Towards Sustainable Development in South Asian Countries: The Role of Economic Complexity and Globalization on Environmental Pollution

Yasir Iqbal[1], Saif Ur Rahman[2] & Sadia Idrees[3]

[1]*PhD Scholar, Faculty of Economics and Commerce, Superior University, Lahore, Pakistan, Email:* yasir6028@outlook.com
[2]*Associate Professor, Faculty of Economics and Commerce, The Superior University, Lahore, Pakistan, Email:* saifrao12@gmail.com
[3]*Faculty of Economics and Commerce, The Superior University, Lahore, Pakistan, Email:* midrees485@gmail.com

ARTICLE INFO	ABSTRACT
	In the context of developing economies, this study aims to investigate the insights found in the literature on economic complexity, globalization, and environmental pollution institutions. The available theoretical and empirical literature on the subject is reviewed and summarized in this work. It begins with a summary of Pakistan's environmental contamination, globalization, and economic complexity. By using the theoretical and empirical insights from the published literature, it identifies the literature in the second place. This article also clarified theoretical approaches that explain how and why they function. Third, this paper suggests three useful areas for additional study. By critically examining and combining current environmental theory and research institutions, this work advances the fields of economic complexity, institutions, globalization, and environmental degradation. The rapid urban expansion, there is frequently an increase in the quantity of energy utilized, the amount of trash created, and the amount of pollution produced. In order to lessen the amount of environmental damage that is caused by urban areas, it is essential to implement waste management systems that are both effective and environmentally friendly. This is accomplished via the use of urban planning strategies.

Introduction

The most significant difficulties that mankind is currently confronted with are climate change and the destruction of the environment. In the year 2020, swarms of desert locusts posed a danger to the safety of food supplies in the midst of a pandemic brought on by COVID-19 throughout South Asia, Africa, and the Middle East. By 2030, it is predicted that the overall number of people living below the poverty line might reach 132 million. If immediate action is not made to tackle climate

change, this forecast is predicated on the presumption that it will happen. This is a significant rise from the current level. The inability to respond quickly enough to the fast changes in the environment during the past few decades is at the root of these most recent and most worldwide difficulties (Parveen et al., 2024; Huang et al., 2024; Shen et al., 2024). In addition to these, temperatures that are abnormally high, severe weather, and a sudden rise in sea level are all factors that contribute to a shift in the factors of production that disrupt the creation of goods and services, which in turn impedes economic growth . The only way to recover and restore people's health and well-being is to get everything back on track through the preservation of the environment and to make an effort on a global scale to safeguard and maintain the ecological integrity that sustains lives and economies (Amin et al., 2024; Sadia Bint Raza et al., 2024; Rabbia Syed, Sehrish Arshad, 2024).

South Asian cities account for nine out of the ten cities in the world that have the worst levels of air pollution. South Asians are particularly vulnerable to severely hazardous levels of ambient air pollution, particularly in areas that are economically disadvantaged and have a high population density (Sibt-e-Ali et al., 2023).
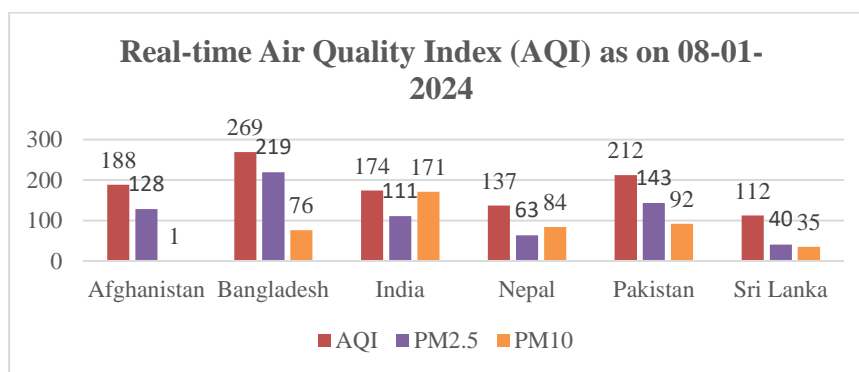

Figure 1 AQI of South Asian Countries (Data Source: https://www.aqi.in/)

The graph illustrates six nations in South Asia. The nations included are Afghanistan, Bangladesh, India, Nepal, Pakistan, and Sri Lanka. The graph displays the real-time Air Quality Index (AQI) as of January 8, 2024. On a scale that ranges from 0 to 500, the Air Quality Index (AQI) is a measurement of the quality of the air, with higher values indicating greater levels of air pollution. Each of the six nations has AQI readings that fall within the range of 150-200, which is regarded to be harmful for sensitive populations (Zubair et al., 2024; Song et al., 2024; Sehrish Arshad et al., 2024). Bangladesh and Pakistan have the highest air quality index ratings, with 219 and 212, respectively. The air quality index (AQI) values for both India and Nepal are in the 170s, meaning that it is risky. The graph also displays the PM2.5 and PM10 concentrations for each country. The World Health Organization (WHO) has established 15 μg/m3 for particulate matter (PM2.5) and 45 μg/m3 for particulate matter (PM10) during a twenty-four-hour period, respectively, as part of the guidelines for air quality (AQGs). The accompanying statistics illustrated in Figure 1 show that all six nations have surpassed the air quality limits (AQGs) for PM2.5 and PM10 (Irfan et al., 2023; Abro et al., 2024; Maqsood1 et al., 2023; Javaid et al., 2023).

As can be seen in the picture that follows, the South Asian region is at a high risk for natural disasters as a consequence of climate change. These conclusions are based on the Global Climate Risk Index 2021.
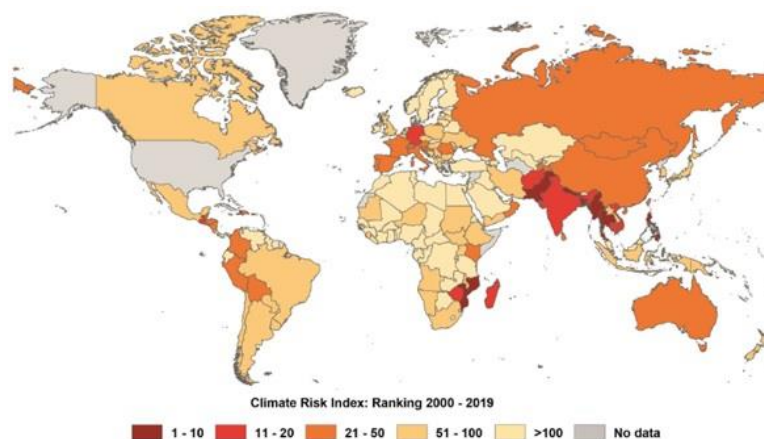
Figure 3: World Map of the Global Climate Risk Index 2000 – 2019

Table 1: Countries most affected by extreme weather events (2000-2019)

Rank	Country
1	Puerto Rico
2	Myanmar
3	Haiti
4	Philippines
5	Mozambique
6	The Bahamas
7	Bangladesh
8	Pakistan
9	Thailand
10	Nepal

The Climate Risk Index (CRI) is an annual ranking of countries that are most affected by weather-related extreme events. It is published by German watch, an independent non-governmental organization that promotes sustainable development and climate justice. The CRI considers three factors which are number of extreme weather events, number of people who have been killed or affected by these events and amount of economic damage caused by these events. Between 2000 and 2019, there were 11,000 weather-related disasters that caused 525,000 deaths and affected 4.2 billion people worldwide. The economic losses caused by these disasters amounted to $6.7 trillion. Three of the South Asian countries are among the top 10 which are Bangladesh, Pakistan and Nepal. India, Sri Lanka and Bhutan are among top 20. Therefore, the entire South Asian region is the one that is most impacted by severe weather events.

The United Nations 2030 Sustainable Development Goals, including Goal 13 which focuses on extreme weather occurrences, provide a significant challenge for developing nations.

Background of the Study

Environmental pollution is an urgent problem that has an impact not only on wealthy countries but also on emerging countries. However, the effects and repercussions of pollution might be quite different for these two segments of the population. Industrialised countries have made substantial advancements in combating environmental pollution and implementing laws to reduce its effects. This is mostly due to the fact that they have access to more advanced technology and greater amounts of money (Shahid et al., 2023; Minhas et al., 2024; Nazik Maqsood, 2024). On the other

hand, developing nations frequently experience more severe environmental repercussions as a result of pollution due to factors such as rapid industrialisation and urbanization, insufficient laws and enforcement, and inadequate legal protections.

Since the beginning of the twenty-first century, one of the most important topics of investigation in the field of environmental economics has been the connection that exists between economic expansion and pollution of the environment. This is because there is a direct correlation between the accumulation of pollution in the environment and the expansion of the economy. One of the main concerns that is addressed is the question of whether or not the pollution of the environment is (at least initially) a necessary trade-off for the advancement of economic prosperity (Amna Shafiq Minhas, Tanveer Ahmad Shahid, 2023). The so-called Environmental Kuznets Curve has developed into a model that can be used to describe and explain the route that environmental pollution follows over the course of a nation's development. Simon Kuznets is one of the researchers acknowledged for designing the model. Kuznets conducted research on the correlation between income inequality and economic growth. Later on, the inverted U-shaped curve that he recognized became known as the Kuznets Curve, which was named after Kuznets's work that was published in 1955. Afterwards (Saeed et al., 2024). established a similar u-shaped pattern for the link between pollution in the environment and economic expansion. The research conducted by (T. A. Shahid et al., 2024) provided further support for the findings of this preliminary evidence. According to the fundamental assumption of the model, if a nation's income is low, then the emissions of certain pollutants would first grow as the income of the nation rises, but they would then decrease again after a certain threshold, despite the fact that the nation's income would continue to increase (T. A. Shahid, 2023).

Environmental degradation is a big problem, particularly in nations that are still growing as mentioned earlier. The process of economic growth frequently results in a rise in pollution as a consequence of variables such as the industrialization of production, the urbanization of settlements, and the usage of more energy (Li et al., 2022). In developing nations, where environmental regulations are often less tight than in wealthy nations, there is a direct correlation between economic advancement and pollution levels (Ullah et al., 2023).

In spite of the fact that it only accounts for 3.4% of the earth's total surface area, South Asia has the highest population density of any region on the planet. It is estimated that around one quarter of the whole human population resides in this region. As a direct consequence of the environmental issues that are plaguing the region, more than 1.8 billion people are compelled to live in conditions that are unacceptable. The current predicament is further made worse by factors like as rising urbanization and industrialisation, as well as an exploding population, and it is deemed a catastrophe zone due to climate change (Javaid et al., 2023). The region of South Asia is currently experiencing the negative effects of environmental degradation, including the inconsistency of monsoon rains, a scarcity of water, a decrease in agricultural goods, and an increase in temperature. The ecosystems themselves are impacted negatively by climate change, which in turn has severe repercussions for agriculture, cattle, forestry, grazing area, and fisheries (Ur Rahman & Bakar, 2018; Dawood et al., 2023). In South Asia, the negative consequences of climate change have become more severe over the course of the previous two decades. In 2007, Pakistan was hit by an unexpected flood that caused widespread damage. In 2017, an unanticipated monsoon season in Nepal, India, and Bangladesh resulted in the deaths and displacement of millions of people across those three countries. An estimated 18 million individuals are projected to be displaced from their residences in Bangladesh and the Maldives during the next four decades due to rising sea levels (A. U. Shahid et al., 2022; Zulfiqar et al., 2022).

South Asia is home to nine of the top 10 cities with the worst levels of air pollution in the world. This is a contributing element that is responsible for roughly two million premature deaths throughout the area each year and imposes significant financial constraints. Sixty percent of South Asia's population lives in places that are very polluted, and the levels of potentially lethal dust particles known as PM2.5 in many areas far exceed even the WHO's laxest air quality regulation. Arsenic has been found at levels that are considered to be unsafe in the groundwater, particularly shallow groundwater, in a number of locations in South Asia (Chaudhary et al., 2023; Zhao et al., 2023).

Conceptualization of Variables

There is a vast body of material that has been created over the course of time on the subject of examining the situation of the environment employing a variety of proxies of environmental contamination. Regarding this, the release of greenhouse gases (also known as GHGs) is of utmost significance. Carbon dioxide emissions are commonly used as a proxy for environmental degradation in the majority of research in environmental economics (Ur Rahman & Bakar, 2019). This is particularly true as the bulk of greenhouse gas emissions from human activity are accounted for by carbon dioxide emissions, which are thus easily accessible. Nevertheless, the ecological footprint (EF) is a more thorough proxy that is commonly utilized in the process of evaluating environmental hazards and making decisions regarding sustainability (Ahman et al., 2023). This is the item that is being considered from a sustainable development standpoint. Researchers have long used the concept of ecological footprint (EF) to assess environmental performance and sustainability (Qureshi et al., 2022). The phrase "ecological footprint" (EF) refers to a modern approach for quantifying environmental deterioration. It supplants the previous approach of assessing environmental deterioration, which focused on carbon dioxide emissions.

According to (Zahra et al., 2023) "CO2 emissions," also known as "carbon dioxide emissions," are the releases of carbon dioxide gas into the air. The majority of the blame for this emission can be placed on human activity, which includes the burning of fossil fuels, the clearance of forests, and the operation of industrial processes. was the first who used the term "ecological footprint" (EF). "Ecological footprint" (EF) is a term that refers to the evaluation of the quantity of biologically productive land and water area that is required to regulate the amount of trash that is produced and to keep the levels of human consumption at the same level (Shahzadi, Sheikh, et al., 2023) claimed that by contrasting the amount of natural resources used and the planet's ability to replace them, this statistic provides important insights on the sustainability of human actions. This study aims to evaluate the connections between economic complexity, institutional quality, globalisation, and environmental pollution in South Asian nations using carbon dioxide emissions and ecological footprints (Rahman et al., 2022).

Understanding the intricate relationship between economic growth and environmental pollution is crucial, and defining variables is a key aspect in this context. Several studies have explored the link between economic growth and environmental pollution, shedding light on the elements that impact both areas. To comprehend the connection between economic growth and environmental pollution, one must acknowledge the interplay between non-renewable resource exploitation and pollution. Empirical study has shown a considerable positive correlation between economic growth and environmental pollution (Rahman & Bakar, 2019; Asghar et al., 2024; Iram et al., 2024). This relationship highlights the importance of considering economic growth as a critical variable in environmental pollution models. The empirical research released in the last two decades has emphasized the strong link between economic expansion and the significant consumption of energy (Saif Ur Rahman, Salyha Zulfiqar Ali Shah, n.d.). In recent years, energy consumption has

been observed as a highly explored topic in a variety of theoretical and empirical investigations. This finding is consistent with the widespread recognition that energy utilization is a significant component in relation to carbon dioxide emissions.

One of the most important factors to take into account as an explanation for the goal of this study is economic complexity since it incorporates all areas of production, including knowledge, development, and skill. Complex economies, according to (Khawaja Hisham Ul Hassan, 2021) are those that can manage pertinent knowledge across wide networks of individuals, which eventually results in the creation of a diverse mix of knowledge-intensive commodities. The alternative type of economy, known as a simpler economy, is characterized by a restricted base of productive knowledge. Additionally, simpler economies create fewer and simpler items, which needs narrower networks for interaction. This idea is evaluated using a statistic known as the Economic Complexity Index (ECI), which compares the variety of a country's export baskets to those of other countries in order to determine the productive capacity of that (Bakar, 2019). Exporting complex and sophisticated items is expected to raise energy consumption, leading to higher energy intensity and increased pollution.

"Institutions" can refer to a collection of rights, norms, and decision-making processes implemented across several levels of social structures. These organizations put a greater focus on environmental circumstances and resource regimes. When people and communities work together to lessen the dangers that threaten human life and to advance environmental and social rights, they are able to achieve the highest possible level of human security. What is essentially referred to as the Environmental Kuznets Curve (EKC) is the relationship between economic expansion and environmental deterioration. In order to achieve the required degree of sustainable development, the curve may be accelerated on account of the quality of the institution. This would allow it to advance and arrive at a turning point more quickly than it would normally pass through. Strong institutions may influence economic development and environmental degradation by effectively regulating the location of polluting industries that can mitigate pollution in designated areas. Moreover, institutional involvement can result in rapid economic growth, potentially causing a rise in environmental deterioration. This degradation can be stopped by the institutions via the implementation of appropriate regulations.

To a large extent, the function that globalization plays in facilitating the growth of industries, expanding commercial opportunities, and making it simpler to do business, as well as reducing migration via the promotion of international trade and commerce. Globalization also helps emerging nations enhance their economic development by lowering the primary issues of poverty, income inequality, and unemployment. This is accomplished via the reduction of disparity in income. Economic growth acceleration is closely linked to the increasing demand for energy, mostly met by fossil fuels like coal, petroleum, natural gas, and related resources. Because of globalization, the nations of the globe are interconnected with one another on several levels, including the economic, political, and social levels. According to (Shahzadi, Ali, et al., 2023) the quality of the environment is impacted by many economic, political, and social factors. According to (Naz et al., 2022; Weimin et al., 2024; Weimin et al., 2022), globalization may be defined as the process by which nations that are geographically isolated and self-restricted, or that have obstacles to investment and trade, or that have cultural differences tend to transition into economies that are increasingly interconnected and integrated. The processes of size, composition, and method influence are defined by (Li et al., 2022; Ximei et al., 2024) because of the various ways in which globalization can have an effect on the environment, the degree of damage can vary. The term "scale effect" describes the growth of economic activities leading to a decline in environmental quality inside the economy as the activities expand. This aim is achieved through the use of natural

resources and increased energy usage. An economy that transitions its production to capital-intensive technology (dirty goods) would produce more pollution than an economy that changes towards labor-intensive technology. This is what is meant by the composition effect, which makes reference to structural changes. The concept of globalization's influence suggests that advanced technology are shared with host nations, resulting in an improvement in the environmental quality (Ullah et al., 2023).

Problem Statement

The nations that comprise South Asia are now facing considerable challenges in relation to environmental pollution. The pollution of the air, climate change, ecological degradation, and the loss of biodiversity are some of the issues that these challenges encompass, but are not limited to these challenges only. There is a clear connection between each of these issues and the long-term viability of the ecosystem, as well as the environment in general and the environment in specific. As a consequence of this, it is of the utmost importance to be aware of the elements that lead to the destruction of the environment in these countries (Javaid et al., 2023).

In South Asian countries, progress in this important industry is significantly hindered, and there is a lack of comprehensive research in this field. This is despite the fact that several studies have been conducted to analyse environmental difficulties for a variety of countries. The relationship between economic complexity, globalization, and environmental pollution remains undetermined, despite several experts having investigated this issue. In addition to these, there is currently no research that has been carried out that has analysed the influence that the complexity of the economic system, the integrity of the institutions, and globalization have on the pollution of the environment in South Asian countries (Ur Rahman & Bakar, 2018).

As a measure of environmental contamination, carbon dioxide emissions are the sole component that are utilized by the great majority of the study that has been conducted up until this point. In order to accurately capture environmental impacts, the use of a single proxy could potentially be detrimental to the accuracy of the results (Dawood et al., 2023) have demonstrated that the majority of the research use just one or two proxies to evaluate the quality of the institution under investigation. Governments, academics, and politicians have given South Asian countries' environmental problems a great deal of attention. This is because greenhouse gas emissions and ecological footprints have been increasing at an alarming rate.

This study focuses on analyzing the intricate connections among globalization, institutional quality, and economic complexity, and their impact on environmental degradation in South Asian nations. The study aims to explore novel insights stemming from the Environmental Kuznets Curve (EKC) theory. This will be achieved by using carbon dioxide emissions and ecological footprints as crucial proxies of environmental pollution.

Literature Review

Theoretical Literature

According to the EKC hypothesis, there is a connection between rising levels of economic activity and rising levels of environmental contamination within the environment. One way to visualize this link is as an inverted U. To explain the connection between these two events, the EKC hypothesis was created. The number of pollutants detected in the environment around a country generally rises in direct proportion to the growth of that nation's GDP. Nonetheless, the amount of pollution in the environment gradually decreases if a particular level of economic growth is

attained. Numerous factors, including technological advancements, modifications to environmental laws, and efforts to build more environmentally friendly industrial practices, might be linked to this drop (A. U. Shahid et al., 2022).

One of the most important macroeconomic variables that must be taken into consideration is the rate at which the economy is expanding. An economy's growth is probably going to be accompanied by both an increase in industrialization and consumption. It's conceivable that these two developments will happen at the same time. It's possible that both of these factors will raise the quantity of pollution that is produced. As countries become more prosperous, claimed that they may invest in environmentally friendly technology and adopt stricter environmental regulations. The quantity of pollution in the environment might be reduced as a result of these two measures (Chaudhary et al., 2023).

One further crucial factor that you should think about is the level of economic complexity. The degree of expertise and understanding needed to produce items intended for export is referred to as "economic complexity". When talking about economic expansion, it is common to link higher rates of economic growth to rising economic complexity. It is widely believed that this is the case. Scholars have investigated the correlation between economically advanced societies and elevated levels of environmental contamination. Our investigation has been guided by the EKC theory. It is postulated that countries with more diverse economies might be better able to allocate resources toward the development of efficient technology and the adoption of environmentally friendly production practices, both of which will lower emissions (Zhao et al., 2023).

The institution's reputation is a crucial consideration when determining if results have an effect on the surroundings. Stronger institutions, such as efficient governance, the rule of law, and the application of environmental legislation, are correlated with the degree of pollution. This is due to the increased likelihood of cleaner environments in these nations. It is feasible to determine a correlation between the efficacy of environmental legislation and the calibre of the current institutions. (Sriyanto et al., 2023) suggested that an investigation into the possibility of a relationship between the standard of the institutions and the level of pollution may be one use of the EKC hypothesis.

One further economic factor that might affect the levels of pollution in the environment is globalization. Globalization, defined as a rise in both worldwide trade and economic integration, has led many businesses that cause substantial amounts of pollution to migrate to nations with laxer environmental rules. The EKC hypothesis is an approach that may be utilized to explore the purported connection between environmental contamination and globalization. According to the EKC theory, there is an association between the advancement of the economy and the degradation of the environment that takes the form of an inverted U. According to this hypothetical scenario, the levels of pollution are claimed to initially increase, but then begin to decline when nations attain larger levels of economic growth.

Empirical Literature

In principle, the initial phase of expansion, which is defined by nations that specialize in agriculturally-based goods, is characterized by a low level of environmental damage. According to (Hacker et al., 2023) nations progressively transition from producing agricultural goods to manufacturing industrial goods. Currently, environmental awareness is low, while the development of items responsible for a significant amount of pollution is rising. According to (Mehfooz et al., 2023), this leads to an increase in the nation's energy consumption, which is detrimental to the nation's ecology. After a certain amount of revenue has been reached, the nation begins to focus

more on output that is dependent on technical advancements. A rise in affluence leads to an increase in the environmental consciousness of the population, which in turn leads to the cessation of the manufacturing of items that raise pollution levels. As a result, nations will focus their production factors on the various categories of technical items. According to (Blumenberg et al., 2023) this results in a decrease in the amount of carbon emissions. In addition, the manufacturing methods that are used will enhance their level of sophistication and become more environmentally friendly as technology will continue to improve (Sakaue et al., 2024) all agree that the use of technology-intensive innovative production processes will result in a reduction in the amount of energy that is spent during production, which in turn will lead to a reduction in CO_2 emissions. For example, according to (Akwataghibe, 2024) when controlling carbon dioxide emissions, the technology used in nations' manufacturing processes is a crucial element to consider.

According to, the production factors are a reflection of the manufacturing capacity of each individual nation. One may assess a country's technical level and production variables by examining the items it manufactures, which can indicate its level of technological development. Research has demonstrated a link between a country's goods' complexity and the sophistication of the components used in their creation. Complex product manufacturing is heavily dependent on a nation's infrastructure, institutions, legal system, human capital, and physical capital. These elements also have an impact on the creation of complex goods.

According to studies on international trade, the economic complexity of a product is a good predictor of the technological sophistication of the things that are created as well as the knowledge-based production structure. assert that it has the capacity to provide insightful data on a nation's economic structure and degree of technology. In accordance with (Zeiri et al., 2023) in terms of the products and industrial processes that a nation is able to generate, it is a reflection of the capacities and qualities that the nation possesses. Taking into account the complexity, these national skills and qualifications are necessary claim that a nation's level of product development may be gauged by looking at its high value of economic complexity. Products from this nation are regarded as being extremely advanced. Economic complexity levels not only showcase countries' capabilities but also provide insight into the wide array of products and services they provide. This is because the degree of economic complexity reveals both of these things. It provides a thorough view of the extent, organization, and technical progress that have taken place in a country.

According to the authors (Richterman et al., 2023) the amount of economic complexity is a crucial component that plays a role in determining the pace of economic growth. Two instances of the many scholars who have arrived at the conclusion that economic complexity plays a large role in the growth of the economy are number of aspects, such as the technical level and product mix of nations, significantly affect the environment's quality. The complexity of the economic system is expected to significantly affect the environment's performance. In accordance with (Sehrish Arshad et al., 2024) most environmentally harmful businesses are located in countries with poor standards of life. For the most part, the people who live in these nations are not aware of the environmental destruction that is brought about by the industrial process, and as a result, they have a lower level of environmental consciousness. High-income nations host high-technology sectors that are less detrimental to the environment. According to (Irfan et al., 2023) the composition of the goods that are produced in the nation is the most crucial element in minimizing the amount of environmental degradation the country is experiencing. When there is a decrease in the level of sophistication of things, it will have a detrimental effect on the ecology of the nation.

Considering this, it is forecasted that the intricacy of the economy would lead to a decrease in the level of carbon dioxide emissions generated by the high-income nations. Conversely, nations with

lower medium incomes and greater middle incomes would experience a rise in carbon dioxide emissions. This explanation is being provided as a potential possibility. During the first stage of development, emerging nations tend to focus on producing less advanced goods that are associated with high pollution levels. During the initial stages of industrialization, countries with medium incomes, both lower and higher, that specialize in agricultural products tend to prioritize the textile sector. When compared to agriculture, the textile industry is both more complicated and more hazardous to the environment. As a consequence of the increased sophistication of the items that are made during this stage, a large amount of economic development is accomplished simultaneously. While this is happening, it is anticipated that the deterioration of the environment would also rise. On the other hand, once a certain amount of revenue is reached, fundamental changes in the economy take place. As a consequence of these enhancements, the country will be able to make the shift from industries that are largely dependent on energy to industries that are strongly dependent on technology. There is a chance that the quantity of environmental degradation that occurs will decrease when businesses that require a lot of energy, like the textile industry, give way to those that require a lot of technology, like the aviation industry (Parveen et al., 2024).

The number of research that have investigated the ways in which the complexity of the economy has an effect on the environment is quite sparse carried out the preliminary investigation on how economic complexity affects the environment. The study provided data to support the EKC theory by showing how France's intricate economic system leads to a decrease in atmospheric carbon dioxide emissions study looked at how economic complexity affects the ecosystem. Their inquiry was conducted within the framework of the EU's member states. They have determined that the intricate economic framework of the region contributes to the rise in CO_2 emissions in the European Union. On the other hand, (Amin et al., 2024) environmental effects of economic complexity are anticipated to differ among countries based on the socioeconomic classes within each nation. In nations with lower and higher middle incomes, economic complexity is expected to result in higher CO_2 emissions, but in countries with high incomes, it is expected to lead to fewer CO_2 emissions due to economic complexity. The research relevant to this issue focused solely on examining the influence of economic complexity on environmental deterioration in a high-income nation (France) and a group of high-income countries (members of the European Union at that time). No research has investigated the influence of economic complexity on environmental deterioration in low and middle-income nations, such those in South Asia.

When it comes to the corpus of research that explores the connection between the quality of an institution and the amount of carbon dioxide emissions, scholars have arrived at findings that are contradictory to one another. Academic scholars have noted that some characteristics of high-quality institutions, such democracy and corruption, can lower carbon dioxide emissions. However, prior studies have shown that comparable institutional features might be linked to a rise in carbon dioxide emissions (Shen et al., 2024) conducted a study to investigate the relationship between carbon dioxide emissions in South Asian nations, their economic growth, and the quality of their institutions. The observation of a negative correlation between carbon dioxide emissions and institutions was one of the discoveries that was discovered. According to (Kebede et al., 2021) efficacy of government, evidence of corruption, and democratic principles are all inversely connected to CO_2 emissions. CO_2 emissions are negatively associated with social and political instability. As per the results of it was revealed that the impact of establishments might potentially have a negative influence on the environment through both direct and indirect sources. The countries that comprise the Asia-Pacific Economic Community (APEC) enjoy better environmental conditions when institutional corruption is reduced. Environmental pollution

decreases as a result of institutional quality increases, according to (Hoang et al., 2021) Countries with low institutional quality need institutional change as a requirement to benefit from the positive environmental impact of trade. Taking the opposite stance (Abu Bakar & Abu Bakar, 2020) examined the fact that CO_2 emissions are influenced by factors such as trade openness, legitimate property rights, insufficient institutional quality, and exchange rate policy. Econometric methods were used in order to ascertain the impact that the quality of institutions has on the environment. In their investigation, they came to the conclusion that the elements responsible for the destruction of the environment are governance and institutions.

In recent decades, there has been significant attention given to the impact of institutional quality on economic progress. The data on the connections between institutions and economic growth is inconsistent. Institution-related traits impact economic growth, as demonstrated by several performed research. However, once a certain threshold of institutional quality is reached, the negative influence that was previously considerable becomes insignificant. In accordance with (Jabeen et al., 2021) those institutions that are efficient are the only ones that, in addition to contributing to the advancement of the economy, also encourage people to participate in activities that are constructive. By providing human interactions with suitable and stable frameworks, good institutions help to limit the amount of uncertainty that exists. According to (Dawood et al., 2023) environment which has a direct influence on the development of the economy, is significantly impacted by the various institutions that are there.

There is a great deal of debate surrounding the connection that exists between the quality of an institution and the impact that it has on the surrounding environment. There is a complex mechanism that underlies the participation of institutions in carbon emissions. This is true regardless of whether or not institutions reduce pollution. Due to the fact that the findings of the research that have previously been conducted that have focused on these inter-linkages are very vague and limited, there are only a few studies that are now accessible that need additional examination. Furthermore, similar data was excluded when examined within the framework of South Asian nations. We are motivated to explore the causal relationship between economic complexity, institutional quality, and carbon emissions, specifically in South Asian nations. Insufficient exploration of the relationships between underlying factors, inconclusive results, methodological limitations, and insufficient data in specific country groups prompt us to study this connection.

In the most recent years, there has been a significant amount of attention paid to the connection that exists between globalization and the condition of the environment (Li et al., 2022)conducted a study to investigate the connection between globalization and a variety of environmental indicators. These indicators included the amount of water contamination, the amount of round wood produced, and the amount of carbon dioxide and sulfur dioxide emissions. Panel regression models have been used to show that globalization is responsible for the production of SO_2 emissions and water contamination. Conversely, globalization had no effect at all on the production of round wood or the release of carbon dioxide into the environment. In their study (Chaudhary et al., 2023) looked at the 36 African countries' total carbon dioxide emissions in connection to globalization. Through the utilization of the GMM methodology, it was discovered that globalization was the root cause of the decline in environmental quality that occurred in a number of South African countries. The research done by (Ur Rahman & Bakar, 2019) was distinct, in this study, using measurements of ecological footprint and carbon dioxide emissions, they investigated whether or not the Environmental Kuznets Curve (EKC) was valid in Qatar. The EKC was found to be invalid in Qatar due to CO_2 emissions, but the ecological footprint approach was used to detect it. In a study (Rahman & Bakar, 2019) found a significant association between

globalization and ecological footprint was found in the nations of Sweden, Belgium, the Netherlands, Denmark, Norway, Switzerland, Portugal, and Canada. Researchers discovered a correlation between globalization and ecological footprint in Germany, France, and Hungary.

It is vital to undertake an analysis of the information that is now available, which makes use of the most recent indicators of globalization and its influence on CO_2 emissions. Furthermore, stated that globalization does not impact the level of environmental pollution in China. They acknowledged that the environmental restrictions in China had resulted in an improvement in the quality of the air. Globalization has been shown to lower air pollution, according to (Shahzadi, Ali, et al., 2023) who conducted an analysis of a large panel data set consisting of both emerging and developed countries. On the other hand, proved that globalization cannot sustain the Indian economy and is responsible for environmental harm. After some time (Saif Ur Rahman, Salyha Zulfiqar Ali Shah, n.d.) found that the economy of Australia benefited from globalization, which had a good influence conducted an investigation into the impact that political globalization has on carbon dioxide emissions. They presented facts showing that political globalization is enhancing the environment by decreasing the production of carbon dioxide emissions released into the atmosphere. In their research, (Ullah et al., 2023) looked into the impact that the political, economic, and social sub-indices of globalization have on CO_2 emissions. Their research findings indicated that globalization had a positive impact on the environment within the Chinese economy.

Gross domestic GDP is another crucial determinant of environmental quality (Zulfiqar et al., 2022) stated that a rise in GDP due to the method influence resulted in a quadratic link between income and nitrogen dioxide emissions, confirming the EKC theory. In addition to this discovered that when economic development is attained through heightened trade openness, environmental quality declines with economic growth. Over time, the impact of income scale would be reduced by technical advancements resulting from shifts in consumer preferences.

It has been discovered that there are only a few studies that have been completed that are associated with the condition of the environment in the countries that are located in South Asia. An illustration of this would be the research that was carried out from the perspective of (Li et al., 2022). Through the course of this research, they evaluate the environmental sustainability performance of countries located in South Asia. Taking into consideration the facts, it was determined that Bhutan had performed far better than the other countries in South Asia. The Maldives came in extremely close behind Nepal, which finished in second place with a stable position. Pakistan has had the least degree of success when it comes to environmental conservation. South Asian nations must increase their involvement in international commerce related to renewable energy sources to ensure the long-term survival of the environment. The authors (T. A. Shahid, 2023) conducted a research in Bangladesh, Pakistan, India, Sri Lanka, and Nepal to examine the correlation between environmental degradation, financial development levels, and institutional quality in those countries. The inquiry spanned from 1985 to 2018. The financial sector's growth led to increased CO_2 emissions, but the quality of the institutions involved helped lessen the negative impact of financial development on environmental quality. Another study demonstrated that the correlation between globalization and CO_2 emissions in South Asian nations follows an inverted U-shaped pattern.

Based on the review, several research has been conducted to explore this link across various groupings of nations, yielding a diverse range of outcomes. There have been few research studies undertaken on the nations in South Asia. Due to the fact that this is the case, there is the possibility that additional research might be carried out in order to investigate this connection with regard to a certain group of countries, which includes South Asia.

Research Gap and Contribution

We examined the connections between economic growth, economic complexity, globalization, institutional quality, and environmental deterioration in the literature review. Considering all the material, it can be inferred that globalization, economic complexity, and institutional quality often play a role in causing environmental harm. The connection between pollution and economic complexity is subtler and complex than the one discussed earlier. It is possible that globalization will have positive or negative effects on pollution, depending on the specific circumstances. The standard of the institutions that are now in existence is another important component that greatly helps to the reduction of environmental pollution. Overall, the study's conclusions highlight how critical it is to battle environmental pollution through the use of sustainable development concepts, as well as through the use of efficient governance, cleaner energy sources, and well considered urban planning.

- Current research emphasizes the necessity for more study on the intricate connection between economic complexity and pollution.
- Further investigation is needed to examine the particular effects of globalization on pollution, taking into account both possible advantages and disadvantages.
- Further investigation and policy focus should be dedicated to studying the impact of institutional quality on reducing environmental pollution.

Method

In this study author following the literature review procedure under the principles of systematic literature review to collect and critically analyse the relevant literature. For the comprehensive and critical analysis, author develop a critical review form to analyse several key points of the previous studies namely focus of the paper, bibliographic details, theory used (where relevant), research philosophy key findings, methodology, definition of institutional quality, economic complexity, globalization and GDP on CO2 emission and Ecological footprint in South Asian Countries, geographical location of the study, theoretical and practical review, and further conclusion and reported limitations. For the critical review of this study author searched literature since November 2017 to April 2023. To identify utmost relevant papers as possible, after identification of the papers researcher conducted a comprehensive search by evaluating in the relevant papers downloaded from (1) Economics journals listed in the Clarivate analytics (The Master Journal List 2017 and JCR report 2016); (2) Comprehensive databases (Business Source Premier by Ensco and Scopus). (3) Google Scholar; (4) extensive cross - disciplinary bibliography on FDI (consisting of several references), published in the different journals. For this literature review, author design the literature selection criteria based on following characteristics, for instance, paper omitted that not dealing with institutional quality, and also that are not empirical or conceptual such as (book, commentaries, summaries of conference summaries, abstracts and keywords, executive abstracts, editorials, literature reviews and newspaper/magazine articles). In total, after repetition author identified almost 600 articles. To set up each paper's importance, Author examined its abstract, title, and, methodology where important (Abro et al., 2024).

Conclusion

After the critical review of the literature, it is concluded that, as compare to total value of institutional quality, both the negative and the positive effects are revealed. It is very much interesting to see both the findings are separately fill the gap in the literature. So, the effect of institutional quality on the environmental pollution is still under discussion and various studies

have been conducted to check the impact of institutional quality on the overall environment. Environmental pollution impacts ecosystems, human health, and general well-being, making it a big worldwide concern. It therefore has an impact on every person on Earth. To create programs and policies that will lessen the harmful effects of environmental degradation, a thorough understanding of the elements that contribute to environmental deterioration is required. In this chapter, we have reviewed the research on how different economic factors affect environmental pollution.

The Environmental Kuznets Curve (EKC) is the most prominent aspect of the research. According to the Environmental Kuznets Curve (EKC), there is an inverted U-shaped link between environmental degradation and economic growth. At some point, pollution levels start to decline rather than rise in unison with economic expansion. This holds true even if pollution levels first increase. This decline may be attributed to several causes such as the advancement of new technology, implementation of environmental laws, and the adoption of eco-friendly industrial methods.

Pollution levels are strongly influenced by the presence of strong institutions, which are characterized by efficient government, the rule of law, and environmental regulations. One issue that keeps cropping up is the incapacity of incompetent institutions to enforce environmental norms, which may be one of the causes of the growing pollution levels. Globalization may lead to a decrease in pollution by promoting the use of eco-friendly technology and facilitating the exchange of knowledge. That might, however, also lead to increased resource use and the migration of polluting businesses, both of which could eventually raise pollution levels in specific areas. It seems sense that economies with higher levels of economic expertise and diversity will be better equipped to pass green legislation and lower pollution levels. However, the distinct characteristics of industrial processes that occur in complex economies could also influence the quantity of pollutants that are present. Growing economic activity is associated with rising industrialization and consumerism, all of which have the potential to exacerbate pollution levels. However, increased income levels may also make it possible to finance the creation of greener laws and technologies, both of which have the power to reduce pollution. Pollutant releases into the environment may decline if investing in clean technology and ecologically beneficial initiatives is made easier by a stable financial system. Inadequate pollution control can impede economic growth and promote companies that use a lot of resources. The use of fossil fuels contributes significantly to pollution since it reduces air quality pollutants and produces greenhouse gas emissions. This is the case since the primary energy source is fossil fuels. Transitioning to renewable energy sources is essential for preserving the ecosystem's health

Future Direction

Three reasons are raised in this review of the literature requiring additional investigation First, the RDL model, OLS regression, and GMM technique are employed in the majority of research conducted to examine institutional quality. It has been noted that only a small number of studies have used a dynamic vector error correction model (VCEM) to conduct the investigation during the literature review. In order to ensure that endogeneity and causation issues are addressed concurrently, the VCEM process helps to capture the time series dynamics under discussion appropriately. Furthermore, any potential indirect impacts and feedback are also recorded using the VECM process. It is suggested that more research be done to determine how best to execute manufacturing growth when FDI inflows are substantial in the host country, as the majority of institutional quality studies conducted in the past have mostly focused on the GDP and economic growth of the host country. Only a small number of studies have looked at economic complexity in

this context. Third, the research was done in the past and was examined in relation to underdeveloped states as well as southeast Asian nations like Malaysia and the US economy, which also included capital and growth in the manufacturing sector in Japan, France, Germany, and the UK. However, not much research has been done in south Asian countries.

References

1. Abro, A. A., Abubakar, M., Shahid, T. A., & Fatima, U. (2024). Does Volatility Spillover among Sectors Varies from Normal to Turbulent Periods ? Evidence from Pakistan Stock Exchange. *Pakistan Journal of Humanities and Social Sciences Volume*, *12*(02), 1174–1187. https://doi.org/10.52131/pjhss.2024.v12i2.2121

2. Abu Bakar, M. Z., & Abu Bakar, S. (2020). Parental Financial Socialisation: Pathways to Positive Financial Behaviour. *International Journal of Academic Research in Business and Social Sciences*, *10*(6), 54–62. https://doi.org/10.6007/ijarbss/v10-i6/7260

3. Ahman, S. U., Zafar, M., Ghaffar, MuTabassum, N., & Rniba. (2023). Institutional Quality, Employment, Trade Openness on Environment (Co2) Nexus From Top Co2 Producing Countries; Panel ARDL Approach. *Review of Education, Administration & Law*, *6*(2), 211–225. https://doi.org/10.47067/real.v6i2.325

4. Akwataghibe, N. N. (2024). *Improving Immunization utilization using participatory action research in Nigeria: Bridging the immunization gap for young children in Nigeria by applying a needs-based strategy to improve access*.

5. Amin, N., Rahman, S. U., Khalid, S., & Idress, S. (2024). How Does Tourism, Trade Openness and Green Energy Influence CO2 emissions? Evidence from ASEAN Countries. *Bulletin of Business and Economics*, *13*(2), 71–79. https://doi.org/https://doi.org/10.61506/01.00300

6. Amna Shafiq Minhas, Tanveer Ahmad Shahid, I. U. R. and A. U. R. (2023). Impact of Human Development Index on Economics Growth: Evidence from Asian Countries. *Article in International Journal of Innovative Science and Research Technology*, *8*(2). https://www.researchgate.net/publication/378481272

7. Asghar, M. M., Arshad, Z., Yousaf, S., e Ali, M. S., & Tariq, M. (2024). Environmental Degradation in BRI Countries: Navigating the Role of Natural Resources, Green Energy and Green Finance. *Pakistan Journal of Humanities and Social Sciences*, *12*(3), 2705-2716.

8. Bakar, S. U. R. and N. A. (2019). Fdi and Manufacturing Growth: Bound Test and Ardl Approach. *International Journal of Research in Social ...*, *9*(5), 36–61. https://www.researchgate.net/profile/Saif_Rahman8/publication/335061648_FDI_and_Manufacturing_Growth_Bound_Test_and_ARDL_Approach/links/5d4d2705a6fdcc370a87393b/FDI-and-Manufacturing-Growth-Bound-Test-and-ARDL-Approach.pdf

9. Blumenberg, C., Costa, J. C., Ricardo, L. I., Jacobs, C., Ferreira, L. Z., Vidaletti, L. P., Wehrmeister, F. C., Barros, A. J. D., Faye, C., & Boerma, T. (2023). Coverage, Trends, and Inequalities of Maternal, Newborn, and Child Health Indicators among the Poor and Non-Poor in the Most Populous Cities from 38 Sub-Saharan African Countries. *Journal of Urban Health*, *0123456789*. https://doi.org/10.1007/s11524-023-00806-y

10. Chaudhary, S., Nasir, N., Ur Rahman, S., & Masood Sheikh, S. (2023). Impact of Work Load and Stress in Call Center Employees: Evidence from Call Center Employees. *Pakistan Journal of Humanities and Social Sciences*, *11*(1), 160–171. https://doi.org/10.52131/pjhss.2023.1101.0338

11. Dawood, M., Rehman, S. ur, Majeed, U., & Idress, S. (2023). Contribution the Effect of Corporate Governance on Firm Performance in Pakistan. *Review of Education, Administration & Law*, *6*(1), 51–62. https://doi.org/10.47067/real.v6i1.304

12. Hacker, J. D., Dribe, M., & Helgertz, J. (2023). Wealth and Child Mortality in the

Nineteenth-Century United States: Evidence from Three Panels of American Couples, 1850-1880. *Social Science History*, *47*(3), 333–366. https://doi.org/10.1017/ssh.2023.12

13. Hoang, T. G., Nguyen, G. N. T., & Le, D. A. (2021). *Developments in Financial Technologies for Achieving the Sustainable Development Goals (SDGs). January*, 1–19. https://doi.org/10.4018/978-1-7998-8900-7.ch001

14. Huang, Y., Rahman, S. U., Meo, M. S., Ali, M. S. E., & Khan, S. (2024). Revisiting the environmental Kuznets curve: assessing the impact of climate policy uncertainty in the Belt and Road Initiative. *Environmental Science and Pollution Research*, *31*(7), 10579–10593. https://doi.org/10.1007/s11356-023-31471-y

15. Irfan, A., Azam, A., & Shahid, T. A. (2023). *Terrorism and Social Politics : How the Increase of Terrorism Impacts the Socio-Political Thoughts of the Pakistani Public*. *4*(1), 21–30.

16. Iram, M., Zameer, S., & Asghar, M. M. (2024). Financial Development, ICT Use, Renewable Energy Consumption and Foreign Direct Investment Impacts on Environmental Degradation in OIC Countries. *Pakistan Journal of Humanities and Social Sciences*, *12*(2), 1303-1315.

17. Jabeen, S., Sheraz, F., Haider, S. A., Iqbal, S., Jahan, S., Tehseen, S., & Hussaini, T. (2021). The nexus between global disruption due to the covid-19 and performance of the construction project. *Management Science Letters*, *11*, 1871–1880. https://doi.org/10.5267/j.msl.2021.1.015

18. Javaid, M. Q., Ximei, K., Irfan, M., Sibt-e-Ali, M., & Shams, T. (2023). Exploring the nonlinear relationship among financial development, human capital and CO 2 emissions: a comparative study of South and East Asian emerging economies. *Environmental Science & Pollution Research*, *30*(37).

19. Javaid, Z., Noor, Q., Iftikhar, H., Haris, M., Rahman, S. U., & Ali, M. (2023). Assessing Mediating Role of Environment Knowledge Between Green Resource Management and Sustainable Performance, Under Moderating Effects of Green Self-Efficacy. *Central European Management Journal*, *31*(2), 352–368.

20. Kebede, K., Nigussie, H., & Amaha, N. (2021). *Applications of Multivariate Multiple Linear Regression Models to Predict Body Weight of Local Chickens from Biometrical Traits in Ethiopia*. 1–6. https://doi.org/10.33552/AAHDS.2021.02.000539

21. Khawaja Hisham Ul Hassan, S. M. S. and S.-R. (2021). Analyzing the Link between Distributed Leadership and Teachers' Self-Efficacy Beliefs at Secondary School Level. *Annals of Social Sciences and Perspective*, *2*(2), 287–298. https://doi.org/10.52700/assap.v2i2.55

22. Li, D., Bai, Y., Yu, P., Meo, M. S., Anees, A., & Rahman, S. U. (2022). Does institutional quality matter for environmental sustainability? *Frontiers in Environmental Science*, *10*(July), 1–12. https://doi.org/10.3389/fenvs.2022.966762

23. Maqsood1, N., Shahid2, T. A., Amir3, H., & Kanwal Bilal4. (2023). Symmetric impact of Trade, exchange rate, and inflation rate on Stock Market in Pakistan: New evidence from Macroeconomic variables. *Bulletin of Business and Economics*, *12*(3), 903–911. https://doi.org/https://doi.org/10.61506/01.00292

24. Mehfooz, S., Mansha, M., Khan, M., & Musharaf, S. (2023). CO2 Emissions, Health Expenditures, and Economic Growth Nexus in Pakistan. *IRASD Journal of Energy & Environment*, *4*(1), 16–29. https://doi.org/10.52131/jee.2023.0401.0032

25. Minhas, A. S., Maqsood, N., Shahid, T. A., & Rehman, A. U. (2024). Investment Performance in Green Finance: Assessing the Impact of Environmental Social and Governance Integration. *IRASD Journal of Economics*, *6*(1), 27–44. https://doi.org/10.52131/joe.2024.0601.0192

26. Naz, N., Gulab, F., & Aslam, M. (2022). The socio-cultural factors influence on women's ability to become social entrepreneurs. *Competitive Social Sciences Research Journal (CSSRJ)*, *3*(2), 42–52.

27. Nazik Maqsood, T. A. S. and A. U. R. (2024). The Impact of Dividend and Tax Avoidance on Earning Management of Companies. *Bulletin of Business and Economics*, *13*(April), 256–272. https://doi.org/10.61506/01.00201

28. Parveen, S., Hanif, A., Rahman, D. S. U., & Sheikh, D. S. M. (2024). Examining the Effect of Foreign Direct Investment and Exports on Stock Market Performance: Evidence from India Based Bound Testing to Cointegration ARDL Approach. *Bulletin of Business and Economics*, *12*(4), 700–707. https://doi.org/https://doi.org/10.61506/01.00293

29. Qureshi, ghaziaKhoulaQureshi G. K., Zaman, mWaheed M. W. U., Rahman, saifUrRahman S. U., & Shahzadi, hafizaNabilaShahzadi H. N. (2022). Legal Insights of Crypto-currency Market and State of Crypto-currency in Pakistan. *Superior Law Review*, *2*(1), 77–104. https://jslr.pk/index.php/SLR/article/view/11

30. Rabbia Syed, Sehrish Arshad, S. U. R. and S. M. S. (2024). An Overview of Foreign Direct Investment and Green Growth in OIC Countries. *Pakistan Journal of Humanities and Social Sciences*, *2*(1), 8826. https://doi.org/10.52131/pjhss.2024.v12i2.2005

31. Rahman, S., & Bakar, N. A. (2019). *Long Run Relationship between Domestic Private Investment and Manufacturing Sector of Pakistan : An Application of Bounds Testing Cointegration Saif ur Rahman Nor ' Aznin Abu Bakar Sa … Long Run Relationship between Domestic Private Investment and Manuf. 39*(August), 739–749.

32. Rahman, S. ur, Chaudhry, I. S., Meo, M. S., Sheikh, S. M., & Idrees, S. (2022). Asymmetric effect of FDI and public expenditure on population health: new evidence from Pakistan based on non-linear ARDL. *Environmental Science and Pollution Research*, *29*(16), 23871–23886. https://doi.org/10.1007/s11356-021-17525-z

33. Richterman, A., Millien, C., Bair, E. F., Jerome, G., Suffrin, J. C. D., Behrman, J. R., & Thirumurthy, H. (2023). The effects of cash transfers on adult and child mortality in low- and middle-income countries. *Nature*, *618*(7965), 575–582. https://doi.org/10.1038/s41586-023-06116-2

34. Sadia Bint Raza, Sheikh, S. M., & Rahman, S. U. (2024). The Mediating Role of Agency Cost between Corporate Governance and Financial Performance: Evidence from Pakistan Stock Exchange. *IRASD Journal of Economics*, *6*(1), 144–163. https://doi.org/10.52131/joe.2024.0601.0199

35. Saeed, J., Maqsood, N., Shahid, T. A., Amir, H., Rehman, A. U., & Kanwal, B. and. (2024). Impacts of Social Capital, Financial Literacy and Financial Inclusion on Economic Growth of a Primary Data Analysis: Evidence from Pakistan Special Focus on Listed Banks. *Bulletin of Business and Economics*, *13*(2), 637–646. https://doi.org/https://doi.org/10.61506/01.00373

36. Saif Ur Rahman, Salyha Zulfiqar Ali Shah, S. M. B. and F. N. J. (n.d.). Impact of Resource Rents and Institutional Quality on Economic Growth : An Approach of Panel Threshold Analysis. *Competitive Educational Research Journal*, *3*(2), 195–208. https://doi.org/https://cerjournal.com

37. Sakaue, K., Wokadala, J., & Ogawa, K. (2024). Updates on private returns to education in Uganda: evidence from universal primary education policy. *Education Economics*, 1–17. https://doi.org/10.1080/09645292.2024.2345708

38. Sehrish Arshad, S. J., Rahman, S. U., & Idress Sadia, T. A. S. (2024). Decarbonizing the Future: A Critical Review of Green Energy, Financial Inclusion and Trade Openness on CO2 Emissions. *Bulletin of Business and Economics*, *13*(2), 160–163. https://doi.org/https://doi.org/10.61506/01.00311

39. Shahid, A. U., Ghaffar, M., Rahman, S. U., Ali, M., Aslam Baig, M., Idrees, S., & Baig, M. A. (2022). Exploring The Impact Of Total Quality Management Mediation Between Green Supply Chain Method And Performance-Palarch's. *Journal Of Archaeology Of Egypt/Egyptology*, *19*(4), 1252–1270.

40. Shahid, T. A. (2023). *A Comparative Analysis of Sustainable Growth on Health : Evidence from Asian Countries*. *8*(1), 1183–1188.

41. Shahid, T. A., Rahman, S. U., Sheikh, S. M., & Allahrakha, R. (2024). Effect of Public Investment on Health Population: A Review of BRICS Countries. *IRASD Journal of Economics*, *6*(1), 1–9. https://doi.org/10.52131/joe.2024.0601.0190

42. Shahid, T. A., Zafar, M., & Minhas, A. S. (2023). *Testing the Economic Theory of Crime in case of Pakistan*. *1*(2), 73–86.

43. Shahzadi, H. N., Ali, M., Ghafoor, R. K., & Rahman, S. U. (2023). Does Innovation and Foreign Direct Investment Affect Renewable Energy Consumption? Evidence from Developing Countries. *Pakistan Journal of Humanities and Social Sciences*, *11*(2), 908–916. https://doi.org/10.52131/pjhss.2023.1102.0402

44. Shahzadi, H. N., Sheikh, S. M., Sadiq, A., & Rahman, S. U. (2023). Effect of Financial Development, Economic Growth on Environment Pollution: Evidence from G-7 based ARDL Cointegration Approach. *Pakistan Journal of Humanities and Social Sciences*, *11*(1), 68–79. https://doi.org/10.52131/pjhss.2023.1101.0330

45. Shen, Y., Ur Rahman, S., Hafiza, N. S., Meo, M. S., & Ali, M. S. E. (2024). Does green investment affect environment pollution: Evidence from asymmetric ARDL approach? *PLoS ONE*, *19*(4 April), 1–25. https://doi.org/10.1371/journal.pone.0292260

46. Sibt-e-Ali, M., Weimin, Z., Javaid, M. Q., & Khan, M. K. (2023). How natural resources depletion, technological innovation, and globalization impact the environmental degradation in East and South Asian regions. *Environmental Science and Pollution Research*, *30*(37), 87768-87782.

47. Song, M., Anees, A., Rahman, S. U., & Ali, M. S. E. (2024). Technology transfer for green investments: exploring how technology transfer through foreign direct investments can contribute to sustainable practices and reduced environmental impact in OIC economies. *Environmental Science and Pollution Research*, *31*(6), 8812–8827. https://doi.org/10.1007/s11356-023-31553-x

48. Sriyanto, S., Khalil, L., Naseem, I., Nassani, A. A., Binsaeed, R. H., Zaman, K., Salamun, H., & Haffar, M. (2023). Development strategies for reducing infant mortality: A focus on healthcare infrastructure and policy in emerging Asian countries. *Journal of Infrastructure, Policy and Development*, *7*(3), 1–22. https://doi.org/10.24294/jipd.v7i3.2585

49. Ullah, S., Ur Rahman, S., & Rehman, C. A. (2023). Public Investment, Technological Innovations, and Environmental Degradation: Asymmetric ARDL Approach. *Pakistan Journal of Humanities and Social Sciences*, *11*(2), 730–741. https://doi.org/10.52131/pjhss.2023.1102.0386

50. Ur Rahman, S., & Bakar, N. A. (2018). A Review of Foreign Direct Investment and Manufacturing Sector of Pakistan. *Pakistan Journal of Humanities and Social Sciences*, *6*(4), 582–599. https://doi.org/10.52131/pjhss.2018.0604.0065

51. Ur Rahman, S., & Bakar, N. A. (2019). Manufacturing sector in Pakistan: A Comprehensive Review for the Future Growth and Development. *Pakistan Journal of Humanities and Social Sciences*, *7*(1), 77–91. https://doi.org/10.52131/pjhss.2019.0701.0073

52. Weimin, Z., Sibt-e-Ali, M., Tariq, M., Dagar, V., & Khan, M. K. (2024). Retraction Note: Globalization toward environmental sustainability and electricity consumption to environmental degradation: does EKC inverted U-shaped hypothesis exist between squared

economic growth and CO2 emissions in top globalized economies.
53. Weimin, Z., Sibt-e-Ali, M., Tariq, M., Dagar, V., & Khan, M. K. (2022). Globalization toward environmental sustainability and electricity consumption to environmental degradation: does EKC inverted U-shaped hypothesis exist between squared economic growth and CO 2 emissions in top globalized economies. *Environmental Science & Pollution Research*, *29*(40).
54. Ximei, K., Javaid, M. Q., Shams, T., & Sibt-e-Ali, M. (2024). Information and communication technology, economic globalization, and environmental sustainability in APEC nations: Insights from LCC and EKC hypotheses testing. *Sustainable Development*.
55. Zahra, A., Nasir, N., Rahman, S. U., & Idress, S. (2023). Impact of Exchange Rate, and Foreign Direct Investment on External Debt: Evidence from Pakistan Using ARDL Cointegration Approach. *IRASD Journal of Economics*, *5*(1), 709–719. https://doi.org/10.52131/joe.2023.0501.0110
56. Zeiri, R., Bouzir, A., Mbarek, M. H. B., & Benammou, S. (2023). The Link between Economic Growth, Air Pollution and Health Expenditure in the G7 Countries. *International Journal of Energy Economics and Policy*, *13*(4), 156–168. https://doi.org/10.32479/ijeep.14480
57. Zhao, J., Rahman, S. ur, Afshan, S., Ali, M. S. E., Ashfaq, H., & Idrees, S. (2023). Green investment, institutional quality, and environmental performance: evidence from G-7 countries using panel NARDL approach. *Environmental Science and Pollution Research*, *30*(45), 100845–100860. https://doi.org/10.1007/s11356-023-29332-9
58. Zubair, S., Rahman, S. U., Sheikh, S. M., & Zafar, M. (2024). A Review of Green Innovation and Environmental Performance in BRICS Nations. *Pakistan Journal of Humanities and Social Sciences*, *12*(1), 444–449. https://doi.org/10.52131/pjhss.2024.v12i1.1992
59. Zulfiqar, M., Ansar, S., Ali, M., Hassan, K. H. U., & ... (2022). The Role of Social Economic Resources Towards Entrepreneurial Intentions. *PalArch's Journal of …*, *19*(1), 2219–2253. https://archives.palarch.nl/index.php/jae/article/view/11386%0Ahttps://archives.palarch.nl/index.php/jae/article/download/11386/10138