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Impact of Global Markets on Green Supply Chain Management, Economic Growth, and Environment

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Abstract

The goal of this research is to learn how green logistics operations affect energy consumption, GDP growth, and environmental stability. The study will use panel data from 43 diverse nations all around the world to better understand the factors that influence the relationship between these variables. In order to draw reliable conclusions from the findings, the researchers used the panel GMM estimates. Findings demonstrated the consumption of energy and fossil fuel by logistics operations, with the quantity of these fuels and other non-green energy sources having an important negative impact on environmental sustainability. As well as a negatively influence on monetary development. Inadequate transport-related organization and logistics services are a major contribution to both CO_2 and total emissions of greenhouse gases. Carbon emissions, on the other hand, cause harm to both flora and fauna and slow down economic progress. According to the findings, the use of green practices and renewable sources of energy may be able to reduce the negative impact of logistical operations on the long-term viability of the environment and stimulate economic activity in a region, resulting in increased opportunities to export goods.

Keywords: *Green Logistics, Management, Environmental Sustainability, CO_2, Emissions, Renewable Energy Source*

1. Introduction:

Supply chains rely heavily on logistics. Storage, material handling, goods movement, and data processing are all crucial parts of a well-oiled supply chain, and logistics management encompasses all of these areas and more Several companies and logisticians began to implement the idea of green supply chain management in the 1990s (structure is needed; also add a reference) Ammar et al (2021). Without a shadow of a doubt, logistics is one of the leading causes of air pollution and a drag on national economies. Examined the link between environmentally responsible logistics and key economic metrics. The findings show that carbon emissions significantly affect GDP, income per person, and the industrial sector. khan et al (2017) Governments position also getting more aggressive in their efforts to establish environmental legislation as citizens become more aware of the importance of buying green and maintaining a sustainable lifestyle. Akenji, L. (2014).

Global sourcing has been used by numerous corporations as a business strategy since the industrial revolution. Countries' economies began to expand as globalization began, and businesses began using worldwide locating as a modest advantage. Brakman, S. (2006). On the other hand, universal sourcing has significant negative effects on environmental sustainability because of the extensive transit involved and the lengthy lead times involved In a similar vein, United Nations (2014) reveals some crucial details concerning transport, namely, that it accounts for over 22 percent of global carbon dioxide releases and about 18 percent of black carbon, both of which have a profoundly negative effect on the environment. Hominid health and contributes to a wide range of ailments like heart disease and cancer. Brown,et al (2002). Under the premise of the SC system emphasized the need of CSS (corporate social sustainability) for competitive advantages.

Supply chain management would be incomplete without logistics management. Companies are responding to customer demands for more environmentally friendly logistical practices by implementing green supply chain management (GSCM). GSCM practices and investment in cleaner technology not only improve environmental sustainability, but also boost long-term profits and provide businesses an edge in the market. Yildiz et al (2019). Recently, the concept of green corridors has been established to regulate environmental elements that impact fuel consumption Environmental performance in freight transport will be enhanced in the future thanks to the new idea of green corridors, which will regulate and drastically cut CO2 productions and fuel depletion. According to European Commission, the transport sector employs roughly 10 million people (4.5% of the total workforce) and contributes nearly 4.6% to GDP. Modarress et al. (2023)

The transportation sector relies heavily on oil, which accounts for nearly all of the sector's energy use. As a result, it is responsible for about 35% of GHG (greenhouse gas) emissions between 1990 and 2008 (European Commission, 2011).

The first step towards sustainability is undeniably the incorporation of environmentally friendly procedures into logistical operations. In accumulation, Green Supply Chain Management is presenting a chance near get a market edge in the area. Customers are increasingly putting pressure on businesses to adopt GSCM practices as they become more conscious of environmental concerns. Jum'a, et al (2022) the government's severe laws on environmental issues are causing businesses to approve extra supportable practices in their logistics activities. However, this effort is made more difficult due to the dearth of literature on how to include these issues. Layaoen,et al(2023).

We observed that most studies on GSCM were conducted via case studies and/or surveys administered within individual companies during our comprehensive literature analysis. Alghababsheh, et al (2023).

However, the scope of this study is much broader than that of similar studies. The purpose of this study is to examine the macro level correlations between logistics performance indicators and environmental and economic parameters in a portion of 43 leading global logistics states between 2007 and 2016. Magazzino, et al (2022).

2. Literature review

A comprehensive literature review was undertaken, following the recommendations of Tranfield et al. (2003) and Denyer and Tranfield (2009), in order to locate and analyze empirical studies that investigate the impacts of green supply chain management techniques in the manufacturing industrial within the AEE region. The temporal scope encompassed all scholarly articles published up until the conclusion of the year 2015. The extraction process was concluded in mid-March 2016 in order to incorporate volumes published in 2015 that were released towards the end of the year. Peng and Lin, 2022; Yang et al., 2022) into our study that were not retrieved via the database search. These articles are pertinent to our research and align with the meta-analysis conducted by Golicic and Smith (2013) on environmental supply chains.

Khan and colleagues, 2017a). Completed the research on environmentally friendly logistics as well as other macroeconomic indicators like the share of renewable energy in total energy use. The findings indicate that logistics indices interact with economic indicators on a national scale, which leads to environmentally responsible management of supply chains in the region. Without a shadow of a doubt, the activities involved in logistics required the use of energy in order to accomplish their goals, and according to Anable et al. (2012), the use of energy increased in the situation of global logistics.

According to Isaksson et al. (2011), The GSCM process includes a number of sub-processes, one of which is sustainable logistics. This process has been an extremely popular topic over the past couple of decades due to globalization, the need of customers, increased market competitiveness, and the discovery of new markets. In the sub-sections that follow, the comprehensive literature review will be offered for your perusal.

The connection between energy consumption and environmentally responsible supply chain management.

Logistics and energy consumption are a hot topic, so it's no surprise that this aspect of supply chain management gets a lot of talk. However, the utilization of renewable sources of energy is necessary for sustainability from the perspective of logistical indicators in order to decrease the negative impact that global logistics happenings have on the atmosphere. (2017), Abdo and Khan. GLP (green logistics performance) is a metric that takes been designed by the efficacy of the duties permission development to decrease carbon emissions, the standard of trade and conveyance-related organization, and the skill and value of logistics facilities while producing the fewest possible emissions.

Businesses increasingly see sustainable practices as a strategic instrument for boosting their economic effectiveness. For instance, eco-efficient businesses lessen their carbon footprints (Schenkel et al., 2015) and their reliance on nonrenewable resources in order to protect the environment's long-term viability. On the other side, businesses can save a significant amount of money by reusing, recycling, and remanufacturing the things they produce. There is no question that nations are coming to

understand the significance of managing their supply chains in an environmentally friendly manner. Empirical research by Zhu et al. (2008) in a Chinese context explains how Chinese businesses fight to enhance their green reputation through cleaner manufacture then renewable energy causes

Shahbaz et al. (2015), implementing government rules to inspire to domestic technology in corporate actions is a viable path toward green development. Energy efficiency, when combined with labor and capital, energy efficiency increases total economic growth, as noted by Shahbaz et al. (2015) and Bhattacharya et al. (2016). Midair pollution, populace development, energy request, and trade policies are identified as the primary drivers affecting worldwide ecological sustainability in the area.

According to Fahimnia et al. (2015), the supply chain (SC) may be more economical to run if there were no stringent regulatory and carbon taxing mechanisms in place. At what time around is no economic price placed happening businesses, however, which inhibits carbon emissions, toxic chemicals, and the overexploitation of finite resources. This results in the highest levels of emissions being produced as well. On the others, Dangelico and Pontrandolfo (2013) found that a negative association exists between the economic performance of an organization and an increase in the amount of CO2 emissions. Businesses have a number of options at their disposal for mitigating the negative consequences of their operations, including the utilization of alternative forms of energy, the reduction of the usage of risky and poisonous elements and resources, and other similar measures. Following the topic that was just presented, we come awake with the subsequent philosophy:

H1. Here is a direct correlation among the deposit of renewable energy then the efficiency of green logistics.

2.1. The connection among Green Logistics and Environmental Considerations.

Logistics and goods mobility can have negative impacts on the environment, however GSCM can help mitigate those consequences (Park et al., 2016). If the right legislation isn't in place to promote ecologically beneficial practices along the supply chain, the global environment will suffer. "(Wang et al., 2015)" Natural resource quality and quantity, climate change, waste management, energy consumption cuts, alternative energy production, and CO2 emission reductions are all factors in environmental sustainability. To wit: Khan et al.,(2017). emphasised that the glasshouse influence the trapping of solar thermal energy is intensified by the release of carbon dioxide into the atmosphere through the burning of fossil fuels (coal, natural gas, and oil), solid waste, and specific chemical reactions. Excessive carbon dioxide in the atmosphere hinders heat dissipation, leading to an increase in the Earth's average temperature. The logistics and transport sector relies heavily on fossil fuels to meet its energy demands, using up to 96% of total energy production between 1990 and 2008 (European Commission, 2011).

Since empirical study by Nakamichi et al. (2016) demonstrates that a Japanese company's pick-up truck suppliers are geographically spread near Bangkok, we estimate that CO2 emissions throughout the cross-border SC (supply chain) are 1.4 times greater than CO2 from local/domestic plants. Producing goods uses fossil fuels, which increases carbon dioxide emissions (D.a. et al., 2015), and nearly SC rely on newer, more energy-effectual technology. Other side, the world has saved between $80 and $90 billion thanks to JIT delivery, but this comes at the cost of increased CO2 emissions from increased trade. Imports of CO2-concentrated commodities necessitate multiple processes, such as uploading, transporting consignment, and storage in source fetter, which contribute to the generation of carbon

footprints at the consuming stage, as opposed to the manufacturing stage. Greater distances among derivation and terminus in the spreading system are directly correlated with increased CO2 emissions zaman et al., (2017); ali et al.,(2016). The conversion of logistics and transportation activities to biofuels sources was proposed by Lee & Wu (2014) to mitigate climate change, global warming, and promote environmental sustainability.

According to Hamelinck et al. (2005), rising global energy use has alleviated previously pressing environmental concerns. The United States, the United Kingdom, Canada, and China are just few of the country's leading the charge on environmental protection and public education through "Green" or "Sustainability" projects (Iakovou et al., 2010). According to Gold & Seuring (2011), the production of bio-ethanol provides one such illustrative bio-energy research concludes that bio-diesel and ethanol have a substantially more positive environmental life-cycle balance than relic oils. Together in an energy situation besides as a mechanical decision to reaction to weather variation, the routine of biofuels is pushed as a green another to relic oils, as confirmed by chenchin (2012). The primary benefit of biofuels stays the decreased production of greenhouse gases. According to Zawaydeh (2017), renewable energy systems that provide electricity close to home are more appealing than those that rely on imported fossil fuels.

Green practices in industry, particularly logistics activities, which have resulted in massive CO2 productions besides PM 2.05 (satisfactory particulate substance), are the key to solving environmental problems. Green technology has the potential to mitigate the negative possessions of releases by as considerable as 18 percent by 2021 (Savit et al., 2013), which is encouraging given that technology and the industrial revolution are major sponsors to conservational deprivation. In addition, the adoption of green practices and green technologies will counteract the growing carbon footprints in IT.

Regulatory bodies, consumer awareness, industrialists, and policymakers all need to work together to find solutions to environmental problems. Long-term development is best served by minimizing the negative effects on the environment caused by international logistics operations. as evidenced by the studies given above. It is assumed in the research (H2).Green logistics effectiveness is positively correlated with a higher level of environmental concern in supply chain management

2.2. The factors that influence economic health in respect to green logistics

The elimination of unnecessary byproducts is fundamental to sustainable green practices. Actually, reducing waste will also immediately result in (Jar et al., 2013) lower costs then improved monetary routine for businesses. GDP per capita, FDI influxes, besides business plainness as a percentage of GDP are the most reliable indicators of a country's economic performance (jan and Qianl, 2017; kamran and Suman, 2016). The connection among green practices in SC and financial presentation was confirmed by Rao and Holt (2005). They found that lime logistics initiatives improved attractiveness and financial health. qurban and Qianl (2015) discovered that green logistics processes are highly connected with economic health, and that green package management as part of the SC (supply chain) process is beneficial for both the financial stability of individual businesses and the national economy as a whole. It was determined by Huang and Yang (2014) that there is a direct association among reverse logistics innovation plus environmental performance.

Green supply chain practices have only marginally improved operational, environmental, and economic performance of enterprises, as demonstrated by Zhu et al. (2007). Green practices popular

logistics processes then decent conservational presentation contribute to a large and advanced influence in enterprises' monetary success, as was also noted by Giovanni . (2012). Companies' bottom lines will increase regardless of whether or not higher-level institutions exert unnecessary pressure, according to the research of Huang and Yang (2014). Empirical research on GSCM in U.S. industrial enterprises was undertaken by Jr et al. (2012). Green source sequence organization was found to have a considerable impact on company profitability, marketplace part, and modest advantage (Jar et al., 2013). In a similar vein, Jacksun et al. (2015) studied the impact of green business practices on company profits. In addition to boosting profits, the research found that incorporating green practices into supply chain operations also boosted companies' public perception.

The impact of green logistics on companies' bottom lines was investigated by Gimenez and Tachizawa (2012). They did not uncover any evidence that green logistics practices improved business profitability. According to the research (chand et al., 2016); businesses that use renewable energy then other environmentally friendly methods see an improvement in their bottom lines. In addition to boosting productivity, switching to renewable energy boosts a company's profile in the eyes of its customers. Reference: (King & Lenox, 2001). argued that regulators should do more to educate consumers and boost support for biofuel.

According to Lai et al. (2012), in order for China to achieve ecological modernization, Chinese export manufacturers will need to make adjustments to how they currently deal with environmental issues. Their involvement in finding solutions to these problems is crucial for environmental protection, as is their work to enhance and stability financial and conservational concert (Lai et al., 2012). Findings demonstrated the significant correlation between reverse logistics innovation and economic performance and competitive benefit (Huang & Yang, 2014). Previous studies have highlighted the need of (green logistics) maintaining eco-friendly operations to promote green transport crosswise republics through continuous economic policies in order to reap competitive advantages. Researchers in this study speculated:

H3 Green logistics operations maintain economic success, hypothesis.

3. Data and Methodology

The paper investigates the associations involving green logistics, environmental challenges, monetary growth, and the need for energy popular 43 different countries. Energy theaters a crucial title role in financial growth through supporting logistics, while SCM or global logistics activities negatively impact economic and environmental concerns without green performs and rules. According to the findings of this study, global logistics activities are linked to the state of the economy, environmental factors, and the need for energy, promoting green logistics across countries through national economic indicators. The resulting equality is founded on our theory.

$$L_i = {}_0 + Engy_i + Envt_i + Ecoc_i + Cont_i + \varepsilon_i$$

The letter "L" denotes the logistics performance indicators of service competence and quality, shipment tracking, competitive pricing, trade and transport infrastructure quality, shipment on-time delivery, and customs clearing efficiency. The indicator ranges from 1 to 5, with 1 indicating poor performance in logistics and 5 indicating excellent performance. Energy demand variables are calculated using Engy and include renewable energy consumption percentage (REC) and GDP each part of energy use

(Energy) in constant 2011 PPP $ per kilogram of lubricant correspondent. Savage, M. D. (2023). Total energy use, glasshouse gas emanations, and carbon dioxide emissions are all displayed in Envt as a function of the percentage of FFUEL used. Ecoc displays current US dollar health expenditure per capita (HEPC) and constant 2005 US dollar gross domestic product per capita (GDPPC) as economic health indicators. Rayan, et al (2022). Control variables in the model include FDI, IVD, MDV, AVD, Export, and Import percentages, with constant and error correction and ε. This research uses panel data from 43 nations worldwide to test our hypothesis and estimate panel data. The following equation evaluates green logistics performance

$$L_{it} = {}_0 + Engy_{it} + {}_tEnvt_{it} + Ecoc_{it} + Cont_{it} + v_t + \varepsilon_{it}$$

Serial correlation and heteroskedasticity are common issues with panel data that can skew the estimates of models. According to, a disturbance term is said to be serially correlated if it does not modify the model's disturbance term for any other parameter. According to Simpson (2012), heteroskedasticity is an issue in panel data when the alteration of the mistake components vary crosswise observations. Addressing successive association and heteroscedasticity problems is a breeze with the help of the FGLS model (Maddala and Lahiri, 2006; Judge et al., 2004). The FGLS can handle heteroskedastic models with no cross-sectional correlation, as mentioned by Greene (2012) and Davidson and Mackinnon (1993). The uncertainty in the estimations from FGLS means that it may not be useful for samples of small size. According to Griliches and Rao (1969), FGLS is preferable to least squares for large samples due to its ability to address hetereskedasticity and autocorrelation.

Due to the fact that equation (2) involved period belongings and secure belongings for individual countries, the model was plagued by the issue of unobserved country specific heterogeneity. This issue was spotted in the study by using dynamic panel GMM estimators to change the stated equations into ones with less serial correlation and heterogeneity, as proposed by Arellano and Bond (2023).

We used the Durbin-Wu-Hausman approach, which involved utilizing 2SLS for panel data, to test for endogenity of the (independent variables), and the results showed that some of the variables are endogenous.

Then, the following equations are completed by plugging in the appropriate values for the endogenous and exogenous variables:

$$LPICCP_{it} = Energy_{it} + CO2_{it} + AVG_{it} + FDI_{it} + REC_{it} + TGHG_{it} + Export_{it} + Import_{it} + MVD_{it} + IVD_{it} + GDPPC_{it} + FFUEL_{it} + HEPC_{it} + \varepsilon_i$$

$$+ v_{it}$$

$$= Z_{it} + \varepsilon_i + v_{it}$$

(3)

$$LPICPS_{it} = REC_{it} + MVD_{it} + IVD_{it} + GDPPC_{it} + FDI_{it} + Energy_{it} + CO2_{it} + TGHG_{it} + Export_{it} \text{ þ } Import_{it} + AVG_{it} + FFUEL_{it} + HEPC_{it} + \varepsilon_i$$

$+ v_{it}$

$= Z_{it} + \varepsilon_i + v_{it}$ (4)

$LPIQLS_{it} = HEPC_{it} + FDI_{it} + REC_{it} + Energy_{it} + CO2_{it} + TGHG + Export_{it} + Import_{it} + AVG_{it} + MVD + IVD + GDPPC + FFUEL + \varepsilon_i$

$+ v_{it}$

$= Z_{it} + \varepsilon_i + v_{it}$ (5)

$LPIQTTI_{it} = CO2_{it} + FDI_{it} + REC_{it} + Energy_{it} + HEPC_{it} + TGHG + Export_{it} + Import_{it} + AVG_{it} + MVD + IVD + GDPPC + FFUEL + \varepsilon_i$

$+ v_{it}$

$= Z_{it} + \varepsilon_i + v_{it}$ (6)

$LPIST_{it} = HEPC_{it} + FDI_{it} + REC_{it} + Energy_{it} + CO2_{it} + TGHG + Export_{it} + Import_{it} + AVG_{it} + MVD + IVD + GDPPC + FFUEL + \varepsilon_i + v_{it}$

$= Z_{it} + \varepsilon_i + v_{it}$ (7)

$LPITTC_{it} = Energy_{it} + HEPC_{it} + FDI_{it} + REC_{it} + CO2_{it} + TGHG + Export_{it} + Import_{it} + AVG_{it} + MVD + IVD + GDPPC + FFUEL + \varepsilon_i + v_{it}$

$= Z_{it} + \varepsilon_i + v_{it}$ (8)

The dependent variables used in equations (3)–(8) are LPICCPit, LPICPSit, LPIQLSit, LPIQTTIit, LPISTit, and LPITTCit. Observations on g2 and endogenous variables included as covariates with coefficients noted as g are allowed to be correlated with vit; observations on the 466e379 591 exogenous variables comprised as covariates are denoted with coefficients noted as b; Zit is the set of instruments, which may be either endogenous or exogenous variables; The coefficients in d form a K = 1 vector, where K = g2 + k1. Panel GMM (generalised method of moments) can be used to address common issues with panel data such serial correlation, heteroskedasticity, and heterogeneity In addition, the GMM estimator excels when the number of cross section IDs is considerable in comparison to the number of time periods. Due to the large number of cross-section identifiers (43 nations) and relatively brief sample period (2007-2016), For this research, the panel generalized method of moments model works best. Forty-three countries were selected for this analysis (all of which are listed in Table 5 of the Appendices).

Table 1

Descriptive statistics.

Vari	**Obes**	**Mean**	**Std. Dev.**	**Min**	**Max**
LPICCP	213	3.179283	0.614622	1.856542	

4.20779				
LPICPS	213	3.281044	0.429991	1.93
4.18				
LPIQTTI	213	3.369228	0.6806075	1.78
4.439356				
LPIST	213	3.807679	0.4778475	2.31
4.52				
LPIQLS	213	3.39492	0.5618273	2.05 4.32
REC	126	1.806176	1.778308	0.008264
6.572483				
LPITTC	213	3.47255	0.5558461	1.89
4.377678				
FDI	172	0.5035383	0.9347422	- 0.3679174
8.744259				
CO2	129	8.613523	7.93223	0.3010834
53.67275				
TGHG	126	11.3989	22.7476	0.23908
124.5461				
HEPC	168	26.1196	21.1431	0.56868
94.0267				
Import	171	4.102649	3.236468	1.13097
22.4431				
Export	171	4.2767	3.5009	0.81435
22.556				
AVG	171	0.10277	0.84255	- 2.6884
3.4526				
FFUEL	149	0.7747863	0.1782291	0.3075437
1				
Energy	153	36.6438	28.74681	1.73581
188.9936				
MVG	166	4.0099	5.1405	- 13.351
22.892				

IVD	166	3.5297	5.2678	-13.612 25.406
GDPPC	171	2.3455	3.1911	-11.212 13.634

All of the variables in Table 1 have positive means and standard deviations and a prominent distribution peak, attesting to the excellent logistics performance. The superiority of trade and conveyance connected substructure, the regularity with which consignments arrive at their consignee on time, the effectiveness of the customs clearance process, and the competence and quality of logistics services all contribute to this outstanding performance. High logistics performance is indicated by an index value of 5, whereas low logistics performance is indicated by an index value of 1. A panel of 43 countries with better economic health and trade policies in terms of manufacturing value added (annual%), GDP per capita (annual%), industry value added (annual%), agriculture value added (annual%), export of goods and services (annual%), import of goods and services (annual%), and FDI (annual%). On the other hand, the environment suffers when fossil fuel energy use has a high mean and standard deviation in comparison to total energy consumption and GDP per unit of energy use in constant 2011 PPP. Carbon emissions (CO2) are measured in metric tons per person, and total greenhouse gas emissions (TGHG) are measured in metric tons per year; both forms of emissions can be controlled and lowered by increasing the percentage of renewable energy consumed. Increasing the use of renewable energy consumptions in logistical activities could also reduce health expenditure per capita (HEPC) in constant US dollars. CO2 emissions, which have serious consequences for both the environment and human health, are largely attributable to the production of energy and logistics activities, as shown in Figure 1. However, it appears that the rising cost of medical treatment is contributing to the growth in emissions. Figure 2 provides a graph of all factors on level data for easy reference and explains how a switch to ecologically outgoing performs and energy sources in the logistics business can solve these problems.

Table 2

Correlation matrix

Vari	FDI	REC	Energy	CO2	TGHG	EXP	IMP	AVD	MVD	IVD	GDPPC	FFUEL	HEPC	LPICCP	LPIQTTI	LPICPS	LPIQLS	LPIST	LPITTC
FDI	1																		
REC	0.199	1																	
Energy	0.132	0.342	1																
CO2	0.114	0.537	0.901	1															
TGHG	-0.104	-0152	0.395	0.416	1														
EXP	0.421	-0.345	0.224	0.32	0.22	1													
IMP	0.413	-0.346	0.034	0.54	0.05	0.038	1												

AVD 0.021 0.224 -0.212 -0.2558 -0.213 0.055 0.038 1

MVD 0.005 0.078 -0.1035 -0.086 -0.008 0.006 -0.041 0.02 1

IVD -0.009 0.232 0.188 -0.178 0.002 -0.114 -0.121 0.026 0.84 1

GDPPC 0.08 0.1987 -0.305 -0.273 0.010 -0.112 -0.147 0.107 0.651 0.736 1

FFUEL 0.16 -0.827 0.205 0.513 0.0834 0.216 0.250 -0.112 -0.077 0.219 -0.15 1

HEPC 0.10 -0.168 0.74 0.579 0.500 0.064 -0.027 -0.129 -0.262 -0.3128 -0.367 0.030 1

LPICCP 0.183 -0.210 0.624 0.460 0.098 0.320 0.211 -0.079 -0.195 -0.263 -0.358 -0.002 0.776 1

LPIQTT 0.159 -0.261 0.674 0.502 0.190 0.25 0.144 -0.045 -0.228 -0.292 -0.404 0.032 0.819 0.955 1

LPICPS 0.224 -0.269 0.531 0.411 0.060 0.32 0.240 -0.1163 -0.224 -0.255 -0.362 0.083 0.630 0.894 0.88 1

LPIQLS 0.191 -0.240 0.614 0.444 0.160 0.262 0.151 -0.058 -0.161 -0.209 -0.318 -0.002 0.773 0.959 0.96 0.88 1

LPIST 0.136 -0.216 0.57 0.414 0.13 0.248 0.139 -0.06 -0.132 -0.233 -0.318 0.021 0.718 0.897 0.901 0.843 0.902 1

LPITTC 0.155 -0.240 0.60 0.445 0.189 0.233 0.127 -0.087 -0.217 -0.26 -0.352 0.004 0.787 0.944 0.957 0.866 0.969 0.915 1

There is an association among logistics and CO2 releases, however supportable logistics actions can dramatically decrease both greenhouse gas emissions and the amount of energy that is consumed from fossil fuels.

Table 2 demonstrates this, and also demonstrates how the various environmental factors have varying effects on logistical output. CO2 emissions are positively correlated with value added in manufacturing, health care spending, and GDP growth. However, in all 43 countries, industrial worth additional upsurges CO2 emissions while declining consumption of relic fuels then TGHG. In addition, there is a substantial positive correlation between the value provided by manufacturing and the amount spent on health care. This indicates that the activities of manufacturing have a significant negative impact on people's health, and that these activities are the primary cause of the deterioration of people's health and the steadily rising costs associated with it.

Table 3

The results of OLS, FE and RE Effects.

Variables	olsdv1	fedv1 olsdv6	olsdv2 redv6 b/t	fedv2	olsdv3	redv3	olsdv4	redv4	olsdv5	redv5	
	b/t b/t	b/t b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	
FDI	—0.006	—0.005	—0.011	—0.007	0.02	0.045	0.013	0.036	—0.016	0.01	—0.003 0.019
	(-0.16)	(-0.17) (0.57)	(-0.29)	(-0.20)	(0.57)	(1.33)	(0.35)	(1.08)	(-0.43)	(0.3)	(-0.07)
REC2	—0.051 —0.097	—0.036	—0.093*	—0.004	—0.044	—0.065	—0.098**	—0.098	—0.04	—0.057	—0.098**
	(-1.35)	(-0.21) (-1.85)	(-2.51)	(-0.02)	(-1.32)	(-1.39)	(-2.70)	(-1.91)	(-1.15)	(-1.17)	(-2.68)
C02	—0.031 —0.039	—0.148	—0.082**	—0.117	—0.037	—0.026	—0.061*	—0.043	—0.055*	—0.039	—0.045
	(-1.07)	(-1.62) (-1.03)	(-2.90)	(-1.06)	(-1.44)	(-0.74)	(-2.18)	(-1.15)	(-2.02)	(-1.10)	(-1.62)
Export	0.098* —0.004	—0.160*	0.126**	—0.057	0.084*	0.061	0.110*	0.009	0.086*	0.025	0.103*
	(2.24)	(-2.28) (-0.08)	(2.91)	(-0.68)	(2.16)	(1.3)	(2.6)	(0.18)	(2.1)	(0.52)	(2.44)
Import	—0.083 —0.003	0.129	—0.143**	—0.056	—0.077	—0.062	—0.125*	—0.016	—0.096*	—0.049	—0.118*
	(-1.64)	(1.74) (-0.05)	(-2.87)	(-0.62)	(-1.70)	(-1.14)	(-2.55)	(-0.28)	(-2.01)	(-0.87)	(-2.41)
AVG	—0.018 —0.035	—0.090**	0.041	—0.043	—0.035	—0.059	0.014	—0.019	—0.006	—0.013	—0.005
	(-0.42)	(-3.24) (-1.08)	(0.96)	(-1.27)	(-0.90)	(-1.73)	(0.33)	(-0.58)	(-0.15)	(-0.40)	(-0.13)
MVD	—0.003 —0.008	—0.001	—0.012	—0.011	—0.015	—0.014	—0.01	—0.005	0.009	0.011	—0.012
	(-0.30)	(-0.18) (-0.97)	(-1.02)	(-1.29)	(-1.49)	(-1.59)	(-0.91)	(-0.60)	(0.85)	(1.27)	(-1.03)
	b/t b/t	b/t b/t IVD	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	
	0.018 0.024	—0.012 0.017	0.032*	0.011	0.026*	0.02	0.032*	0.016	0.006	—0.003	
	(1.23)	(-1.24) (1.52)	(2.24)	(0.89)	(2.05)	(1.66)	(2.32)	(1.39)	(0.46)	(-0.23)	(1.76)
GDPPC	—0.174 —0.053	0.236	—0.390*	—0.069	—0.236	—0.164	—0.24	—0.032	—0.177	—0.077	—0.199
	(-1.07)	(1.81) (-0.38)	(-2.43)	(-0.44)	(-1.63)	(-1.15)	(-1.52)	(-0.23)	(-1.15)	(-0.00)	(-1.26)
FFUEL	0.073 —0.238	0.346	0.434	0.898	0.315	0.006	0.096	—0.253	0.453	0.113	—0.054
	(0.15)	(0.24) (-0.37)	(0.89)	(0.51)	(0.71)	(0.01)	(0.2)	(-0.40)	(0.97)	(0.19)	(-0.11)
TGHG	—0.012*** 0.008**	—0.025 —0.008*	—0.009**	0.006	—0.006*	—0.006	—0.008**	—0.008*	—0.007**	—0.008*	—

	(-4.46)	(-1.08)	(-3.32)	(0.21)	(-2.57)	(-1.72)	(-3.26)	(-2.30)	(-2.85)	(-2.39)	(-3.15)	(-2.17)
Energy	0.006 0.012	0.054*	0.018**	0.038	0.007	0.007	0.012	0.014	0.01	0.011	0.007	
	(0.95)	(2.21) (1.37)	(2.81)	(1.26)	(1.18)	(0.89)	(1.81)	(1.55)	(1.65)	(1.32)	(1.16)	
HEPC	0.027***	0.001 0.024***	0.027*** 0.020***	0.008	0.014***	0.010**	0.024***	0.019***	0.019***	0.016***		
(9.34)	(0.07)	(9.43) (5.61)	(0.93)	(5.33)	(3.13)	(8.53)	(5.48)	(7.08)	(4.8)	(8.67)		
Intercept	2.530***	2.591 3.270***	2.649*** 3.244***	2.464	2.816***	3.098***	3.033***	3.155***	3.191***	3.451***		
(5.71)	(1.95)	(6.04) (5.59)	(1.53)	(7.1)	(5.9)	(7.05)	(5.49)	(7.63)	(6.3)	(7.58)		

If you see dv1, it means LPICCP; dv2 means LPIQTTI; dv3 means LPICPS; dv4 means LPIQLS; dv5 means LPIST; and dv6 means LPITTC. The letters ols, fe, and re denote the ordinary least square, fixed effect, and random effect models, respectively. We have executed either a FE or RE model for various DVs based on the outcomes of Hausman tests. The goodness of fit and the stability of the model are further validated by the R-squared and F-statistics. The ratio of the coefficient value to t is denoted by b/t. Significance at 1% is indicated by ***, at 5% by **, and at 10% by *

Table 3 displays the effects obtained using OLS (ordinary least square) and FE. At the 5% and 10% confidence levels Transportation infrastructure and the quality of logistics services have a negative effect on the CO2 and TGHG coefficient value whereas the remaining correlation is attributable to chance, and Random Effects (RE) models. Inadequate transportation infrastructure and subpar logistics services will have a major detrimental effect on environmental sustainability by increasing carbon emissions and accelerating global warming However, at the 10% confidence level, stronger transports-related infrastructure, higher quality logistics services, and on-time delivery of cargoes are positively and significantly connected with higher export volumes. While lower export volumes are correlated with less efficient customs clearance processes. This holds true regardless of the statistical significance of the link.

The findings also suggest that the demand for energy is increasing at a positive and respective sureness level, which is a worrying development for the controlling establishments, who are tasked with enhancing the infrastructure associated to transportation and the effectiveness of the customs clearing procedure. Because increasing energy use is a major contributor to environmental problems like global warming and climate change. Additionally, at the 1% confidence level, health expenditure is strongly connected with trade and transportation infrastructure quality, customs clearance efficiency, the ability to track shipments, the cost-effectiveness of shipments, and the competence and quality of logistical

services. So, more complex logistics led to higher health care costs. Because the majority of logistical operations rely on the burning of fossil fuels, which has negative effects on human health in the form of asthma, lung cancer, and neurological disorders, among others.

Table 4

The regression data for FGLS and GMM Panel estimation

DVs	LPICCP		LPIQTTI		LPICPS		LPIQLS		LPIST		LPITTC
	FGLS	GMM	FGLS	GMM	FGLS	GMM	FGLS	GMM	FGLS	GMM	FGLS
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
CO2	0.011	-0.1103	-0.046*	-0.0382*	-0.002	0.0310*	-0.019	-0.0681*	0.002	0.2094*	-0.021
	0.0286										
	(0.47)	(-1.303)	(-2.06)	(-0.324)	(-0.07)	(1.931)	(-0.45)	(-0.805)	(0.09)	(1.631)	(-1.03)
		(0.239)									
MVD	0.009	0.0064	-0.005	-0.0094	-0.024**	-0.0161*	0.005	-0.0010	-0.002	-0.0111	0.003
	-0.0151										
	(1.81)	(0.652)	(-0.94)	(-0.918)	(-3.01)	(1.743)	(1.11)	(-0.100)	(-0.73)	(-1.085)	(0.43)
		(-1.543)									
IVD	-0.014	-0.0106	0.011	0.0142	0.021	0.0273**	-0.003	0.0083	0.015***	-0.0045	0.011
	0.0184										
	(-1.78)	(-0.867)	(1.31)	(1.125)	(1.92)	(2.030)	(-0.41)	(0.648)	(3.78)	(-0.420)	(1.07)
		(1.492)									
FFUEL	-0.305	0.7390	-0.031	-0.0435	-0.134	-1.6305	0.378	0.5754	0.37	-2.6939	-0.211
	-0.7158										
	(-1.00)	(0.892)	(-0.08)	(-0.035)	(-0.32)	(-1.121)	(0.39)	(0.576)	(0.73)	(1.594)	(-0.76)
		(-0.374)									
Energy	0.005	0.0467**	0.015**	0.0121	0.001	-0.0900**	0.032**	0.0034	-0.0012	-0.0325	0.005
	0.0276										
	(0.88)	(2.411)	(2.95)	(0.399)	(0.17)	(-2.209)	(2.92)	(0.184)	(-0.01)	(-1.136)	(1.1)
		(0.895)									
AVG	-0.048*	-0.0626*	-0.023	-0.0199	-0.042	-0.0717	0.004	-0.0197	-0.017	-0.0478	-0.001
	-0.0409										
	(-2.16)	(-1.998)	(-1.11)	(-0.683)	(-1.30)	(-1.627)	(0.19)	(-0.542)	(-1.01)	(-1.519)	(-0.03)
		(-1.135)									
Export	0.017	-0.1396**	0.131***	-0.0146	0.098***	0.2015***	-0.078	-0.0753	0.199***	0.0277	0.111**
	-0.1174										
	(0.49)	(-2.120)	(4.21)	(-0.192)	(3.34)	(2.841)	(-1.61)	(-1.209)	(4.04)	(0.356)	(3)
		(-1.337)									
FGLS		GMM	FGLS	GMM	FGLS	GMM	FGLS	GMM	FGLS	GMM	
		FGLS	GMM								
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
	b/t										
Import	0.004	0.1247	-0.148***	-0.0155	-0.093**	-0.1815**	0.083	0.1147	-0.193***	-0.0413	-0.124**
	0.2442**										

	(0.1)	(1.657) (2.465)	(-4.03)	(-0.182)	(-2.88)	(-2.554)	(1.22)	(1.352)	(-3.51)	(-0.530)	(-2.77)
HEPC	0.019*** -0.0048	-0.0012	0.020***	0.0001	0.010***	-0.0154	-0.013*	-0.0124	0.039***	-0.0026	0.022***
	(8.98)	(-0.165) (-0.431)	(9.11)	(0.007)	(4.16)	(-1.430)	(-2.07)	(-1.127)	(9.14)	(-0.294)	(11.82)
TGHG	-0.012*** -0.0044	-0.0345***	-0.009***	-0.0061	-0.005*	0.0258	-0.018*	-0.0214	-0.018***	0.0057	-0.009***
	(-6.47)	(-2.852) (-0.147)	(-4.46)	(-0.432)	(-2.43)	(1.065)	(-2.33)	(-1.409)	(-7.50)	(0.211)	(-5.30)
FDI	0.018 0.0178	-0.0028	0.015	0.0014	0.052**	0.0285	0.020*	0.0082	-0.012*	0.0121	0.005
	(1.17)	(-0.285) (0.451)	(0.9)	(0.077)	(2.97)	(1.096)	(2.02)	(0.667)	(-2.29)	(0.914)	(0.38)
REC	-0.027 -0.0714	-0.0377	-0.103***	-0.0635	-0.065*	-0.3879**	0.078	0.1218	-0.015	-0.1348	-0.115***
	(-1.14)	(-0.237) (-0.321)	(-3.77)	(-0.432)	(-2.29)	(-2.265)	(0.72)	(0.877)	(-0.37)	(-0.839)	(-5.93)
GDPPC	0.011 0.0119	0.0177	-0.019*	-0.0011	-0.015	-0.0191	0.020*	0.0139	-0.008	0.0465***	-0.013
	(1.19)	(1.435) (0.666)	(-2.12)	(-0.085)	(-1.31)	(-1.121)	(2.2)	(0.944)	(-0.95)	(3.139)	(-1.24)
Intercept	2.735***		3.047***		3.297***		0.433		2.855***		3.392***
(11.25)	(9.3)		(9.24)		(0.49)		(5.8)		(14.64)		

Note: LPITTC indicates the efficiency of logistics, such as the aptitude to track and trace shipments; LPIQLS shows the superiority of logistics services; LPICPS demonstrations how easy it is to arrange shipments at competitive prices; LPICCP shows how well customs clearance works; LPIST shows how often shipments arrive at their destination on time; and LPIQTTI shows the quality of trade and transportation-related infrastructure.

At a 5% confidence level, Sarjan statistics show that the list of instruments is not important. This means that the lists given can be used for empirical analysis. Also, instrument rank is a good choice for more in-depth scientific research. *mark the point of significance at 1%; **mark the point of significance at 5%; *mark the point of significance at 10%.

The regression estimates using the panel GMM and FGLS are displayed in Table 4. At the 95% confidence level, the consequences demonstration a significant and direct relationship among logistics performance and energy efficiency. This connection is less elastic than others; a one percent delay in the customs clearance process, for example, will lead to a 0.0467 percent increase in energy use. In other words, a more streamlined customs clearance procedure has positive effects on both the economy and the environment. Energy consumption is inversely associated to LPICPS-related logistical performance with a 5% degree of confidence. Increasing the efficiency with which competitively priced shipments are arranged can cut energy consumption by 0.09 percent. At the 5% confidence level, there is a positive and significantly association amongst the superiority of logistical services and energy efficiency. When logistics costs go up by 1%, quality only goes up by 0.032 percentage points, but when shipping costs go down by the same percentage, we can develop green financial development and lessen the environmental impact of carbon productions. Greater logistical operations necessitated

higher consumption of energy, as shown by Khan et al. (2023). The findings corroborated the hypothesis that logistics-related activities contribute to national GDP expansion. Logistics operations that contaminate the environment are a threat to both human health and the health of the planet. The author of the study argued for the use of renewable energy sources to hearten "green practices" in logistical actions in order to decrease the consequences of carbon dioxide (CO2), greenhouse gases (GHGs), and global warming.

The findings show, with varying degrees of certainty, that the use of renewable energy sources is connected negatively with the likes of LPIQTTI, LPICPS, and LPITTC. A 0.010 percentage point drop in renewable energy use is expected for every one percentage point growth in the superiority of trade and transportation-connected organization, while a 0.038 percentage point drop in renewable energy use is expected for every one percentage point rise in spacing competitively valued consignments and the ability to track consignments. In simple words, the high costs of using renewable energy sources and the lack of support and reassurance from the government in the form of tax breaks, low-slung prices for green energy sources, subsidies, then other forms are strongly and negatively linked to the performance of logistics. Like biofuel, renewable energy has a promising future thanks to government measures that protect the environment, as noted by Using renewable energy can improve a company's standing in domestic and international markets while also benefiting the environment. According to Bui, (2023), bioenergy is a practical energy source that might improve the efficiency of logistical operations in a low-carbon economy. Lin (2022) pointed out, businesses who want to use renewable energy in their logistics systems need to be encouraged to do so by the government.

Three environmental criteria were employed in this study: carbon dioxide (CO2) emissions, total greenhouse gas emissions, and fossil fuel usage. Table 2 displays the correlation matrix based on the findings. CO2 emissions are linked to both LPIST and LPICPS in a way that is positive and statistically significant at the 1% level of confidence. A lot of damage can be done to people's health and the environment if packages don't arrive when they're meant to. The delay adds 0.0209 tons of CO2 to the air. However, LPIQTTI and LPIQLS are both linked to CO2 releases in the wrong way. It is possible to cut CO2 emissions by 0.0681% and 0.0382% for every 1% improvement in the quality of trade and transportation facilities and logistics services. Transporting things is an important part of logistics, but cars and trucks also put out a lot of carbon dioxide (CO2). It was said by Dekker et al. (2012) that carbon dioxide (CO2), greenhouse gases (GHG), and climate change are mostly the fault of the transportation sector. To reduce demand for fossil fuels and boost environmental sustainability, argue that governments should levy high tariffs on polluting automobiles. highlighted the importance of green transport in reducing carbon emissions and enhancing environmental sustainability, They also said that the use of renewable energy probably won't make much of a difference if the government doesn't make policies that are good for the environment and protect business profits or lower the overall cost of logistics systems (for example, by not taxing green materials or putting low import duties on them or giving subsidies to green materials).

At the 1% confidence level, our findings show a negative and significant correlation between GHG emissions and customs clearing times, shipment arrival rates, and the quality of trade and transportation-related infrastructure. Connection to logistical efficiency measures. Large volumes of trade place a heavy burden on customs authorities, which in turn leads to a lengthier customs clearance process. Good transportation facilities and logistics services, on the other hand, cut greenhouse gas emissions by a large amount. The results show that if the quality of travel and transportation infrastructure goes up by 1%, greenhouse gas emissions will go down by 0.009%. On the other hand,

goods that don't get to their destination on time are linked to higher greenhouse gas emissions. According to Zawaydeh (2017), the logistics sector is crucial to a country's economic well-being. Several environmental issues, including as increased CO2 and greenhouse gas emissions, a changing climate, and the spread of invasive species are directly attributable to logistics operations. emphasized the significance of biofuels and renewable energy bases in maintaining a healthy economy and protecting the environment. Renewable energy is the initial stage in implementing green logistics, but businesses will need support from government in order to make the switch on their own.

A country's ability to draw foreign investment and its economic health can be judged by how many goods it exports. There is a strong and good link between the number of exports and things like the quality of trade and transportation infrastructure, competitive prices, and on-time deliveries to the consignee. If the amount of exports went up by 1%, LPIQTTI would go up by 0.013 %, LPICPS by 0.098 %, LPIST by 0.027 %, and LPITTC by 0.11 %. To put it another way, increased export volume benefits from global logistics operations. Green logistics and environmentally friendly government initiatives, as described by Zawaydeh (2017), promote FDI inflows. Some European nations have outright prohibited polluting businesses and slapped stiff fines on their polluting logistics network. However, European countries lose export prospects and gain a bad reputation abroad because they use polluting vehicles and other non-green methods in their logistical operations. Previous studies have shown that governments have banned polluting logistics systems and materials and have imposed weighty introduction responsibilities on polluting logistics actions in an effort to promote green logistics schemes, which is reliable with the consequences of the current study. Though, an in height level of pollution in the logistics system is inversely connected to successful logistics operations. To safeguard and encourage sustainable logistics operations, governments offer a variety of subsidies for green products and logistics systems, which Green & Morton (1998) attribute to the fact that import volumes are lower in Europe. Both on-time shipment delivery and the quality of logistics services were found to have a positive and statistically significant effect on GDP per capita, with the former leading to an increase of 0.0465 per capita and the latter leading to an increase of 0.0220 per capita. However, there is an inverse relationship between GDP per capita and commerce and transport infrastructure, with a 0.019 percentage point increase in transport infrastructure for every one percentage point increase in GDP per capita. According to Khan and Qianli's (2017) findings, businesses who implement environmentally friendly procedures throughout their supply chains and logistical operations see a beneficial impact on their bottom lines. Green logistics has been linked to improved financial performance for businesses by an empirical study demonstrated that eco-friendly logistics practices are positively correlated with national GDP growth. These practices not only improve environmental sustainability, but they also improve economic performance.

Greater energy and carbon emissions are produced by logistical operations, which is problematic because carbon emissions are linked to adverse health effects and damage to the natural environment. The results demonstrate a negative correlation between healthcare costs and logistics service quality at the 10% confidence level, and a positive correlation between healthcare costs and the speed with which shipments clear customs and arrive at their destination at the 1% confidence level. If logistical services can be improved by just 1 percent, health care costs might be cut by 0.013 percent. However, healthcare costs will rise by 0.039% for every one day that a shipment takes longer to reach its destination, and by 0.019% for every day that customs clearance takes longer. According to study on the topic undertaken by Wu and Dunn (1995), contaminated logistics have substantial effects on human health, and increased emissions have a negative impact on human life. Companies have begun "greening" their logistics and production procedures to lessen their impact on anthropological health and the

environment.

At the 10% level of confidence, this investigation demonstrations that FDI invasions correlate positively with the superiority of logistics amenities, and at the 5% level of certainty, LPICPS correlate absolutely with FDI invasions. It demonstrations that a 1% increase in the quality of logistics services and a 1% increase in the organization of competitively priced shipments may be expected to result in a 0.052% increase in FDI inflows. Delays or missed delivery dates for shipments are predicted to reduce FDI inflows by 0.012 percent. Foreign direct investment (FDI) flows into countries with high logistics rankings because of the improved logistical performance and environmentally friendly policies enacted by such governments. Poor quality logistics infrastructure and government policies are driving up logistics costs, and poor and ineffective transport policies account for 70 percent of the increase in logistics operating costs, which has a negative effect on a country's economic growth and foreign direct investment (FDI) flows (United Nations, 2013). There is a direct association between green logistics and the success of a company's public image Businesses are going green in order to boost profits and get an edge in the market. However, green practices in logistics operations generally have a beneficial and significant impact on national economies.

4. Conclusion

In logistics and supply chain management, the value of international logistics to the growth of the economy is analyzed and debated. Issues of environmental deterioration and their connection to the economic development of poor countries are further explored, along with the environmentally friendly logistical activities related with green practices and biofuel sources. The GMM model and the FGLS model were used to accurately assess the correlation flanked by logistics performance and monetary and ecological variables.

The consequences demonstration a positive and statistically significant correlation between the effectiveness of customs clearance and the need for energy and overall greenhouse gas emissions. Delays in clearing customs have been linked to an increase in both energy use and greenhouse gas emissions, both of which worsen the planet's condition. The quality of commerce and transportation infrastructure is significantly inversely related to the use of renewable energy, the volume of carbon dioxide emissions, the number of imports that add value, and the level of economic output per person. Logistical processes that generate greater carbon dioxide emissions are more prevalent in countries by deprived trade and conveyance substructure, which is positively connected with lesser per capita income and lesser importation capacities. Despite the government's inability to encourage renewable energy options, many businesses continue to rely on fossil fuel oil, which is a major source of environmental pollution. Expertise and excellence of logistics facilities are definitely and strongly connected with foreign direct investment (FDI), per capita income, and energy effectiveness. If this is the case, then the standard of a country's logistical services is directly proportional to its economic development.

Lack of on-time delivery of cargo is inversely related to both foreign direct investment and greenhouse gas emissions. If a shipment is delayed or fails to arrive at its destination on time, it can have a devastating effect on a country's standing abroad and its ability to attract foreign investment. What's more, the increased emissions caused by the delay can have an adverse impact on the environment and drive up the cost of logistics systems as a whole. Green logistics strategies are needed to reduce the use of fossil fuels and other unsustainable methods in supply chain management and transportation. This

study examined the association among logistics recital indices and energy efficiency, ecological impact, and financial growth. The findings of this research can be utilized to develop environmentally protective green logistics policies that encourage carbon reduction, global warming mitigation, and the conservation of animals and flora through the application of environmentally friendly performs and the use of renewable energy sources in the logistics sector. The eco-friendly logistics organization is a symbol of the global competitive struggle for a more environmentally and economically sustainable economy. Renewable energy sources, green practices in logistical operations, and a healthy balance between environmental performance and economic growth can all be fostered by environmentally friendly regulations.

4.1. Policy Importance Section

Logistics operations that are kind to the environment are tied to commercial and industrial actions all the way from product conception through manufacturing. Energy and fossil fuel use are major factors in the success of logistical activities. As a result, policymakers need comprehensive understanding of renewable energy bases, which are significantly reducing the negative impact of logistics actions happening the situation.

Per capita income is a good indicator of a country's economic health, and logistical operations' environmental impact is strongly correlated with environmental degradation. Low levels of foreign direct investment (FDI) are a major contributor to high unemployment rates, and Inadequate environmental legislation and non-green logistical operations are strongly correlated with a high unemployment rate. It's undeniable that the logistics industry is a major source of conservatory gas releases then climate change, both of which have negative consequences for human health in the form of conditions including asthma, heart disease, cancer, and stroke. We need government laws that encourage eco-friendly logistics practices that benefit the economy.

Future. In the selected panel of 43 nations, the following policies would best promote the procedure of green logistics actions:

Green practices and the usage of renewable energy in logistics actions reduce greenhouse gas emissions and carbon dioxide equivalents caused by goods movement.

i) To encourage eco-friendly transportation and logistics,

ii) The government could offer rebates and exemptions for eco-design automobiles.

iii) Legislation and oversight mechanisms that encourage environmentally responsible production.

iv) The logistics sector and the government's regulatory body need to work together to implement certification schemes that will assist promote a sustainable agenda.

v) High taxes and import charges on fossil fuel and dirty commodities are two examples of how the government could discourage non-green logistical practices.

Businesses looking to use renewable and green energy sources could benefit from low-interest loans from the government.

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