaped connotation among Economic Growth and Environmental Degradation. The assumption of EKChypothesis is that an Inverse U-Shaped association among Economic Behavior, frequently calculated in conditions of ‘Income Per Capita’ and the quality of environmental, and calculated by environmental indicators like Per Capita CO_2 Emission. The Figure 3.1 below shows U shaped of (EKC)Environmental Kuznets curve.

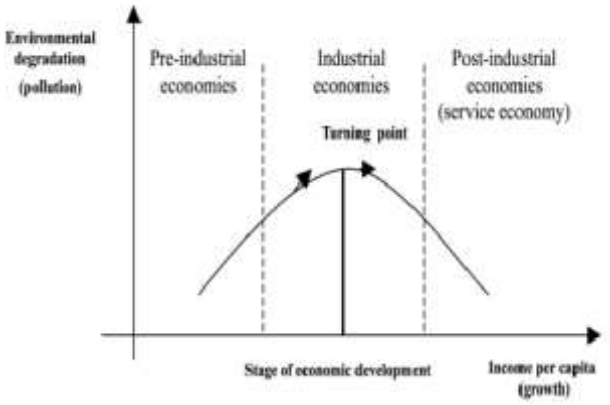


Figure 3.1: Environmental Kuznets Curve

So, Environmental Degradation will grow with an increase in Income/Capita during the First Period of Economic Growth and start to decrease when income per capita increases before the Turning Point of Income.

Data & Methodology

To see the Tourism and Foreign Direct Investment effect on Environment in case of Pakistan, the study used Annual Time Series Data since 1990 till 2021.The data is consists of different variables. The below equation can be utilized to estimate the study's model:

$\mathbf{CO_2} = f(TOR, FDI, GDP, GDP^2, RE, NRE)$ …….. (4.1)

The below equation can be utilized to estimate the study's econometric model:

$\mathbf{CO_2} = \beta_0 + \beta_1 TOR_t + \beta_2 FDI_t + \beta_3 GDP_t + \beta_4 GDP^2_t + \beta_5 RE_t + \beta_6 NRE_t + €_t$ …….. (4.2)

In the above equation, CO_2 represent the Environment, TOR is Tourism Arrival, FDI is Foreign Direct Investment, GDP and GDP^2, is employed according to the theory of Environmental Kuznets Curve (EKC). RE and NRE represent the Renewable Energy and Non Renewable Energy. The literature reviews and the Theory of Environmental Kuznets Curve (EKC) determine the study's estimated model.

Measurement of Variables

A table below provides a summary of the variables utilized in this investigation, along with their measurement units and abbreviations.

Table: Summaries of Variables

Variables	Explanation	Measurement Unit
CO_2	Carbon Dioxide Emission	Thousand Ton (kt)
TOR	Tourism Arrival	Number of Arrivals in Millions
FDI	Foreign Direct Investment	Inflow, % of GDP
GDP	Gross Domestic Product	Annual Growth
GDP^2	Square of Gross Domestic Product	Annual Growth
RE	Renewable Energy	% of Total Consumption
NRE	Non-Renewable Energy	% of Total Consumption

Data Type and Sources

To find the influence of Tourism and Foreign Direct Investment and different other variables on Environment in Pakistan, present research employed Annual Time Series data since 1990 to 2021. The data is compiled from many sources like World Development Indicators (WDI) and International Renewable Energy Agency (IREA).

Data Analysis and Results Interpretation

This section present the interpretation of the empirical results.

Analysis of Multicolinearity

"Multicollinearity is meant the presence of a perfect or exact linear relationship among some or all explanatory variables of a regression model." The problem of multicollinearity between the variables is generally recognized by Pair – Wise Correlation Matrix.

Table: Results of Pair – Wise Correlation Matrix

Variables	LCO_2	FDI	TOR	GDP	GDP^2	RE	NRE
LCO_2	**1.000000**						
FDI	-0.016728	**1.000000**					
TOR	0.569087	-0.110173	**1.000000**				
GDP	0.112957	0.069011	0.062853	**1.000000**			
GDP^2	0.196809	0.087914	0.140597	0.727908	**1.000000**		
RE	-0.673026	-0.101200	-0.424976	-0.135099	-0.259299	**1.000000**	
NRE	0.727161	0.255544	0.870210	0.132693	0.233755	-0.547947	**1.000000**

The Pair-Wise Correlation Matrix findings are displayed in the table above. It establishes how high values specify a high degree of correlation among variables. The overall findings show that the data set lacks multi-collinearity.

Analysis of Autocorrelation

"The Autocorrelation issue happen when repeated error terms are correlated with each other." The problem of Autocorrelation is undertaken by Breusch-Godfrey Serial Correlation LM test. The outcomes of Serial Correlation LM test are given in the table below:

Table: Results of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test.			
F-Statistics	1.143829	**Prob. F(215)**	0.3449

The findings validate that there is no autocorrelation issue in the data set because the value of probability of LM test is negligible (0.3449).

Analysis of Heteroskedasticity

"In the case of heteroskedasticity, the residuals' variance is uneven throughout a range of measured values." The Heteroskedasticity issue is tackled by Breusch – Pagan – Godfrey Test.

Table: Results of Breusch – Pagan – Godfrey Test

Breusch – Pagan – Godfrey Test			
F-Statistics	0.363306	**Prob. F(817)**	0.9259

The outcomes exhibit that there is no heteroskedasticity matter in the data set since the Value of probability of heteroskedasticity test is negligible (0.9259).

Empirical Results of Ordinary Least Square (OLS) Method

The table below shows the outcomes of Ordinary Least Square (OLS).

Table: Results of Ordinary Least Square (OLS) Method

Dependent Variable: Log of CO_2				
Method: Ordinary Least Square				
30 observations used for estimation from 1990 to 2021				
Variables	**Coefficient**	**Standard Error**	**T-Statistic**	**Prob.**
TOR	0.118650	0.036286	3.269902	0.0043
FDI	-0.008561	0.003284	-2.606736	0.0178
GDP	0.001907	0.001462	1.304753	0.0284
GDP^2	-0.000406	0.008271	-0.491485	0.0690
RE	-0.018197	0.001324	-1.374654	0.0000
NRE	0.010435	0.005682	1.836452	0.0029
$LCO_2(-1)$	0.963043	0.247921	3.884478	0.0009
C	5.250884	0.339316	15.47492	0.0000
R^2:	0.983559		**Adjusted R^2:**	0.977165
F-Statistics	153.8327		**Prob.(F-Statistic):**	0.000000
Durbin-Watson Stat:	1.928615			

Results and Discussion

In table 4.1 up above, the value of co-efficient of Tourism shows optimistic and statistically important effect on environment. It indicates that, visitor arrival and departure increase the amount of energy used in transportation. Foreign travelers contribute to the exchange of diseases and their spread. As a result, environmental issues are complex and cross national boundaries. The co-efficient value of FDI is showing the destructive and statistically important effect on environment. It indicate that, An escalation in FDI accelerates economic growth through capital formation as well as productivity growth brought on by the transmission of managerial capability, technical know-how, and knowledge to modernize the economy through inventions and technology. By bringing cleanser technologies to streamline the making procedure and investing in the R&D industry, FDI lowers CO2 emissions. The value of the co-efficient of GDP shows positively and GDP^2 shows negatively impact on environment. This shows the Inverted U-Shaped Association among GDP and CO2 emissions. This supported the presence of Environmental Kuznets Curve (EKC) Hypothesis in Pakistan. The value of the co-efficient of Renewable Energy shows positively and Non-Renewable Energy shows negatively impact on environment. This indicates that the usage of renewable energy including Solar, Wind, Biomass and Thermal is very helpful in reducing the CO2 Emission in Pakistan. While, the usage of Non-Renewable Energy like Fossil Fuels Increase CO_2 Emission in Pakistan. The reason behind this is that Pakistan is developing country and most developing

countries use Non-Renewable Energy to keep the economy on track.

Granger Causality Test

A statistical method for determining whether one time series may be used to predict another is the Granger Causality test. Granger, C. W. J. (1969). The results of Granger Causality test is reported in the table below:

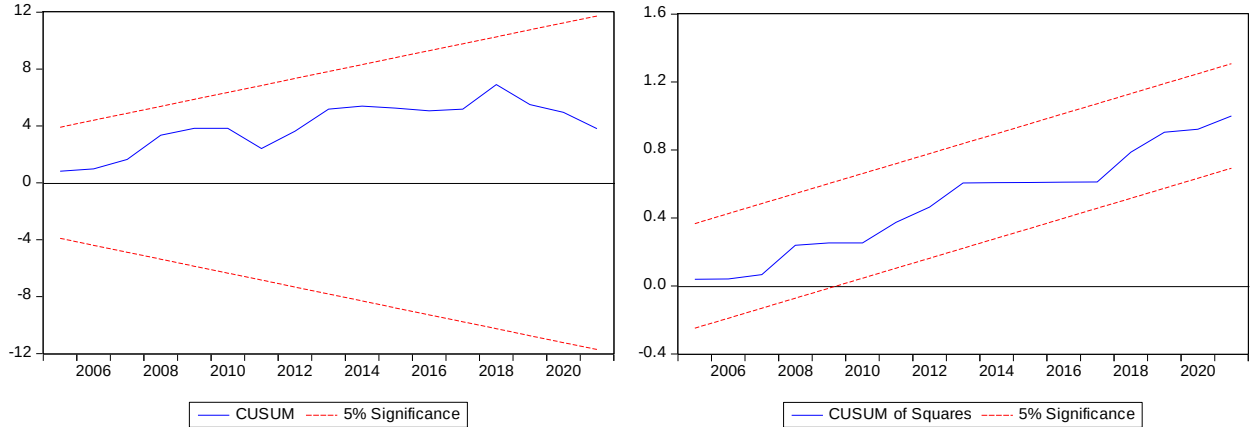
Table: Results of Ordinary Least Square (OLS) Method

Pair – Wise Granger Causality Test				
Null Hypothesis	**Obs.**	**F-Statistic**	**Prob.**	**Results**
TOR does not Granger Cause LCO_2	26	3.43094	0.0775	Accepted
LCO_2 does not Granger Cause TOR		5.36230	0.0303	Accepted
FDI does not Granger Cause LCO_2	26	0.02123	0.8855	Rejected
LCO_2 does not Granger Cause FDI		0.02945	0.8653	Rejected

According to the table above; the first Null Hypothesis is TOR does not Granger Cause LCO_2. The probability value of this Hypothesis is 0.0775, which is significant. The other Null Hypothesis is LCO_2 does not Granger Cause TOR. The probability value of this Hypothesis is 0.0303, which is also significant. Both variables are Granger Cause to each other. Therefore, we conclude that, there exist Bidirectional or Two way Causality. The next we turn to FDI and LCO_2, the Null Hypothesis is FDI does not Granger Cause LCO_2. The probability value of this Hypothesis is 0.8855, which is insignificant. The other Null Hypothesis is LCO_2 does not Granger Cause FDI. The probability value of this Hypothesis is 0.8653, which is also insignificant. Both variables are Not Granger Cause to each other. Therefore, we conclude that, there exists no Causal relationship.

Stability Test

To test the stability of the computed coefficients, we created the Cumulative Sum (CUSUM) of Recursive Residuals and Cumulative Sum (CUSUMQ) of Recursive Residual Square. Due to the fact that both CUSUM and CUSUMSQ fall inside the 5% significance level bounds, the result shows that it is stable.



Given that both CUSUM and CUSUMSQ are within the 5% significance level bounds, the result suggests that the situation is stable.

Conclusion and Policy Recommendations

The primary goal of present research is to investigate the impact of Foreign Direct Investment and Tourism on Environment in case of Pakistan. This study used the Annual Time Series Data of Pakistan over the period of 1990 to 2021 composed from several databases. The study utilized Ordinary Least Square (OLS) method titt find

the results. Experiential outcomes designate several crucial findings. Firstly, Foreign Direct Investment, GDP^2 and Renewable Energy decrease the Carbon Dioxide Emission (CO_2) in Pakistan. On the other hand, Tourism, Gross Domestic Product and Non-Renewable Energy increase the Carbon Dioxide Emission (CO_2) in this region. The study also validate the validity of the EKC hypothesis in Pakistan.

The present study presents some policy recommendations on the basis of findings. By using clean and environmentally friendly technology for production, Pakistan urgently needs to establish and manage environmental legislation. To raise environmental improvement, it is important to control the technologies that FDI introduces. CO_2 emissions can be decreased through the use of green innovation, innovation and renewable energy, which is a widely accepted indicator of sustainable development. As a result, significant investment in green technology and renewable energy sources, combined with careful economic activity management, can help Pakistan reduce its CO_2 emissions. In this regard, Pakistani governments ought to enhance their spending on environmentally friendly technical advancements. Additionally, its crucial to encourage the usage of renewable energy at the housing and marketable sectors by providing incentives, such as price subsidies for renewable energy bases, in order to solve the problem of environmental deterioration. There should be less consumption of fossil fuels, which has been a big factor in the section's tourism boom and economic expansion. In order to maintain Pakistan's environmental excellence, the representatives and government must adopt alternative and hygienic energy structure, such as renewable and further substitute uses of energy.

REFERENCES

Ahmad, M., Ahmed, Z., Yang, X., Hussain, N., & Sinha, A. (2022). Financial development and environmental degradation: Do human capital and institutional quality make a difference?. *Gondwana Research*, *105*, 299-310.

Granger, C. W. J. (1969). "Investigating Causal Relations by Econometric Models and Cross-spectral Methods". Econometrica. 37 (3): 424–438. doi:10.2307/1912791. JSTOR 1912791.

Islam, M., Khan, M. K., Tareque, M., Jehan, N., & Dagar, V. (2021). Impact of globalization, foreign direct investment, and energy consumption on CO2 emissions in Bangladesh: Does institutional quality matter?. *Environmental Science and Pollution Research*, *28*(35), 48851-48871.

Jalil, A., & Feridun, M. (2011). The impact of growth, energy and financial development on the environment in China: a cointegration analysis. *Energy Economics*, *33*(2), 284-291.

Javaid, A., Arshed, N., Munir, M., Amani Zakaria, Z., Alamri, F. S., Abd El-Wahed Khalifa, H., & Hanif, U. (2022). Econometric Assessment of Institutional Quality in Mitigating Global Climate-Change Risk. *Sustainability*, *14*(2), 669.

Khan, H., Weili, L., & Khan, I. (2021). Recent advances in energy usage and environmental degradation: Does quality institutions matter? A worldwide evidence. *Energy Reports*, *7*, 1091-1103.

Khan, H., Weili, L., & Khan, I. (2022). The role of institutional quality in FDI inflows and carbon emission reduction: evidence from the global developing and belt road initiative countries. *Environmental Science and Pollution Research*, *29*(20), 30594-30621.

Nadeem, A. M., Ali, T., Khan, M. T., & Guo, Z. (2020). Relationship between inward FDI and environmental degradation for Pakistan: an exploration of pollution haven hypothesis through ARDL approach. *Environmental Science and Pollution Research*, *27*(13), 15407-15425.

Rahman, M. M., Nepal, R., & Alam, K. (2021). Impacts of human capital, exports, economic growth and energy consumption on CO2 emissions of a cross-sectionally dependent panel: Evidence from the newly industrialized countries (NICs). *Environmental Science & Policy*, *121*, 24-36.

Sabir S, Gorus MS (2019) The impact of globalization on ecological Footprint: Empirical Evidence from the South Asian Countries. Environ Sci Pollut Res. https://doi.org/10.1007/s11356-019- 06458-3

Sabir, S., Qayyum, U., & Majeed, T. (2020). FDI and environmental degradation: the role of political institutions in South Asian countries. *Environmental Science and Pollution Research*, *27*(26), 32544-32553.

Stretesky PB, Lynch MJ (2009) A cross-national study of the association between per capita carbon dioxide emissions and exports to the United States. Soc Sci Res 38(1):239–250