


**A CRITICAL REVIEW OF THE RELATIONSHIP BETWEEN ENVIRONMENTAL PERFORMANCE INDEX, FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH**

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ARTICLE INFO	ABSTRACT
<p><b>Article history:</b></p> <p><b>Received</b> 21 April 2023</p> <p><b>Accepted</b> 18 July 2023</p>	<p><b>Purpose:</b> Through a literature review, this study aims to understand the relationship between the Environmental Performance Index (EPI), Financial Development, and Economic Growth. In order to provide a complete understanding of the impact of EPI and Financial Development on Economic Growth, the authors propose a conceptual framework based on empirical data. In order to expand knowledge in this field, the study also seeks to identify gaps in the literature and recommend new lines of inquiry.</p>
<p><b>Keywords:</b></p> <p>Economic Growth; Financial Development; Environmental Performance Index; Developed Countries; Developing Countries; CO2 Emissions.</p>	<p><b>Design/Methodology/Approach:</b> This study conducts an extensive literature analysis emphasizing publications between 2018 and 2022. The literature of developed, developed-group, and developing countries will be thoroughly and a comprehensive and systematic literature review will be conducted to meet the goals of this study. However, a qualitative method will help us better understand how EPI and financial development affect economic growth and sustainable development because the results and conclusions of empirical investigations need to be more consistent.</p>
	<p><b>Findings:</b> The study concluded that environmental performance and sustainability are essential for achieving economic growth and development in industrialized countries, and policymakers should give top priority to settling carbon costs and taxes, commercializing low-CO<sub>2</sub> emissions technologies, cutting non-renewable energy subsidies, offering technology transfer programs, and developing a green trade policy. The study also emphasized the potential of sustainable financial systems and renewable energy to lower emissions and promote economic growth in developing nations. However, successful policies and investments in green technologies are required to achieve this balance.</p>
	<p><b>Practical implication:</b> This study has practical implications for policymakers who must prioritize sustainable development goals in their economic policies. This includes promoting renewable energy, reducing carbon emissions, and implementing green trade policies. The study highlights the critical role of government policies in promoting sustainable economic growth, particularly the EPI and Financial Development.</p>
	<p><b>Originality/Value:</b> This study's originality and value lie in its examination of the complex relationship between environmental sustainability, financial development, and economic growth across different countries and regions. The study emphasizes the role of government policies, specifically the EPI and Financial Development, in promoting sustainable economic growth and provides practical implications for policymakers. The study also highlights the need for further research to identify effective policies for promoting sustainable economic growth.</p>
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## UMA ANÁLISE CRÍTICA DA RELAÇÃO ENTRE ÍNDICE DE DESEMPENHO AMBIENTAL, DESENVOLVIMENTO FINANCEIRO E CRESCIMENTO ECONÔMICO

### RESUMO

**Objetivo:** Através de revisão de literatura, o presente estudo tem como objetivo compreender a relação entre o Índice de Desempenho Ambiental (EPI), Desenvolvimento Financeiro e Crescimento Econômico. A fim de proporcionar uma compreensão completa do impacto do EPI e do Desenvolvimento Financeiro no Crescimento Econômico, os autores propõem um quadro conceptual baseado em dados empíricos. Para ampliar o conhecimento nesse campo, o estudo também busca identificar lacunas na literatura e recomendar novas linhas de investigação.

**Projeto/Metodologia/Abordagem:** Este estudo realiza uma extensa análise da literatura, destacando publicações entre 2018 e 2022. A literatura de países desenvolvidos, em desenvolvimento e em desenvolvimento será minuciosa e uma revisão de literatura abrangente e sistemática será conduzida para atender aos objetivos deste estudo. No entanto, um método qualitativo ajudar-nos-á a compreender melhor como o IEP e o desenvolvimento financeiro afetam o crescimento econômico e o desenvolvimento sustentável, porque os resultados e as conclusões das investigações empíricas precisam de ser mais consistentes.

**Constatações:** O estudo concluiu que o desempenho ambiental e a sustentabilidade são essenciais para alcançar o crescimento econômico e o desenvolvimento nos países industrializados, e os legisladores devem dar prioridade máxima à liquidação dos custos e impostos do carbono, à comercialização de tecnologias com baixas emissões de CO<sub>2</sub>, à redução dos subsídios às energias não renováveis, à oferta de programas de transferência de tecnologia e ao desenvolvimento de uma política comercial verde. O estudo também enfatizou o potencial de sistemas financeiros sustentáveis e energia renovável para reduzir as emissões e promover o crescimento econômico em nações em desenvolvimento. No entanto, são necessárias políticas bem-sucedidas e investimentos em tecnologias ecológicas para alcançar esse equilíbrio.

**Implicação prática:** Este estudo tem implicações práticas para os formuladores de políticas que devem priorizar os objetivos de desenvolvimento sustentável em suas políticas econômicas. Isso inclui promover a energia renovável, reduzir as emissões de carbono e implementar políticas de comércio verde. O estudo destaca o papel crítico das políticas governamentais na promoção do crescimento econômico sustentável, particularmente o IEP e o Desenvolvimento Financeiro.

**Originalidade/Valor:** A originalidade e o valor deste estudo residem na análise da complexa relação entre sustentabilidade ambiental, desenvolvimento financeiro e crescimento econômico entre diferentes países e regiões. O estudo enfatiza o papel das políticas governamentais, especificamente o EPI e o Desenvolvimento Financeiro, na promoção do crescimento econômico sustentável e fornece implicações práticas para os formuladores de políticas. O estudo também destaca a necessidade de mais pesquisas para identificar políticas eficazes de promoção do crescimento econômico sustentável.

**Palavras-chave:** Crescimento Econômico, Desenvolvimento Financeiro, Índice de Desempenho Ambiental, Países Desenvolvidos, Países em Desenvolvimento, Emissões de CO<sub>2</sub>.

## UNA REVISIÓN CRÍTICA DE LA RELACIÓN ENTRE ÍNDICE DE DESEMPEÑO AMBIENTAL, DESARROLLO FINANCIERO Y CRECIMIENTO ECONÓMICO

### RESUMEN

**Objetivo:** A través de una revisión bibliográfica, el presente estudio pretende comprender la relación entre el Índice de Desempeño Ambiental (IEP), el Desarrollo Financiero y el Crecimiento Económico. Con el fin de proporcionar una comprensión completa del impacto del IPE y el desarrollo financiero en el crecimiento económico, los autores proponen un marco conceptual basado en datos empíricos. Con el fin de ampliar el conocimiento en este campo, el estudio también busca identificar vacíos en la literatura y recomendar nuevas líneas de investigación.

**Diseño/Metodología/Enfoque:** Este estudio realiza un amplio análisis bibliográfico enfatizando publicaciones entre 2018 y 2022. Se estudiará a fondo la bibliografía de los países desarrollados, los países desarrollados y los países en desarrollo y se hará una revisión amplia y sistemática de la bibliografía para alcanzar los objetivos de este estudio. Sin embargo, un método cualitativo nos ayudará a comprender mejor cómo el programa ampliado de inmunización y el desarrollo financiero afectan el crecimiento económico y el desarrollo sostenible, porque los resultados y conclusiones de las investigaciones empíricas deben ser más coherentes.

**Conclusiones:** El estudio concluyó que el desempeño ambiental y la sustentabilidad son esenciales para lograr el crecimiento económico y el desarrollo en los países industrializados, y los responsables de las políticas deberían dar máxima prioridad a la liquidación de los costos e impuestos del carbono, la comercialización de tecnologías de bajas emisiones de CO<sub>2</sub>, el recorte de los subsidios a las energías no renovables, la oferta de programas de transferencia de tecnología y el desarrollo de una política de comercio verde. En el estudio también se hizo hincapié

en el potencial de los sistemas financieros sostenibles y la energía renovable para reducir las emisiones y promover el crecimiento económico en los países en desarrollo. Sin embargo, para lograr este equilibrio se necesitan políticas e inversiones satisfactorias en tecnologías ecológicas.

**Implicación práctica:** Este estudio tiene implicaciones prácticas para los responsables políticos que deben priorizar los objetivos de desarrollo sostenible en sus políticas económicas. Esto incluye promover la energía renovable, reducir las emisiones de carbono e implementar políticas de comercio verde. El estudio destaca el papel fundamental de las políticas gubernamentales en la promoción del crecimiento económico sostenible, en particular el Programa Ampliado de Inversión y el desarrollo financiero.

**Originalidad/Valor:** La originalidad y el valor de este estudio radican en su examen de la compleja relación entre la sostenibilidad ambiental, el desarrollo financiero y el crecimiento económico en diferentes países y regiones. El estudio hace hincapié en el papel de las políticas gubernamentales, en particular el Programa Ampliado de Inversión y el Desarrollo Financiero, en la promoción del crecimiento económico sostenible y tiene consecuencias prácticas para los encargados de formular políticas. En el estudio también se destaca la necesidad de seguir investigando para determinar políticas eficaces que promuevan el crecimiento económico sostenible.

**Palabras clave:** Crecimiento Económico, Desarrollo Financiero, Índice de Desempeño Ambiental, Países Desarrollados, Países en Desarrollo, Emisiones de CO<sub>2</sub>.

## INTRODUCTION

Due to growing concern about sustainable development, environmental experts, economists, policy analysts, and decision-makers have recently adopted the term "environmental performance" (Neagu et al., 2017). Climate change is a factor in environmental sustainability (Abbass et al., 2022). Since 2006, experts from Yale and Columbia Universities have created the Environmental Performance Index, which offers a worldwide view of environmental performance and serves as a tool for decision- and policymaking (Szymczyk et al., 2021). The Environmental Performance Indicator is a target-bound composite indicator that evaluates the effectiveness of environmental policies in achieving two primary, interdependent goals: (i) preserving ecological vitality and (ii) protecting human health (Zomer, 2014). This index incorporates metrics that describe environmental constraints and encourage resource consumption efficiency and indicators that identify and illustrate the economic effect on the environment (Loiseau et al., 2016). Sustainable economic development depends on the effective and efficient use of natural resources (Szymczyk et al., 2021).

Policymakers and scholars throughout the globe are primarily concerned with environmental quality and economic development. A clean and healthy environment offers better living conditions, and a healthier human capital may encourage economic growth and increase national wealth. According to Chunyu et al. (2021) and Olimpia and Teodora (2021), there is a strong correlation between financial development, energy consumption, economic success, and the state of the environment.

Since the turn of the century, there has been a significant increase in the flow of goods, capital, and services, impacting people worldwide. According to numerous studies, trade

globalization boosts global growth and productivity, lowering poverty levels. Increased commercial activity will stimulate economic expansion by facilitating the dissemination of information and enhancing the development of new technologies (Raghutla, 2020; Gabriel & David, 2021). As a direct consequence of this, there is now a higher level of competitiveness in both the home and foreign markets, which has led to improved manufacturing methods (Kong et al., 2021). Because of this, trade liberalization is regarded to stimulate economic expansion, which ultimately leads to an increase in the amount of energy consumed (Saleem & Shabbir, 2020). This is reflected in the changing global trade patterns, oil consumption, and economic development worldwide. Investigating the short-term and long-term links between the various components involved in this evolution is imperative. In addition, international trade focused on the export of commodities is typically considered a primary engine of economic growth in rich and developing countries. Regional and international trade plays an essential role in economic expansion under policies that encourage the liberalization of markets and the opening of economies. Jordan relies heavily on trade. International trade is crucial for Jordan's export-driven economy. Global oil demand affects Jordan's external and domestic trade. International trade measures economic development, market openness, and product and service exchange. The correlation between economic expansion and the growth of the financial sector is strengthened in developing nations that are just entering the economic development process.

Recent years have seen a growth in energy consumption, which has been helped along by programs funded by the government, such as tax breaks and subsidies. Cost competitiveness has contributed to a reduction in the costs of producing energy. Adam Smith, an eminent 18th-century economist, posed the value paradox (also known as the diamond vs. water paradox). There can be no economic growth without access to clean water. The marginal cost of producing water is drastically less than that of making diamonds. Because water is necessary for life, water pollution has become a pressing environmental concern. The major, as well as controversial global issues of recent times are environmental degradation and global warming. Since the beginning of the industrial revolution, countries have been making momentum efforts to attain the maximum amount of economic growth. The race has led to an extraordinary rise in the amount of GHGs (Green Houses Gases) in general and CO<sub>2</sub> emissions that cause global warming as well as ozone depletion (Acheampong, 2019). The effect of environmental degradation, climate change, and global warming are visible already in changing the pattern of rainfall, escalating the intensity of the storm, increasing the incidence of severe weather events,

and ever increment in the sea level. Such kind of changes has a substantial effect on the proper operation of the ecosystems, human survival as well as forest sustainability.

## **LITERATURE BACKGROUND**

The literature contains a great deal of research that examines how much of an impact financial development, openness to commerce, and energy use has on economic expansion. On the other hand, empirical literature reveals contradictory findings. However, there has not been a lot of research done on how financial development, energy consumption, and economic growth are all related to one another. Given the significance of both developed and developing economies as energy consumers, the objective of this study is to shed additional light on the relationship between energy consumption, financial development, and economic growth from the point of view of both advanced and emerging economies. Specifically, this research will focus on how energy consumption, trade openness, and financial development relate to economic growth.

### **Environmental Performance and Economic Growth**

The natural environment is vital to our economy as a direct input into production and via the many services it offers. Minerals and fossil fuels, for example, directly aid in producing goods and services. Other environmental services facilitating economic activity include carbon sequestration, air, and water pollution filtration, flood risk reduction, and soil formation. It is also essential for our well-being, providing recreational opportunities, improving our health, and much more (Everett et al., 2010).

Economic growth, in turn, is crucial for the prosperity and health of the economy and its citizens, both in established nations and in the developing world. It encourages technological breakthroughs, such as those required to continue decoupling consumption and production from their environmental implications (Akbar, & Mahdi. 2023). Additionally, it plays a significant role in facilitating other well-being-enhancing factors, including advancements in health, education, and general quality of life (Everett et al., 2010), (Alnaim, et al., 2023). Studies using environmental composite indices to assess economic progress may be categorized as those in Table1.

Table 1: Resent Studies on the relationship between environmental Performance and Economic Growth

Study	Population Survey	Time	Environmental Index	Economic growth variable	Tool	Finding
Almeida et al. (2017)	152 countries	6 years	Modified composite index of environmental performance (MCIEP)	GDP per capita	Panel data	Ecological harm rises early in economic expansion, then falls, then rises again at the peak.
Liu et al. (2022)	five Asian emerging economies	1995 to 2019	carbon emissions, energy use	GDP per capita, trade, and population growth	panel-ARDL	It shows that financial inclusion is strongly correlated with both GDP and CO2 emissions. Bank branches and loans have a positive impact on long-term economic development and CO2 emissions, while insurance premiums have no effect on economic development but negatively impact long-term carbon emissions. Energy usage is highly sensitive to economic development and carbon emissions.
Neagu et al. (2017)	166 countries	2016	(EPI) calculated by Yale and Columbia University	GDP per capita	a cross-country regression analysis	A study of 166 nations found a positive correlation between log GDP per capita and 2016 EPI values, indicating that GDP per capita enhances national environmental performance. Environmental Health (EH) and Ecosystem Vitality (EV) are positively connected with GDP per capita, with EH having a stronger connection. As nations grow, they spend more on public health, sanitation, and infrastructure. However, a limitation is that the analysis was limited to 2016, and a cross-country and cross-time analysis would provide more insights into the relationship between environmental performance and economic growth worldwide and whether developed and developing countries have different connections.
Kubatko et al. (2018)	15 developing nations	2000–2010.	Environmental Performance Index (EPI) is used as an indicator of environmental quality	GDP	Generalized least squares (GLS) regression	This study found a positive relationship between economic performance and environmental quality in developing countries, with energy use being a significant factor. Environmental health and vitality also yielded similar results. No Environmental Kuznets Curve (EKC) link was

						found between economic performance and EPI for underdeveloped nations. A \$100 increase in GDP per capita increased EPI by 0.1, suggesting a positive correlation between economic performance and environmental quality in developing countries.
Wang (2021)	China	1978-2016	capita ecological footprints (EF) as an indication of environmental adversities and regulating resource rent (NR)	gross domestic product (GDP)	(ARDL)	The study found a long-term equilibrium between environmental factors (EF), GDP, natural resources (NR), urbanization (UR), and land coverage (LC). An environmental Kuznets curve (EKC) connection exists in the long term, but China is still in the growing stage with a positive relationship between EF and NR, indicating a resource curse. UR is also becoming increasingly unsustainable, and LC is best for sustainable development. Only lagging GDP inhibits EF in the short term, and all explanatory factors are Granger causes.
Boleti et al. (2020)	88 developed and developing countries	2002–2012.	CO2 and PM2.5 and energy consumption index.	a country's productive structure	simple linear algebra techniques	According to the study, a nation's export mix has a significant impact on its environmental performance, and panel data shows a high positive correlation between environmental performance (air quality) and product complexity. Environmental performance is also impacted by economic complexity. Moving quickly from a production structure based on agriculture to one with industrial and technical sectors enhances environmental performance but degrades air quality.

Source: Authors Contributions

## **Environmental Performance Index, Financial Development and Economic Growth in Developed Country**

Khan et al. (2021) examined energy transitions, consumption, and sustainable economic growth in 38 International Energy Agency members (IEA) using econometric methods. The study found that economic sustainability affects economic growth both short-term and long-term, while energy transitions only affect it in the long run, negatively impacting host nations' growth. Consumption of renewable and non-renewable energy, labor, and capital positively affects economic growth. The study recommends policymakers in IEA countries settle carbon costs and taxation, commercialize low-CO<sub>2</sub>-emission technologies, reduce subsidies on non-renewable energy, offer technology transfer programs, and develop a green trade policy to achieve sustainable development.

Salari et al. (2021) examined the relationship between state-level CO<sub>2</sub> emissions, energy consumption, and GDP in the US from 1997 to 2016. Using static and dynamic models, the study quantified how various energy consumption patterns affect CO<sub>2</sub> emissions across states. The study discovered that while renewable energy reduces CO<sub>2</sub> emissions, total non-renewable, industrial, and residential energy consumption increases. Both static and dynamic models demonstrated a long-term association between state-level energy consumption and CO<sub>2</sub> emissions, along with an inverted U-shaped relationship between GDP and CO<sub>2</sub> emissions. The analysis supports the Environmental Kuznets Curve (EKC) theory in all states, and both static and dynamic models produce reliable results.

Ivanovski et al. (2021) studied the impact of renewable and non-renewable energy sources on economic development in OECD countries from 1990 to 2015 using a parameter-free modelling technique called LLDVE. Their findings suggest that non-renewable energy usage increases economic development in all OECD nations, with the coefficient function growing over time. However, the influence of renewable energy on economic development in these nations was statistically negligible for most of the period. The study also suggests that while renewable and non-renewable energy consumption supports economic development in non-OECD nations, emerging countries may face technological limitations when transitioning to renewables.

Pillo et al. (2017) analyzed CO<sub>2</sub> emissions normalized by business turnover for 236 firms in Italy over a six-year period from 2008 to 2013. The findings of the study revealed that the energy sector had the worst performance in terms of CO<sub>2</sub> emissions normalized by business turnover, operational efficiency, company profitability, financial viability, and company



liquidity. This indicates a positive relationship between environmental performance and economic-financial performance, as companies with better environmental performance tended to have better financial performance.

Salari et al. (2021) investigated the relationship between state-level CO<sub>2</sub> emissions, energy consumption in the United States, and GDP over a period spanning from 1997 to 2016. The study's conclusions showed that state-level energy use and CO<sub>2</sub> emissions were highly connected in both static and dynamic models. The findings also demonstrated that renewable energy consumption had a significant and unfavorable impact on CO<sub>2</sub> emissions, suggesting that increasing renewable energy sources could help lower CO<sub>2</sub> emissions. These findings emphasize the significance of considering GDP and energy consumption when formulating policies to mitigate climate change.

The studies reviewed in this section how crucial environmental performance and sustainability are to achieving economic growth and development in industrialized nations. According to Khan et al. (2021), in order to achieve sustainable development, policymakers in IEA countries should give priority to settling carbon costs and taxes, commercializing low-CO<sub>2</sub> emissions technologies, reducing subsidies for non-renewable energy, providing technology transfer programs, and creating a green trade policy.

According to Salari et al. (2021) and Pillo et al. (2017), there is a correlation between economic-financial performance and environmental performance, with greater environmental performance generally translating into higher financial performance for businesses and industries. They also emphasize how crucial it is to consider CO<sub>2</sub> emissions and energy use when formulating measures to lessen climate change. The necessity of switching to renewable energy sources is further highlighted by Ivanovski et al. in their article from 2021.

## Environmental Performance Index, Financial Development and Economic Growth in Developing Countries

Table 2: Summary of reviewed studies

Author	Country	Objective	Practice and Tools	Finding
Charfeddine and Kahia (2019)	Twenty-four MENA nations	examined how renewable energy and financial markets affect CO2 emissions and economic growth. Twenty-four MENA nations were studied from 1980 to 2015	used the impulse response function tool, established in the same area, to better understand the reaction of the two main variables of interest, CO2 emissions and economic growth, and the aftershocks on renewable energy and financial development.	that renewable energy consumption and financial market growth have a negligible effect on CO2 emissions and economic growth. These findings show that the financial development and renewable energy sectors in MENA nations have yet to attain their full potential in improving environmental quality and economic growth.
Bist (2018)	16 selected low-income countries	analysis to examine the long-term relationship between financial development and economic growth. from 1995 to 2014. Research took 20 years.	panel unit root and panel cointegration analysis. Fully modified and dynamic OLS algorithms evaluates the long-run link. Cross-country reliance was identified.	financial development and economic expansion are long-term cointegrated. Financial development enhances economic growth over time. Country-by-country time-series analysis boosted this study. Most countries benefit from financial development. This region's private sector is also overlooked. This research proposes governments prioritise private sector growth.
Banday et al. (2021)		examined the relationship between foreign direct investment, trade openness, and GDP in BRICS members from 1990 to 2018	used an auto-regressive distributed lag model to assess cointegration and Dumitrescu and Hurlin Granger causality	Research shows DI and trade openness improve long-term economic development. The real effective exchange rate, gross capital creation, and economic growth are linked throughout time. The causation research links economic progress, trade openness, and foreign direct investment.
Rahman (2021)	BRICS and ASEAN countries	examined the dynamic relationship between energy consumption, international trade, and FDI with economic growth from 1990 to 2017	Panel co-integration, panel quantile regression, impulse response function, and heterogeneous panel causality tests are used for empirical research. The results show that the variables are stable and in equilibrium.	The variables are steady. These nations' economies benefit long-term from energy consumption, international commerce, FDI, and capital. Heterogeneous panel causation shows bidirectional causality between international trade, labour force, economic growth, and energy consumption. FDI also drives economic development, international commerce, and energy consumption.

Wang et al. (2021)	China's	examined China's national and regional renewable energy usage from 1997 to 2017	using panel data.	Financial development diminishes renewable energy use in China and western China, while economic growth enhances it. Economic development encourages consumer spending. Short-term links reveal that economic growth and financial development impact renewable energy consumption favourably and adversely. Granger causality was also examined. China's financial growth drives eastern China's renewable energy consumption, according to causality testing.
Tiwari et al. (2021)	India	examined the Granger-causal link between power consumption and Indian economic growth at the state and sectoral levels.	The heterogeneous panel causality test, panel cointegration tests with the structural break, and panel VAR-based impulse-response model accomplish this.	The data imply unidirectional Granger causality from economic development to a state's power use. In agriculture and industry, economic expansion increases power use. Industry and agriculture are related.
Abbasi et al. (2021)	Pakistan	examined economic growth from 1972 to 2018. examine the positive and negative effects of energy consumption, industrial expansion, urbanization, and carbon emissions on Pakistan's economic growth	The dynamic autoregressive distributed lag (ARDL)	Their empirical study reveals that electricity usage and industrial value impact short- and long-term economic development. Urbanisation and carbon emissions increase short-term economic growth. Energy consumption, industrial expansion, urbanisation, and CO2 emissions enhance the Pakistani economy. The FDC supported long-term, medium-term, and short-term causation hypotheses. The report recommended electricity production and management efficiency in economic policy. The government should spend more in renewable energy, limit low-energy electronics, and reconsider refugee policies to safeguard the environment.
Acheampong et al. (2021)	China, India, Indonesia, South Africa, and Turkey	examined the economic growth–energy consumption thesis from 1970 to 2015.	by examining the effects of economic, social, and political globalization on the nexus in 23 rising economies	An instrumental variable generalised moment model hypothesis is I Energy use impacts GDP. (ii) Economic and political globalisation impede growth, but social globalisation benefits. (iii) Economic growth and globalisation are reverse U-shaped (economic, social, and political). (iv) Globalization—economic, social, and political—slows economic development by using energy. Globalisation does not influence energy usage. Energy usage is U-shaped with economic, social, and political globalisation. Political globalisation moderates' energy use, whereas economic and social globalisation increase it. Globalisation impacts the environment.

Rehman et al. (2021)	Pakistan	examined how information and communication technologies, foreign direct investment, trade, and renewable energy affected GDP development from 1985 to 2017	a long- and short-run autoregressive distributed lag (ARDL) model. FMOLS, DOLS, and CCR cointegrating regression analyses were performed.	ICTE, commerce, and renewable energy improve Pakistani GDP growth over the long term, while foreign direct investment does not. Foreign direct investment, ICTE, and commerce all positively affect GDP growth in Pakistan, except renewable energy, according to cointegrating regression.
Ren et al. (2022)	China	examined the temporal and geographical link between rising economic output and energy use. study the time-varying province-specific trends, the general trend, and the coefficients using panel data from 26 Chinese provinces from 1995 to 2017.	local linear dummy variable estimation (LLDVE) approach	Energy consumption boosts economic development in an inverted U shape, according to academics. Non-parametric models better capture this impact. Carbon intensity characterised the sample for sustainable economic development and carbon emission reduction. Thus, high-carbon development regions should prioritise energy efficiency and low-carbon sectors investment and innovation.
Gyimah et al. (2022)	Developing countries	examined how renewable energy affects economic growth directly and indirectly using 1990–2015 data.	Granger causality and mediation models were used	The findings demonstrated that renewable energy consumption indirectly affects economic development. Renewable energy increases economy. Renewable energy helps economic development. Their analysis suggested prioritising renewable energy for economic growth.
Steve et al. (2022)	East, Central, and West sub-Saharan Africa	examined the impact of renewable energy consumption on economic growth Over the 1990–2018 sample period,	The common correlated effects mean group estimator (CCEMG) and Dumitrescu-Hurlin Granger causality test methods achieve this. These methods consider cross-sectional dependency and nation-to-nation heterogeneity.	
Hosan et al. (2022)	developing nations	examined how developing nations could benefit from the demographic dividend, digital economy, and energy efficiency.	This study uses advanced econometric approaches and panel estimations	Investigating its duration. Demographics and digitalisation will promote long-term economic development in all quantiles. Urbanisation, capital creation, and industrialization are positively connected, whereas sustainable economic growth, energy intensity, and sustainability are adversely correlated.

Rehman et al. (2022)	Pakistan	examined CO2 emissions, economic growth, fossil fuel energy output, nuclear electricity production, and renewable energy sources in Pakistan. Unit root testing ensured that our data was stationary from 1975 to 2019.	Unit root testing ensured that our data was stationary	Long-term research demonstrated that fossil fuel energy, renewable energy, CO2 emissions, and GDP per capita all boost Pakistani economic growth. Electricity, nuclear, and energy consumption impede economic progress. In the short term, fossil fuel energy consumption, renewable energy consumption, carbon dioxide emissions, and GDP per capita impact Pakistan's economic development. However, power use, nuclear electricity generation, and energy use all hurt Pakistan's economy. The Pakistani government must create effective and creative energy and power sector strategies to address the nation's energy demands.
Saadaoui and Chtourou (2022)	Tunisia	examined institutional quality, financial development, economic growth, and renewable energy use	ARDL models.	Nonlinear methods showed a negative and substantial impact of financial development on renewable energy use, indicating sustainable financial structures are required. Finance hurt renewable energy use. Economic development and institutional quality increase renewable energy usage. The nonlinear Granger causality test reveals that renewable energy helps the economy and institutions. Economic development seems to cause renewable energy generation. Their results also illuminate Tunisia's renewable energy deployment, which looks to effectively tackle energy poverty and climate change.
Saadaoui and Chtourou (2022)	Tunisia	examined institutional quality, financial development, economic growth, and renewable energy use	ARDL models	Nonlinear methods showed a negative and substantial impact of financial development on renewable energy use, indicating sustainable financial structures are required. Finance hurt renewable energy use. Economic development and institutional quality increase renewable energy usage. The nonlinear Granger causality test reveals that renewable energy helps the economy and institutions. Economic development seems to cause renewable energy generation. Their results also illuminate Tunisia's renewable energy deployment, which looks to effectively tackle energy poverty and climate change.
Bibi and Li (2022)	Developing countries	raised concerns about unequal links between financial development, renewable energy, economic growth, capital, and labor.	Using a nonlinear autoregressive distributed lag model	The results reveal short- and long-term impacts of the factors of interest. Expansion affects renewable energy and financial sectors in different ways. This research indicated that renewable energy consumption has a positive and substantial influence on economic growth in both the short and long term, whereas financial development has a large, asymmetric, and positive short-term effect but a negative long-term effect. Pakistan's energy authorities and investors are impacted.

Kirikaleli et al. (2022)	Chile	examined how financial development and renewable energy use affect consumption-based CO2 emissions	autoregressive distributed lag (ARDL) bounds	Financial growth and renewable energy usage are lowering Chile's consumer-based carbon emissions, but economic development and power demand are increasing them. Gradual shift causality matches ARDL, FMOLS, and DOLS estimators. Thus, Chilean government should support low-carbon and renewable energy research. Reduce imported nonrenewable energy sources in energy-intensive businesses that emit CO2.
Cao et al. (2022)	south Asian	Examines how energy consumption, financial development, and sustainable environmental economic growth affect economies.	An autoregressive distributive lag (ARDL) model and WDI panel data	Financial development boosts south Asian economies, according to studies. Energy consumption promotes sustainable economic and environmental development. Energy consumption findings support sustainable economic development, the mean group, pooled mean group, and CMEMG.
Zahoor et al. (2022)	China's	Examined how renewable energy investment and financial development affected environmental sustainability and economic growth from 1970 to 2016.	Manufacturing value-added and urbanization as moderators	Ecologically friendly energy investments increase China's GDP and reduce CO2 emissions. China's economy, financial sector, value-added industries, and urbanisation increase CO2 emissions and ecological impact. Green energy investments boost sustainability but harm economic development.

Source: Authors Contributions

Based on the studies, the critical conclusions about the environment, financial development, and economic growth in developing countries are:

1. Renewable energy and energy efficiency can help reduce CO<sub>2</sub> emissions and support more sustainable economic development, though their impact on short-term growth is often negligible.
2. Financial development has complex and sometimes contradictory effects - it can both enable renewable energy use but also increase emissions and environmental impact, depending on the country and time frame. More sustainable financial structures are often needed.
3. Conventional growth drivers like energy consumption, trade, and investment generally promote short- and long-term economic growth but can also increase CO<sub>2</sub> emissions and environmental impact.
4. Globalization, especially economic and social globalization, tends to increase energy usage and CO<sub>2</sub> emissions, though its effect on economic growth is mixed. Political globalization may help moderate energy consumption.
5. Developing countries need policies to shift toward more renewable energy and energy efficiency, like carbon pricing, fossil fuel subsidy reform, and green finance incentives. This can help balance economic and environmental sustainability goals.
6. Technological progress and innovation will be essential for developing countries to reap the environmental and economic benefits of transitioning to renewable energy and sustainable development.

In summary, renewable energy and sustainable financial systems show the potential to help reduce emissions and support growth in developing countries. Nevertheless, effective policies and investments in green technology will be needed to realize these benefits and balance economic and environmental sustainability goals.

### **Economic Growth, its Determinants and Environmental Quality in Group Countries**

Studies have been done on the links between environmental factors and economic development in group countries. According to Aslan et al. (2021), the banking industry's growth reduces energy consumption over time in G7 countries and raises it in emerging market economies. In their study of the short- and long-term connections between environmental and economic growth determinants in the G-20 countries, Arvin et al. (2021) discovered numerous temporal correlations between variables. These findings' most significant policy implication is that better co-development and harmonization of ICT, FDI, and trade openness policies are

required for longer-term growth in this group of countries. Short-run covariable correlations should also be taken into consideration by public officials.

Jin et al. (2022) investigated the connection between renewable and nonrenewable energy consumption, economic growth, and carbon emissions in the top 28 countries that account for most global carbon emissions. The study discovered a two-way causal relationship between carbon emissions and economic growth in all economies. According to the study, there is no discernible link between economic growth and energy use in developing nations. Unlike developing nations, developed nations show a two-way causal relationship between economic growth and renewable and non-renewable energy usage. Additionally, all economies demonstrated a bidirectional causal relationship between renewable energy and carbon emissions, with apparent differences between industrialized and developing countries. Based on a nation's level of development, the study's conclusions can guide the creation of specific energy and economic policy approaches.

## CONCLUSION

The reviewed studies emphasize the importance of environmental performance and sustainability in achieving economic growth and development in both developed and developing countries. Policymakers in these countries should prioritize settling carbon costs and taxes, commercializing low-CO<sub>2</sub> emissions technologies, reducing subsidies for non-renewable energy, providing technology transfer programs, and creating a green trade policy to achieve sustainable development. There is a correlation between economic-financial performance and environmental performance, with greater environmental performance generally translating into higher financial performance for businesses and industries. Switching to renewable energy sources is crucial Ivanovski et al. (2021)

In developing countries, renewable energy and energy efficiency can support sustainable economic development and reduce CO<sub>2</sub> emissions, although their impact on short-term growth is often negligible. Financial development has complex and sometimes contradictory effects, enabling renewable energy use but also increasing emissions and environmental impact, depending on the country and time frame. Conventional growth drivers like energy consumption, trade, and investment generally promote short- and long-term economic growth but can also increase CO<sub>2</sub> emissions and environmental impact. Developing countries need policies to shift toward more renewable energy and energy efficiency, like carbon pricing, fossil fuel subsidy reform, and green finance incentives, to balance economic



and environmental sustainability goals. The study's findings can inform tailored approaches to energy and economic development policies based on a country's level of development.

Overall, the reviewed studies emphasize the need for effective policies and investments in green technology to balance economic growth with environmental sustainability and highlight the potential of renewable energy and sustainable financial systems to support growth in developing countries.

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