DOI: https://doi.org/10.52131/pjhss.2023.1101.0355

Pakistan Journal of Humanities and Social Sciences

Volume 11, Number 1, 2023, Pages 350–363
Journal Homepage:
https://journals.internationalrasd.org/index.php/pjhss

Measurement the Impact of Logisitc Management System on Economic Growth in Selected Asian Countries

Taimoor Khan Akhunzada[1], Sher Ali[2]

[1] Ph.D. Scholar, Department of Economics, Islamia College Peshawar, Pakistan. Email: taimoorakhunzada@gmail.com
[2] Associate Professor/Chairman Department of Economics, Islamia College Peshawar, Pakistan. Email: drali@icp.edu.pk

ARTICLE INFO

Article History:
Received: January 15, 20223
Revised: March 25, 2023
Accepted: March 26, 2023
Available Online: March 27, 2023

Keywords:
Logistics System
Renewable Energy
Growth
Random Effect Model ICT
Asia

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

This study intended to investigate the impact of on logistics management system on economic growth in selected Asian countries for the period of 2009-2018. Moreover, the impact of renewable energy consumption is association with logistics management system is also examined. There are six (06) sub-regions in Asia and from each region, two countries are selected. Effective logistic Management System is measured by different six (06) components are chosen to get the clear impact on growth. Hausman test suggested to use Random effect regression analyses for the said investigation. The results of the mentioned techniques showed that the impact of Logistics management system components i.e. LPIEA, LPIEC and LPIFS are found significant in the absence of renewable energy and CO2 was found effective to affect growth. While in the presence of renewable energy consumption the components of Logistics management system i.e. LPIAT, LPICQ, LPIEC and LPIQT are found significant to affect growth in the study area. Moreover, renewable energy consumption is found significant to affect growth. Policymakers in Asian countries should prioritize investment in these areas to promote sustainable development and contribute to global efforts to combat climate change.

Corresponding Author's Email: drali@icp.edu.pk

1. Introduction

Economic growth is desirable and achieved in the most recent decades in developed and developing countries. One of the curses associated with growth is the depletion of natural resources. The most recent trend in globalization has the accelerated the speed of economic growth that have increased the use of natural resources, raising worries for humanity. According to the Global Footprint Network, in 2019 saw the earliest Earth overrun day ever. By devouring over 1.7 of Earth in 2019, mankind has consumed more than the planet's ecology can replenish. The need for energy usage is rising as well. According to the International Energy Agency (IEA), increased energy use in 2018 caused a 2% increase in worldwide energy-related CO2 emissions. The increase in the average world temperature, which is mostly brought on by the combustion of fossil fuels, which increases CO2 emissions, is a severe worry for people today. The IEA reports that worldwide emissions increased by 1.4% in 2017 and 2.1%, in 2018 (IEA, 2019). As a result of its enormous environmental effect and potential for impact investment, renewable energy consumption (REC) has grown up significantly in popularity over the past 20 years. The European Union Commission has adopted a series of actions to minimalize greenhouse gas emissions by utilizing more REC bases after the 2015 Paris Agreement on Climate Change. Reaching 20% and 30% of energy consumption from renewable sources, respectively, is one of the EU's goals for 2020 and 2030 (Liobikienė & Butkus, 2017). The last five years have seen a high in global RE investment. The market share of wealthy nations slowly decreased even while worldwide investment in RE is rising. The funds in RE most developed and emerging nations are depicted in Figure 1. Until 2014, developed nations dominated investments in renewable energy. The scales tipped in favor of emerging nations in 2015. By 2017, emerging nations accounted for 63% of all RE investments made worldwide, compared to developed nations' 37% participation.

The US's stake fell by 6% as a result of stringent restrictions. RE investments decreased by 65%, 36%, and 28% respectively, in the UK, Europe, and Japan (Sharvini, Noor, Chong, Stringer, & Yusuf, 2018).

Few affluent nations and the majority of developing ones have seen significant gains in RE investment in the recent years. China was the top investing nation in 2017 and was responsible for 50% of all worldwide investments in renewable energy and at least 58% of solar investments, according to Globalized Trends in RE Investment 2018. The amount invested by developing nations in RE projects was USD 177 billion, outpacing that of industrialized nations by 74 USD billions. Figure 1 depicts the distribution of worldwide RE funds since 2004 to 2017. From 2004 through 2011, developed nations made the most investments in RE; after that, such investments sharply declined. By 2017, China, India, and Brazil accounted for the majority of investments in RE. Other developing nations also raised their investments in RE, bringing the total of 33.9 billion USD in 2017 (Sharvini et al., 2018).

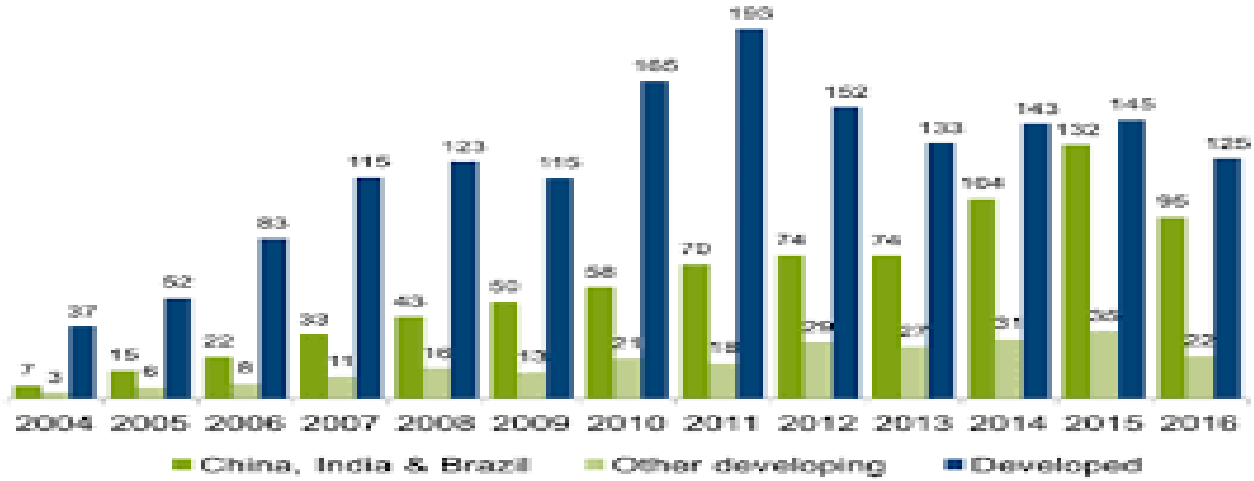

Figure:1 Global RE Funds Splitting 2004 to 2017 (Ateba, Prinsloo, & Fourie, 2018)

Investment in renewable energy capacity was USD 125.8 billion in industrialized economies in 2018 compared to USD 47.5 billion in developing nations. These investments comprised public market equities, worldwide asset financing, solar and wind projects, and research and development for renewable energy technology. Up to USD 16.1 billion was invested by the Gulf Region and African region to finance solar energy projects in South Africa, Kenya, and Morocco. Similarly, the US committed close to 43 billion USD to green power plant schemes, while European investments in solar and wind energy increased to 19.2 billion USD and 36.7 billion USD, respectively (Chlyeh, 2020). As a result, RE investment increased by USD 2.6 trillion between 2010 to 2019 and by 4% in 2018. This investment provided about 45% of the world's electricity and included solar PV, hydropower, biofuels, and wind energy (Chlyeh, 2020).

For the world's cities, countries, and continents to be connected in the twenty-first century, logistics is crucial. This indicates that logistics encompasses a wide variety of integrated activities, including the transportation of freight, the sharing of information, and the storage of inventory among supply chain members (Cooper, Lambert, & Pagh, 1997). The logistics industry has recently became the part of discussion and gained popular trend because of its importance in attaining growth & productivity, and it is also important in environmental standard determination.

But the slogan of the contemporary worlds is to get sustainable which less affecting environmental standards. Environmental sustainability became more important and some businesses have been implemented to adopted environmental friendly technologies in productive environment more particularly in their logistics system. However, in developing Asian nations, it is observed that green logistics chains implementations less or even no adverse impacts on business performance and its profitability. In Asian economies environment friendly technologies in logistics green chain in relation to growth and manufacturing performance are less affected environment in emerging Asian nations (Aldakhil, Nassani, Awan, Abro, & Zaman, 2018; K. A. Khan, Çera, & Nétek, 2019; Martel, Klibi, Martel, & Klibi, 2016). According to K. A. Khan et al. (2019) Asian economies are more polluted to their competitors in the rest of the world. The

estimated value of PM 2.5 (Particulate Matter) has reached to a level which dangerous to world existence. It is observed more particularly in economies like China, India, Bangladesh, and Pakistan. According to the research study conducted by World health Organization (2017), polluted air cause about 2.1 million deaths worldwide per year. The research also stated that several Asian metropolitans like Beijing, Xi'an, Delhi, Bombay, Dhaka, Karachi and Lahore suffer from air pollution that is so poor that there are many occasions when a haze cloud obscures visibility over the city. The energy, manufacturing, and transportation sectors all contribute significantly to carbon emissions, accounting for 42%, 19%, and 23% of total emissions, respectively, according to the IEA. Global logistics operations unquestionably rely substantially on energy, particularly dirty energy use, that negatively affect environment and the public's health (K. A. Khan et al., 2019).

In order to reduce the negative impacts of logistics on social and environmental sustainability without sacrificing the profitability and effectiveness of logistical operations, the idea of "green logistics" was established. According to a survey by the European Union, the logistics and transportation industries employed more than 10.3 million people globally, or 4.5% of all employment. Approximately 96% of the energy used by the logistics sector is provided by fossil fuels. Because of this, the sectors of logistics and transportation contribute more to emissions of carbon, PM 2.5 (fine particles), nitrogen, and greenhouse gases (Pozzer, Tsimpidi, Karydis, De Meij, & Lelieveld, 2017).

Research was conducted on European nations by (Zaman & Shamsuddin, 2017) to look at the connection between logistics and energy usage. The findings demonstrated a significant relationship between logistical activities and energy usage. Countries must pay a premium in the shape of subpar environmental performance since the logistics industry is so important to their economic prosperity. K. A. Khan et al. (2019) made the case that using environment friendly technology i.e. the induction of renewable energy in the operation of logistics system which may be the sole source of maintaining of the standard of environment and can heals Global warming and abrupt climate changes. A panel analysis of the BRICS nations was undertaken by Aldakhil et al. (2018) in order to develop an integrated business model for green enterprises. They found that most of the BRICS countries, including South Africa, Brazil, and Russia, have increased their environmental performance through the use of renewable energy and environmentally friendly practices in logistics operations without suffering any negative effects or slowdowns in economic growth. In contrast, India and China continue to experience severe emission of PM 2.5 and CO2 emission which leads to huge smoke, which harm their reputation and image on the global stage and significantly worsen the health of their citizens through a variety of pollution-intensive diseases, including asthma, lung disease, and coronary heart disease.

According to a study by the Organization for Economic Cooperation and Development (OECD, 2008), green growth can be achieved through a variety of policies, including investments in renewable energy and energy efficiency, green innovation, sustainable land use practices, and conservation of biodiversity (Rafael et al., 2021). These policies can lead to reduced greenhouse gas emissions, improved natural resource management, and enhanced economic growth. One of the key drivers of green economic growth is the development of new technologies and innovations. For example, the development of renewable energy sources such as solar and wind power can help reduce reliance on fossil fuels, which are major contributors to climate change (IPCC, 2014). In addition, improvements in energy efficiency can help reduce energy waste, leading to increased efficiency and lower costs.

Another important aspect of green economic growth is sustainable land use practices. This can include conservation of biodiversity, reforestation, and the promotion of sustainable agriculture. By protecting natural ecosystems, we can ensure that they continue to provide vital services, such as water regulation and soil preservation, which are essential for human well-being and economic growth (Corvalan, Hales, McMichael, & Butler, 2005). On a corporate level, a lot of businesses have changed their priorities to invest more in green energy because they think it is the best way to stop global warming and be sustainable in the long term.

Logistic system and green economic growth have been extensively studied by researchers and economists. One of the key studies in this area was conducted by(Dekker, Bloemhof, &

Mallidis, 2012), who analyzed the role of logistics in promoting sustainable development. They found that effective logistics management can lead to reduced carbon emissions, improved resource utilization, and reduced waste. Another significant study was carried out by (S. A. R. Khan, Yu, & Umar, 2022), who investigated the impact of logistics efficiency on the green economy. They discovered that improvements in logistics efficiency can lead to significant reductions in greenhouse gas emissions and other environmental impacts, as well as improved resource utilization and cost savings. Additionally, a number of studies have focused on the role of green logistics in promoting sustainable economic growth. For example, (Liu & Dong, 2021) found that the adoption of green logistics practices can lead to improved competitiveness and increased market share for firms, as well as reduced costs and improved sustainability performance. Overall, these studies highlight the important role of logistics in promoting sustainable economic growth, and suggest that investments in green logistics practices and technologies can have a positive impact on both the economy and the environment. They came to understand that this strategy affects economic growth in addition to improving environmental performance (Hart & Ahuja, 1996). Many businesses, like Google, Facebook, and Apple, have made commitments to produce all of their energy from RE in the next years.

Renewable energy and logistics on economic growth has been the subject of numerous studies in recent years. One study by the International Energy Agency found that investment in renewable energy can lead to significant economic growth and job creation. The IEA estimates that every $1 million invested in renewable energy can create 8.5 jobs in the sector, compared to only 4 jobs in the fossil fuel industry (IEA, 2022). Furthermore, the implementation of renewable energy can lead to cost savings for both businesses and consumers. For example, a study by the National Renewable Energy Laboratory (NREL) found that commercial building owners who invest in renewable energy systems can see a return on investment in as little as five years, and a reduced energy bill in the long term. Logistics also plays a significant role in economic growth, as it enables the efficient movement of goods and services. A study by the World Bank found that countries with better logistics systems experience higher levels of economic growth and competitiveness (World Bank, 2013). In particular, the development of efficient renewable energy supply chains can lead to increased economic growth and job creation. However, it is important to note that the transition to renewable energy and the development of efficient logistics systems can also present challenges. For example, the cost of renewable energy technology can be a barrier to widespread adoption, and the development of new supply chains and distribution networks can be complex and expensive (IEA, 2022). The main research questions addressed in this study explore the impact of various factors on economic growth and development in the Asian region. The focus is on the interplay between logistics systems, renewable energy, carbon emissions, and green economic growth. By examining these questions, we aim to find solutions that can contribute to conventional economic development in the Asian region. By pursuing this study, main objective is to provide a comprehensive examination of the interconnections between the various factors that influence economic growth and development in the Asian region. The results of this study will shed light on the most effective strategies for promoting sustainable economic development in the region, and provide valuable insights for policymakers and stakeholders who are seeking to drive positive change. The study’s unique focus on the interplay between logistics systems, renewable energy, carbon emissions, and green economic growth sets it apart from previous research and provides a comprehensive perspective on the challenges and opportunities for sustainable economic development in the Asian region.

Several researchers and academics started examining the connection between logistical management systems, RE, and growth. Others were persuaded that this relationship is a good-faith circle, arguing that RE consumption is affecting growth positively and significantly, which in turn causes economic growth to accelerate. Some researchers discovered a one-way relationship between the use of renewable energy and a country's economic growth, or the opposite. Clarkson, Li, Richardson, and Vasvari (2011); Nelling and Webb (2009) examined if the adoption of sustainable energy systems enhanced the economies of the nations (Martí-Ballester, 2017) and looked into the relationship between RE use and economic growth. The primary objective of this study is to determine the impact of renewable energy recital on business financial routine in developing markets. International decision-makers worked really hard to pass environmental laws that would benefit nations in general and businesses in particular. However, both nations and businesses need to adhere to and put these regulations into practice. We do, however, have a challenge, laws and social position of many nations vary, as do the

enterprises. Renewable energy and logistics play a crucial role in promoting economic growth. The world is facing an unprecedented energy crisis, with a growing demand for energy, which is further complicated by the depletion of finite energy sources. The adoption of renewable energy sources such as solar, wind, and hydro power offers a solution to the energy crisis and helps to promote economic growth. The integration of renewable energy into the energy mix leads to increased energy security, reduced dependence on fossil fuels, and a decrease in greenhouse gas emissions. Logistics is an important component of the economy and a key driver of economic growth. It involves the efficient and effective management of the movement of goods and services from one place to another (Wang & Wang, 2020). The growth of the logistics sector depends on a reliable energy supply and the availability of efficient transportation systems. The integration of renewable energy into the logistics sector can lead to lower energy costs, increased energy security, and reduced carbon emissions.

However, despite the potential benefits of renewable energy and logistics, the development of these industries is often hindered by a number of challenges. The lack of infrastructure and investment in renewable energy projects can make it difficult to scale up production and distribution. The logistics sector faces challenges such as high transportation costs, congestion, and lack of investment in efficient transportation systems. These challenges can limit the potential of renewable energy and logistics to promote economic growth. To overcome these challenges and promote economic growth, it is important to develop and implement effective policies and strategies that support the integration of renewable energy and logistics. This can include the creation of favorable investment environments, the development of renewable energy infrastructure, and the promotion of efficient transportation systems. Governments can also provide financial incentives to support the growth of renewable energy and logistics, such as tax credits and grants.

Renewable energy and logistics are critical components of the economy that play a significant role in promoting economic growth. Despite the challenges, the integration of renewable energy and logistics can lead to increased energy security, reduced dependence on fossil fuels, and reduced carbon emissions. Numerous researchers looked at the relationship between renewable energy and effective logistic system without accounting for cultural differences across nations or variations in industrial structures (Clarkson et al., 2011; Lee & Shin, 2018; Martí-Ballester, 2017; Nelling & Webb, 2009). By examining how the performance of renewable energy, logistic system their interaction and carbon emission impacts on conventional economic growth, this thesis aims to close the gap. Based on the above discussion this study aimed to examine the impact Effective Logistic System on Economic Growth in Selected Asian counties and the presence of renewable energy consumption.

2. Research Methodology

2.1. Theoretical Framework

The relationship between economic growth and effective logistics systems has been widely studied and discussed in academic and policy circles. Numerous studies have found a strong positive correlation between the two, with improved logistics performance leading to increased economic growth and vice versa. Economic growth and effective logistics systems are positively correlated, as the efficient movement of goods and services within a country is crucial for boosting economic activity and promoting economic development. In Asian countries, improving logistics infrastructure and operations has become a priority for governments and businesses, as these nations aim to increase competitiveness and trade within the region and globally. Studies have shown that investment in logistics can have a positive impact on a country's Gross Domestic Product growth rate. For example, a study by the World Bank found that a 1% increase in logistics performance can lead to a 0.5% increase in a country's GDP (Munim & Schramm, 2018). Additionally, efficient logistics systems can lead to reduced transportation costs, improved delivery times, and increased trade, all of which can drive economic growth. One another study by the found that countries with better logistics systems tend to have higher levels of economic growth, lower poverty rates, and greater competitiveness. The study also found that investment in logistics infrastructure and improvements in the efficiency of logistics operations can boost economic growth and trade, particularly in developing countries. However, implementing effective logistics systems in Asian countries can be challenging due to several factors such as inadequate transportation infrastructure, corruption, and bureaucratic barriers. Therefore, governments in the region need

to take a proactive approach to address these challenges and create an enabling environment for the development of effective logistics systems.

A research paper by the K. A. Khan et al. (2019) found that the quality of a country's logistics system is a significant predictor of economic growth. The authors used data from the World Bank's Logistics Performance Index to demonstrate the positive correlation between logistics performance and economic growth. They also found that investment in logistics infrastructure and improvements in the efficiency of logistics operations are crucial for boosting economic growth and competitiveness. The logistic performance index is a reliable indicator of a country's economic growth potential (Civelek, Uca, & Çemberci, 2015). Inefficient logistics systems hinder economic growth and competitiveness (Chakamera & Pisa, 2021). Effective logistics management is crucial for sustainable economic development (Gu & Wang, 2022). The integration of modern technologies in the logistics sector boosts economic growth (Saidi, Mani, Mefteh, Shahbaz, & Akhtar, 2020). Another study by the Canton (2021) found that efficient logistics systems can significantly contribute to economic growth by reducing transaction costs, improving delivery times, and facilitating trade. The study also emphasized the importance of investing in logistics infrastructure, such as ports, roads, and intermodal transport systems, to support the development of efficient logistics systems and promote economic growth. Additionally, a research paper by Liu and Dong (2021) found that the impact of logistics performance on economic growth is particularly strong in developing countries, where logistics systems are often less developed and inefficient. The authors concluded that investment in logistics infrastructure and improvements in the efficiency of logistics operations can help to close the gap between developed and developing countries, thereby promoting economic growth and development. Improved logistic performance leads to increased economic growth (Hausman, Lee, & Subramanian, 2013). The quality of a country's logistics system are positively related to its level of economic development (Navickas, Sujeta, & Vojtovich, 2011).

Investments in logistics infrastructure result in higher economic growth (Magazzino & Mele, 2021). Better logistics performance enhances a country's competitiveness in the global market (Göçer, Özpeynirci, & Semiz, 2022). Efficient logistics management contributes to higher Gross Domestic Product (Jayathilaka et al., 2022). The relationship between economic growth and effective logistics systems is generally positive; it is not always straightforward and depends on a variety of factors. A research paper by the Goel, Saunoris, and Goel (2021) found that the relationship between economic growth and logistics performance is not straightforward and depends on a number of factors, such as the level of economic development, the size of the economy, and the quality of institutions. The authors concluded that while investment in logistics infrastructure and improvements in logistics performance can boost economic growth in some cases, this is not always the case (Gani, 2017). For example, in countries with poor institutions and high levels of corruption, investment in logistics infrastructure may not lead to improved logistics performance or economic growth. The relationship between economic growth and effective logistics systems is well established, with numerous studies and reports highlighting the positive impact of improved logistics performance on economic growth. Investment in logistics infrastructure and operations is crucial for boosting economic growth, particularly in developing countries in Asia and elsewhere. Economic growth and effective logistics systems are closely linked, and investment in logistics infrastructure and operations can play a significant role in boosting economic development in Asian countries. Governments and businesses in the region should prioritize the development of efficient logistics systems to drive economic growth. Thus, research posit that components of Logistic management system i.e. LPIAT, LPICQ, LPIEA, LPIEC, LPIFS and LPIQT positively affect GDP.

2.2. The Model

The model of the present study based on past studies conducted by (K. A. Khan et al., 2019; Liu & Dong, 2021; Mohsin, Taghizadeh-Hesary, Iqbal, & Saydaliev, 2022). The equational form of the model of the study is as:

$$GDPC = \beta 0 + \beta 1LPIAT + \beta 2LPICQ + \beta 3LPIEA + \beta 4LPIEC + \beta 5LPIFS + \beta 6LPIQT + \beta 7RENWC + \beta 8CO2 + \varepsilon \quad (1)$$

Where GDPC is the gross domestic product per capita (a dependent variable)
GDP= Gross Domestic Product (a dependent variable)
LPIAT= tracking & tracing consignments' ability

LPICQ= Quality of logistics system services
LPIEA= priced shipments' arrangement
LPIEC= customs clearance process's efficiency
LPIFS= Frequency of shipments delivered at specified time
LPIQT= Quality of infrastructure related to trade 0
REC= Renewable energy consumption
CO_2 = Carbon Dioxide emissions
ε is the random error term.
β0, β1, β2, ..., βk are the estimated coefficients for the independent variables

2.3. Economic Growth

Economic growth means an increase in a country's production of goods & services over a period of time. GDP is the total value of all goods & services produced within a country's borders in a given time period over a period of one year. According to the International Monetary Fund (IMF), GDP per capita is an important metric for a country's economic performance, as it considers both output and population size (IMF, 2022). The World Bank also notes that economic growth is often measured by the change in real GDP per capita, adjusted for inflation, over a specific time period (World Bank, 2013). A positive change indicates growth while a negative change indicates contraction. These definitions emphasize the importance of considering both the output and population size in measuring a country's economic growth and adjusting for inflation to compare growth over time.

2.4. Effective Logistic System

The Logistics system is a measure of a country's ability to provide efficient and effective logistics services. It is published by the World Bank and is based on a survey of firms that have experience importing and/or exporting goods. The effective logistic system assesses various aspects of a country's logistics environment, including customs procedures, infrastructure, reliability of transportation services, and the competence of logistics services (Skorobogatova & Kuzmina-Merlino, 2017). According to a research article by the World Bank, the Logistics Performance Index "provides a unique benchmarking tool for logistics providers, policymakers, and firms to assess the performance of logistics systems in different countries." The article goes on to state that the effective logistic system "enables firms to make informed decisions about their global supply chains and helps policymakers to identify opportunities for improving the competitiveness of their logistics systems." Another research article published by the World Bank explains that the LPI focuses on the ability of a country to provide efficient and effective logistics services, considering the country's performance in areas such as infrastructure, customs procedures, transportation services, and the competence of logistics services. The article further states that the effective logistic system "provides a comprehensive and objective measure of a country's logistics environment, enabling firms to make informed decisions about their supply chains and helping policymakers to identify areas for improvement (Song et al., 2022)". These definitions highlight the importance of the Logistics Performance Index as a tool for assessing the efficiency and effectiveness of a country's logistics services. The effective logistic system is valuable for firms looking to make informed decisions about their global supply chains and for policymakers looking to improve the competitiveness of their logistics systems.

2.5. Renewable Energy Consumption

Renewable energy consumption refers to the use of renewable energy sources, such as solar, wind, hydro, geothermal, and bioenergy, to generate electricity, heat, or transportation fuel. Renewable energy sources are considered to be renewable because they are replenished naturally, unlike non-renewable sources such as fossil fuels (Groth, 2007). According to a study by the International Renewable Energy Agency (IRENA), "renewable energy consumption refers to the use of renewable energy sources to provide energy services, such as electricity, heating, and cooling, for residential, commercial, and industrial sectors." The European Commission defines renewable energy consumption as "the energy produced by renewable energy sources that is used directly or indirectly by final consumers, including households, businesses, and public institutions." The U.S. Energy Information Administration (EIA) notes that "renewable energy consumption includes energy from renewable sources that are used directly or indirectly to generate electricity, heat, and transportation fuel (Alrikabi, 2014)". These definitions emphasize the importance of using renewable energy sources, such as wind, solar, hydro, geothermal, and bioenergy, to meet the energy needs of households, businesses, and public

institutions. Renewable energy consumption is seen as a way to reduce dependence on non-renewable sources and to promote a sustainable and clean energy future.

2.6. Carbon Emission CO_2

Carbon dioxide emissions refer to the release of the greenhouse gas into the atmosphere from human activities, such as the burning of fossil fuels for energy and transportation. CO_2 is considered to be the leading contributor to global warming and climate change. A study in the "Nature Climate Change" states that human activities such as the burning of fossil fuels, deforestation, and land-use changes cause carbon emissions. These emissions have a significant impact on the Earth's atmosphere and ecosystems (Mackey et al., 2013). According to an article in the "Cleaner Production," CO_2 emissions are the largest contributor to the increase in atmospheric greenhouse gases. The emission of CO_2 occurs from the burning of fossil fuels for energy and transportation, as well as from industrial processes (Herzog & Golomb, 2004). These sources emphasize the importance of reducing CO_2 emissions as a means to address global warming and climate change. The transition to clean energy sources and decreased reliance on fossil fuels is seen as crucial in mitigating the effects of carbon emissions on the environment.

2.7. Definitions of Variables and Data Sources

Table-1: presents several key variables related to the environment and energy production. These variables include economic growth as measured by GDP, effective logistic system as measured by logistic performance index from the World Bank, renewable energy consumption, and carbon dioxide emissions. All of these variables are important indicators of the state of the economy and the environment, and they play a critical role in shaping policies related to sustainable development and the transition to clean energy. Understanding these variables and the trends they reflect is essential for designing effective strategies to address global challenges such as climate change and environmental degradation.

Table 1: Study Variables and their Measurements

Variables	Definitions	Measurements	Source/justification
Economic Growth	Economic growth is an increase in country's production of goods & services.	GDP per capita	WDI
Effective Logistic System	The Logistics system is a measure of a country's ability to provide efficient and effective logistics services.	Tracking and tracing consignments quality Quality of logistics services Arranging competitively priced shipments customs clearance process' efficiency Frequency of shipments which reach consignment within scheduled time Quality of infrastructure and transport-related	WDI (Mohsin et al., 2022)
Renewable Energy Consumption	Renewable energy sources are considered to be renewable because they are replenished naturally.	REC (% of total final energy consumption)	WDI(Bhattacharya, Paramati, Ozturk, & Bhattacharya, 2016)
CO_2 Emission	CO_2 emissions are those stemming from the burning of fossil fuels and refer to the release of the greenhouse gas into the atmosphere from human activities.	CO_2 emissions (metric tons per capita)	WDI (Acheampong, 2018)

2.8. Econometric Techniques Employed

This study deals in correlation, Hausman test and in Fixed and Random Effect techniques.

3. Results and Discussions

In this part of the study results of the different techniques are presented in turn.

3.1. Correlation Results

The results of correlation are presented in the following table.

Table: 2 Correlation Matrix

	GDP	GGDP	LPIAT	LPICQ	LPIEA	LPIEC	LPIFS	LPIQT
GDP	1.000							
GGDP	0.126	1.0000						
LPIAT	-0.03	-0.086	1.000					
LPICQ	-0.03	-0.051	0.788	1.000				
LPIEA	-0.04	-0.026	0.772	0.791	1.000			
LPIEC	-0.03	0.008	0.767	0.871	0.752	1.000		
LPIFS	-0.00	0.0140	0.802	0.674	0.769	0.585	1.000	
LPIQT	-0.10	0.0239	0.810	0.901	0.835	0.876	0.708	1.000
REC	0.329	-0.035	-0.369	-0.670	-0.548	-0.497	-0.490	-0.708
CO2	-0.40	-0.085	-0.066	0.251	0.048	0.124	0.046	0.284
RNAT	0.309	-0.050	-0.284	-0.555	-0.367	-0.435	-0.354	-0.537
RNCQ	0.316	-0.044	-0.303	-0.514	-0.357	-0.407	-0.385	-0.520
RNEA	0.295	-0.049	-0.291	-0.539	-0.308	-0.423	-0.346	-0.517
RNEC	0.308	-0.034	-0.302	-0.526	-0.362	-0.374	-0.392	-0.514
RNFS	0.309	-0.049	-0.300	-0.581	-0.367	-0.467	-0.311	-0.558
RNQT	0.296	-0.034	-0.289	-0.523	-0.335	-0.395	-0.370	-0.484
	REC	**CO_2**	**RNEA**	**RNAT**	**RNCQ**	**RNEC**	**RNFS**	**RNQT**
REC	1.000							
CO2	-0.680	1.000						
RNAT	0.769	-0.508	1.000					
RNCQ	0.776	-0.516	0.994	1.000				
RNEA	0.761	-0.513	0.994	0.993	1.000			
RNEC	0.800	-0.529	0.991	0.995	0.989	1.000		
RNFS	0.724	-0.488	0.993	0.983	0.989	0.978	1.000	
RNQT	0.804	-0.538	0.990	0.993	0.991	0.993	0.976	1.000

As it is indicated in the table-2, there is significant correlation between variables, as study explains that there is positive association between GDP and LPIEC these both are genuinely correlated, GDP and CO_2 show a negative relation with each other, and GDP with REC has a positive association with the coefficient of 0.329. The interaction of all LPI's and REC shows a positive relation with GDP but on the other hand all interaction with GDP are negatively associated with each other. But if we see in table-2, GRGDP have mixed relationship logistic performance indexes indicators i.e., LPIAT, LPICQ and LPIEA shows a negative relationship with GDP and other indicators like LPIEC, LPIFS and LPIQT shows a positive relationship with GDP. The same measures are used by Mohsin et al. (2022). They have used these measures in their study.

Correlation analysis is a useful tool for understanding the relationship between variables, but it should be interpreted with caution. It is just one piece of evidence in the larger puzzle of understanding the world and should be complemented with other techniques, such as regression analysis and experimentation, to establish cause and effect relationships.

3.2. Hausman Test

This test is used for whether fixed and random effect test should be used for estimation purpose. The decision under which the compatible estimation technique will be selected is as under:

The probability value of the chi-square is 0.4556, which indicates that it is greater than 0.05. and directed to use random effect. This examination suggests that suitable technique for the analysis of the relationship between logistic management system and economic growth is in the selected countries is Random effect technique.

3.3. Random Effect Regression

Fixed effect regression is used in this research and its aims to control for the effects of confounding variables that are not randomly distributed across this study group. This regression analysis is used when the aim is to estimate the average treatment effect of a variable on the outcome, while controlling for the effects of other confounding variables that are stable within each group or individual. After making a comparison between fixed and random effect regression Hausman test identifies and provides a test statistic to determine which model is more

appropriate. While performing the analysis study gets the results which was accepting the null hypothesis, that makes random effect model is more appropriate over the fixed effect regression. Results of the study is shown in table-3.

Table 3: Random Effect Regression

Variable	Model-1 (GDPC)	Model-2 (GDP)
LPIAT	0.455 (0.021)	0.726*** (0.206)
LPICQ	0.724 (0.031)	0.258* (0.091)
LPIEA	0.091** (0.052)	0.281 (0.549)
LPIEC	-0.272* (0.0357)	−3.228*** (0.588)
LPIFS	0.081*** (0.0302)	0.704* (0.326)
LPIQT	-0.0432 (0.004)	1.333 (1.773)
REC	----------	0.444*** 0.085
CO_2	0.075** (0.027)	0.057 (0.085)

Note: *, ** and ***for 10%, 5% and 1% respectively, Standard errors are in parenthesis

LPIAT is considered an insignificant result with GDP is the dependent variable, it means that the relationship between LPIAT and GDP is not statistically significant at a certain level of confidence, often taken to be 5% or 1%. LPIAT 0.726*** (0.206) is significant with GDP indicates that there is a statistically significant positive relationship between the independent variable LPIAT and the dependent variable GDP. The coefficient estimates of 0.726 suggests that for every 1 unit increase in LPIAT, GDP is estimated to increase by 0.726 units, on average. LPICQ 0.724 (0.031) is insignificant with GDP" means that the relationship between the independent variable LPICQ and the dependent variable GDP is not statistically significant at a certain level of confidence. The result "LPICQ 0.258* (0.091) is significant with GDP" indicates that there is a statistically significant positive relationship between the independent variable LPICQ and the dependent variable GDP at a certain level of confidence. The coefficient estimates of 0.258 suggests that for every 1 unit increase in LPICQ, GDP is estimated to increase by 0.258 units, on average. The next result "LPIEA with GDP is significant .0916** (0.052)" indicates that there is a statistically significant positive relationship between the independent variable LPIEA and the dependent variable GDP. The coefficient estimates of 0.0916 suggests that for every 1 unit increase in LPIEA, GDP is estimated to increase by 0.0916 units, on average. LPIEA 0.281 (0.549) is insignificant with GDP.

LPIEC -0.272* (0.0357) is significant at 10% with GDP indicates that there is a statistically significant negative relationship between the independent variable LPIEC and the dependent variable GDPC at a level of confidence of 10%. The coefficient estimates of -0.272 suggests that for every 1 unit increase in LPIEC, GDP is estimated to decrease by 0.272 units, on average. LPIEC -3.228*** (0.588) is significant with GDP the coefficient estimates of -3.228 suggests that for every 1 unit increase in LPIEC, GDP is estimated to decrease by 3.228 units, on average. The results suggest that all independent variables (LPIFS, RENWC, and CO2) have a statistically significant relationship with the dependent variable GDP. However, LPIQT does not have a statistically significant relationship with GDPC. The coefficient estimates suggest that an increase in LPIFS will help to increase growth as there is positive relationship between the two variables. The impact of REC on growth is found positive and statistically significant. For every increase in CO_2 has increased growth as the value of the coefficient is positive with a value of 0.0756.

The results suggest that all independent variables (LPIFS, REC) have a statistically significant relationship with the dependent variable GDP. However, LPIQT and CO_2 do not have a statistically significant relationship with GDP. The coefficient estimates suggest that for every an increase in LPIFS, leads to increase in GDP as the estimated value of the coefficient is positive with value of 0.704. Moreover, an increase REC leads to increase in growth as the estimated value of the coefficient is 0.444, which is a positive value.

4. Conclusion

The conclusion of a study on the impact of effective logistics management systems and REC on growth in selected Asian economies are aimed to assess the impact of logistics management systems and renewable energy on conventional economic growth in Asian countries. The analysis used GDP as dependent variable, and logistics management systems, renewable energy consumption, and CO_2 emissions as independent variables. The results of the study showed that effective logistics management systems and REC have strong impact on GDP

in selected Asian countries. This suggests that investing in and improving logistics management systems, as well as increasing the use of renewable energy sources, could help to promote conventional economic growth in these countries. The study also found that CO_2 emissions have a positive and direct impact on both GDP. This highlights the importance of reducing CO_2 emissions in order to promote GDP in Asian countries.

The findings of the present study provide important insights into the role of logistics management systems and renewable energy in promoting GDP in selected Asian countries. The findings suggest that investing in and improving logistics management systems, increasing the use of renewable energy sources, and reducing CO_2 emissions could be key strategies for promoting GDP in these countries. In addition to these findings, the study highlights the need for further research to explore the specific strategies and initiatives that could be implemented to maximize the positive impact of effective logistics management systems and renewable energy on sustainable and economic growth in Asian countries. It's important to note that the results of this study are specific to selected Asian countries and may not generalize to other regions. Further research is needed to assess the impact of effective logistics management systems and renewable energy on sustainable economic growth in other regions and countries. The study provides valuable insights into the relationship between effective logistics management systems, REC, CO_2 emissions, and sustainable economic growth in Asian countries. The findings suggest that investing in and improving logistics management systems, increasing the use of RE sources, and reducing CO_2 emissions could be key strategies for promoting GDP in these countries.

4.1. Policy Recommendations

The study focuses solely on selected Asian countries and the findings may not be generalizable to other regions or countries. Further research is needed to assess the impact of effective logistics management systems and renewable energy consumption on GDP in other regions and countries. This will help to provide a more comprehensive understanding of these relationships and to identify best practices that can be applied in different regions and countries. The study relies on secondary data sources, which may not accurately reflect the actual situation in Asian countries. Future research should collect primary data to provide a more accurate understanding of the relationships between effective logistics management systems, renewable energy consumption, CO_2 emissions, and GDP in Asian countries. The study focuses on a specific time period and may not accurately reflect the current situation or future trends. Future research should use longitudinal data to assess the impact of changes in logistics management systems, REC, and CO_2 emissions over time on GDP in Asian countries. The study is based on a cross-sectional analysis and does not establish causality between the independent and dependent variables. Future research should use panel data or experimental methods to establish the causal relationship between effective logistics management systems, REC, CO_2 emissions, and GDP in selected Asian countries.

Reference

Aldakhil, A. M., Nassani, A. A., Awan, U., Abro, M. M. Q., & Zaman, K. (2018). Determinants of green logistics in BRICS countries: An integrated supply chain model for green business. *Journal of Cleaner Production, 195*, 861-868. doi:https://doi.org/10.1016/j.jclepro.2018.05.248

Alrikabi, N. (2014). Renewable energy types. *Journal of Clean Energy Technologies, 2*(1), 61-64.

Canton, H. (2021). United nations conference on trade and development—unctad. In *The Europa Directory of International Organizations 2021* (pp. 172-176): Routledge.

Chakamera, C., & Pisa, N. M. (2021). Associations between logistics and economic growth in Africa. *South African Journal of Economics, 89*(3), 417-438. doi:https://doi.org/10.1111/saje.12272

Chlyeh, D. (2020). *The impact of renewable energy performance on corporate financial performance.* İbn Haldun Üniversitesi, Lisansüstü Eğitim Enstitüsü, Retrieved from https://hdl.handle.net/20.500.12154/1628

Civelek, M. E., Uca, N., & Çemberci, M. (2015). The mediator effect of logistics performance index on the relation between global competitiveness index and gross domestic product. *European Scientific Journal May*.

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2011). Does it really pay to be green? Determinants and consequences of proactive environmental strategies. *Journal of accounting and public policy, 30*(2), 122-144. doi:https://doi.org/10.1016/j.jaccpubpol.2010.09.013

Cooper, M. C., Lambert, D. M., & Pagh, J. D. (1997). Supply chain management: more than a new name for logistics. *The international journal of logistics management, 8*(1), 1-14. doi:https://doi.org/10.1108/09574099710805556

Corvalan, C., Hales, S., McMichael, A. J., & Butler, C. (2005). *Ecosystems and human well-being: health synthesis* (Vol. 1): World Health Organization.

Dekker, R., Bloemhof, J., & Mallidis, I. (2012). Operations Research for green logistics–An overview of aspects, issues, contributions and challenges. *European journal of operational research, 219*(3), 671-679. doi:https://doi.org/10.1016/j.ejor.2011.11.010

Gani, A. (2017). The logistics performance effect in international trade. *The Asian Journal of Shipping and Logistics, 33*(4), 279-288. doi:https://doi.org/10.1016/j.ajsl.2017.12.012

Göçer, A., Özpeynirci, Ö., & Semiz, M. (2022). Logistics performance index-driven policy development: An application to Turkey. *Transport policy, 124*, 20-32. doi:https://doi.org/10.1016/j.tranpol.2021.03.007

Goel, R. K., Saunoris, J. W., & Goel, S. S. (2021). Supply chain performance and economic growth: The impact of COVID-19 disruptions. *Journal of Policy Modeling, 43*(2), 298-316. doi:https://doi.org/10.1016/j.jpolmod.2021.01.003

Groth, C. (2007). *A new-growth perspective on non-renewable resources*: Springer.

Gu, W., & Wang, J. (2022). Research on index construction of sustainable entrepreneurship and its impact on economic growth. *Journal of Business Research, 142*, 266-276. doi:https://doi.org/10.1016/j.jbusres.2021.12.060

Hart, S. L., & Ahuja, G. (1996). Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance. *Business strategy and the Environment, 5*(1), 30-37. doi:https://doi.org/10.1002/(SICI)1099-0836(199603)5:1<30::AID-BSE38>3.0.CO;2-Q

Hausman, W. H., Lee, H. L., & Subramanian, U. (2013). The impact of logistics performance on trade. *Production and Operations Management, 22*(2), 236-252. doi:https://doi.org/10.1111/j.1937-5956.2011.01312.x

Herzog, H., & Golomb, D. (2004). Carbon capture and storage from fossil fuel use. *Encyclopedia of energy, 1*(6562), 277-287.

IEA. (2019). *IEA – International Energy Agency*. Retrieved from https://www.iea.org

IEA. (2022). *IEA – International Energy Agency*. Retrieved from https://www.iea.org

IMF. (2022). *IMF Annual Report 2022: Crisis upon crisis - World | ReliefWeb*. Retrieved from https://reliefweb.int/report/world/imf-annual-report-2022-crisis-upon-crisis-enarruzh?gclid=CjwKCAjw_YShBhAiEiwAMomsEKQu57DwXsUV8K0ae1O-TSvbhBLgAi95_Ee9FWLhBqd9uDNLvPD9LBoCt1sQAvD_BwE

IPCC. (2014). *Find the IPCC Report Here - United Nations*. Retrieved from https://www.un.org/en/climatechange/reports?gclid=CjwKCAjw_YShBhAiEiwAMomsEGNUJkUjTtLpeIcy-aegR6VGO91xUjV004VDZXOesSSxKcguBPFZShoCwikQAvD_BwE

Jayathilaka, R., Jayawardhana, C., Embogama, N., Jayasooriya, S., Karunarathna, N., Gamage, T., & Kuruppu, N. (2022). Gross domestic product and logistics performance index drive the world trade: A study based on all continents. *PloS one, 17*(3), e0264474. doi:https://doi.org/10.1371/journal.pone.0264474

Khan, K. A., Çera, G., & Nétek, V. (2019). Perception of the Selected Business Environment Aspects by Service Firms: Ajaz Khan, K., Çera, G., Nétek, V.(2019). Perception of the Selected Business Environment Aspects by Service Firms. Journal of Tourism and Services, 10 (19): 111-127. https://doi. org/10.29036/jots. v10i19. 115. *Journal of Tourism and Services, 10*(19), 111-127.

Khan, S. A. R., Yu, Z., & Umar, M. (2022). A road map for environmental sustainability and green economic development: an empirical study. *Environmental Science and Pollution Research*, 1-9. doi:https://doi.org/10.1007/s11356-021-16961-1

Lee, I., & Shin, Y. J. (2018). Fintech: Ecosystem, business models, investment decisions, and challenges. *Business horizons, 61*(1), 35-46. doi:https://doi.org/10.1016/j.bushor.2017.09.003

Liobikienė, G., & Butkus, M. (2017). The European Union possibilities to achieve targets of Europe 2020 and Paris agreement climate policy. *Renewable Energy, 106*, 298-309. doi:https://doi.org/10.1016/j.renene.2017.01.036

Liu, Y., & Dong, F. (2021). How technological innovation impacts urban green economy efficiency in emerging economies: A case study of 278 Chinese cities. *Resources, Conservation and Recycling, 169*, 105534. doi:https://doi.org/10.1016/j.resconrec.2021.105534
Mackey, B., Prentice, I. C., Steffen, W., House, J. I., Lindenmayer, D., Keith, H., & Berry, S. (2013). Untangling the confusion around land carbon science and climate change mitigation policy. *Nature climate change, 3*(6), 552-557.
Magazzino, C., & Mele, M. (2021). On the relationship between transportation infrastructure and economic development in China. *Research in Transportation Economics, 88*, 100947. doi:https://doi.org/10.1016/j.retrec.2020.100947
Martel, A., Klibi, W., Martel, A., & Klibi, W. (2016). SCNs for Sustainable Development. *Designing Value-Creating Supply Chain Networks*, 463-501. doi:https://doi.org/10.1007/978-3-319-28146-9_12
Martí-Ballester, C.-P. (2017). Sustainable energy systems and company performance: Does the implementation of sustainable energy systems improve companies' financial performance? *Journal of Cleaner Production, 162*, S35-S50. doi:https://doi.org/10.1016/j.jclepro.2016.12.015
Mohsin, M., Taghizadeh-Hesary, F., Iqbal, N., & Saydaliev, H. B. (2022). The role of technological progress and renewable energy deployment in green economic growth. *Renewable Energy, 190*, 777-787. doi:https://doi.org/10.1016/j.renene.2022.03.076
Munim, Z. H., & Schramm, H.-J. (2018). The impacts of port infrastructure and logistics performance on economic growth: the mediating role of seaborne trade. *Journal of Shipping and Trade, 3*(1), 1-19. doi:https://doi.org/10.1186/s41072-018-0027-0
Navickas, V., Sujeta, L., & Vojtovich, S. (2011). Logistics systems as a factor of country's competitiveness. *Ekonomika ir vadyba*(16), 231-237.
Nelling, E., & Webb, E. (2009). Corporate social responsibility and financial performance: the "virtuous circle" revisited. *Review of Quantitative finance and accounting, 32*, 197-209. doi:https://doi.org/10.1007/s11156-008-0090-y
OECD. (2008). *OECD Annual Report 2008*. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjzw_Gehfz9AhWKhf0HHbAxA6cQFnoECBoQAQ&url=https%3A%2F%2Fwww.oecd-ilibrary.org%2Feconomics%2Foecd-annual-report-2008_annrep-2008-en&usg=AOvVaw3b03I-dlvANqjIAyoRYV2u
Pozzer, A., Tsimpidi, A. P., Karydis, V. A., De Meij, A., & Lelieveld, J. (2017). Impact of agricultural emission reductions on fine-particulate matter and public health. *Atmospheric Chemistry and Physics, 17*(20), 12813-12826. doi:https://doi.org/10.5194/acp-17-12813-2017
Rafael, S., Correia, L., Ascenso, A., Augusto, B., Lopes, D., & Miranda, A. (2021). Are green roofs the path to clean air and low carbon cities? *Science of the Total Environment, 798*, 149313. doi:https://doi.org/10.1016/j.scitotenv.2021.149313
Saidi, S., Mani, V., Mefteh, H., Shahbaz, M., & Akhtar, P. (2020). Dynamic linkages between transport, logistics, foreign direct Investment, and economic growth: Empirical evidence from developing countries. *Transportation Research Part A: Policy and Practice, 141*, 277-293. doi:https://doi.org/10.1016/j.tra.2020.09.020
Sharvini, S. R., Noor, Z. Z., Chong, C. S., Stringer, L. C., & Yusuf, R. O. (2018). Energy consumption trends and their linkages with renewable energy policies in East and Southeast Asian countries: Challenges and opportunities. *Sustainable Environment Research, 28*(6), 257-266. doi:https://doi.org/10.1016/j.serj.2018.08.006
Skorobogatova, O., & Kuzmina-Merlino, I. (2017). Transport infrastructure development performance. *Procedia Engineering, 178*, 319-329. doi:https://doi.org/10.1016/j.proeng.2017.01.056
Song, J., Lee, K.-B., Zhou, Z., Jia, L., Cegielski, C., & Shin, S. I. (2022). Enhancing supply chain sensing capability through social media: an environmental scanning perspective. *Information Technology & People, 35*(1), 367-391. doi:https://doi.org/10.1108/ITP-11-2019-0609
Wang, Q., & Wang, L. (2020). Renewable energy consumption and economic growth in OECD countries: A nonlinear panel data analysis. *Energy, 207*, 118200. doi:https://doi.org/10.1016/j.energy.2020.118200
World Bank, W. (2013). *The World Bank Annual Report 2013*. Retrieved from https://elibrary.worldbank.org/doi/abs/10.1596/978-0-8213-9937-8

World health Organization, W. (2017). *UN World Health Organization (WHO)*. Retrieved from https://www.refworld.org/publisher/WHO.html

Zaman, K., & Shamsuddin, S. (2017). Green logistics and national scale economic indicators: Evidence from a panel of selected European countries. *Journal of Cleaner Production, 143*, 51-63. doi:https://doi.org/10.1016/j.jclepro.2016.12.150