RESEARCH PAPER

Sustainability vs. Economic Development: A Comparative Analysis of Environmental Impact and Economic Growth in Developed and Developing Economies

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ABSTRACT
The connection between economic growth and the sustainability of the environment has become one of the most significant themes in the economic policy of the world. Although economic growth will enhance the standards of living, it could also create environmental stresses by increasing the level of energy consumption and carbon emissions. In this study, the correlation between the speed of economic growth and environmental impact is examined through the analysis of the changes in the GDP per capita and carbon dioxide (CO 2) per capita in the United States and Vietnam in the years 2003-2022. The study examines the relationship between economic growth and environmental degradation or improvement in the economies at various development stages through a comparative quantitative research method and application of the Environmental Kuznets Curve (EKC) framework. The findings indicate conflicting trends in the two nations. In the US, GDP per capita rose over time and CO 2 emissions per capita fell, indicating a slow decoupling of economic growth and environmental degradation. Unlike Vietnam, which recorded a combination of growth rates of income and carbon emissions, which indicates the environmental pressures that come with the rapid industrialisation and the growth of energy demand. These results demonstrate that the correlation between the level of economic development and the quality of an environment depends on the development level and policy potential. In the research, the significance of technological advancement, environmental control, and renewable energy expenditure in minimizing the intensity of emissions but maintaining economic growth is also highlighted. Overall, the analysis helps to understand the way in which countries with various levels of income may achieve economic development and overcome the problem of environmental sustainability.

Keywords: Environmental Kuznets Curve, Economic Growth, CO_2 Emissions, Sustainable Development, Comparative Analysis, Economic Growth.

How to cite this article: Kit LK, Teck TS, Geok LS, Fernandez RT, Toh JS, Veerunjaysingh S, Prakash S; Sustainability vs. Economic Development: A Comparative Analysis of Environmental Impact and Economic Growth in Developed and Developing Economies..Int J Drug Deliv Technol. .2026;16(10s): 42-52; DOI: 10.25258/ijddt.16.10s.6
Source of support: Nil.
Conflict of interest: Nil

INTRODUCTION

Economic development is generally accepted as a key factor in the increase in the level of living, as it allows society to reach a higher level of income, improved infrastructure, and access to higher healthcare and education. One of the most important indicators of the economic development and prosperity of the country is gross domestic product (GDP) per capita. The effect of rapid economic growth, however, is usually very environmental, especially the high use of energy and carbon emissions caused by industrial production and urbanisation. Since nations are seeking to increase their economic performance, environmental strains are a significant issue of interest to policymakers and researchers. Over the past few decades, a problem of economic development and environmental sustainability has become more and more popular in both developed and developing economies. This issue has become especially important since countries are trying to decrease the number of greenhouse gases without losing economic growth. States worldwide have thus come up with other policy tools which are geared towards ensuring that there are a cleaner energy system and less environmental degradation. To give an example, the renewable energy projects have become more and more widespread, with wind and solar energy becoming more significant in the process of decreasing the intensity of carbon emissions into the electricity generation (Buchholz, 2023; Gazi et al, 2025). Concurrently, there has been the establishment of several policy frameworks by many countries so as to hasten the move towards the low-energy system. The government policies that encourage the development of renewable electricity sources such as the feed-in tariff mechanism, to facilitate the development of solar energy sources, have been

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introduced in Vietnam to support the development of clean energy technologies (Asia Pacific Energy Portal, 2020; VEPG, 2020). Such developments explain the how economic policy is more coming to internalize the goals of the environment in the broad growth strategies. Although the issues of sustainability are becoming increasingly popular, there is usually a trade-off between the act of protecting the environment and economic growth. The growth in industries, development of infrastructure and the escalated energy need often lead to higher levels of emissions and environmental degradation especially in the economies that are rapidly changing their structures. Third world economies are more inclined towards economic growth and poverty alleviation and this may exert pressure on the environment at early developmental phases. Due to the growth of industrial production and urbanisation, fossil fuel consumption tends to grow in line with the level of economic performance. In turn, environmental degradation can possibly increase faster when nations seek more incomes and industrial capabilities. The policymakers are thus left with a challenge of structuring economic policies that can ensure growth and at the same time controlling environmental degradation. Various policy tools have also been proposed at the international level to deal with this challenge. Carbon pricing and environmental taxation are both well known as methods of internalising environmental costs and promoting cleaner production methods. As an illustration, the policy of carbon taxes in Sweden has a long history of implementing fiscal policies to promote the minimisation of emissions and favour the sustained economic growth (Government Offices of Sweden, 2018). The same way, some of the developing economies have implemented taxes on environmental protection and other regulatory measures to deter economic activities that are intensive to pollution, but still sustain economic growth (Vietnam Briefing, 2025). Such initiatives indicate rising tendencies toward balancing economic and environmental agendas by governments.

The Environmental Kuznets Curve (EKC) is a hypothetical method of researching the dependence between the environmental state and economic progress. In this model environmental degradation is found to be more in the initial years of the industrialisation process where there is increased income. As the economies transform and the degree of income increases further, the reduction in the level of pollution could be noticed as a consequence of the growth of technologies, the tightening of the environmental conditions and the changes of the structure towards service sectors. This trend means that there is an inverse- U relationship between the environment destruction and economic growth. EKC model has already been applied in research studies with a wide usage in order to establish the influence of the level of economic growth on the environmental performance at different levels of development. It also gives emphasis on the significance of the institutional capacity and policy interventions in the operation of the environmental trajectories. In recent years, policymakers have shown interest in the formulation of market-based environmental policies, such as emission trading schemes, to provide a better management of carbon emissions. Vietnam, being a part of the broader climate policy, is beginning to introduce a system of carbon markets and emissions trading (Baker McKenzie, 2025). The fact that the country is also attempting to align the goals of economic development with environmental protection is also evidenced by the adoption of the policies on greenhouse gas mitigation and emissions monitoring (Climate Laws, 2022; FAOLEX, 2025).

Despite the fact that an extensive literature has studied the association between growth and deterioration of the environment, numerous studies have conducted cross-country statistical studies as opposed to comparing particular developed and developing economies. Consequently, not much attention has been paid to the question of environmental outcomes in individual countries at various economic development levels. Specifically, the comparative empirical research that looks at the economic indicator and environmental performance in contrasting development situations is comparatively scarce. The country of Vietnam presents a particularly pertinent example of the analysis of this problem, as the country has been engaged in the rapid economic progress and in the formation of the new environmental policies. The latest efforts are the launch of a domestic carbon market roadmap and pilot emissions trading scheme, which are aimed at controlling the emission of greenhouse gases in industrial sectors with the key industries (ICAP, 2025a; ICAP, 2025b). The policy reforms have also been cited to have contributed to the facilitation of the creation of the emissions trading systems and carbon markets in the emerging economies (Icapcarbonaction.com, 2025; Reuters, 2025). Nevertheless, there are still obstacles to the effective implementation of these policies, such as financial and regulatory limitations to renewable energy investment (Taylor, 2025). This is an indication that more studies should be done to explore the interaction between economic growth and the quality of the environment both in developed and developing settings.

Objectives of the study

1. To examine the long-term relationship between economic growth and environmental impact by analysing GDP per capita and CO_2 emissions per capita trends in the United States and Vietnam from 2003 to 2022.
2. To compare how different stages of economic development influence the growth–environment relationship using the Environmental Kuznets Curve (EKC) framework.

2. Methodology

2.1 Research Design

The study design adopted in this study was a comparative quantitative research design in order to establish the relationship between economic growth and the environmental impact of two economies that had different rates of development. The purpose of the analysis was to identify the trends of income growth and carbon with time. The comparison between a developed economy and a developing one was done by way of a case-study to capture the difference in the structure of the economy, to capture the potential of the environmental policy and industrial development. The design allowed the research to test the hypothesis on whether there was development variation in relationship growth and quality of the environment. The theoretical model adopted in describing the trend in the economic and environmental statistics was the Environmental Kuznets Curve.

2.2 Country Selection

2.2.1 Developed Economy: United States

The developed economy chosen as the representative was the United States, since it has a very high level of industrial and technological organization and a long tradition of applying environmental policies. Being one of the biggest economies in the world, it offers much information about the work of the economy and environmental indicators. The nation has been enjoying a high rate of economic growth and structural changes of more service-based industries and cleaner energy technologies. These attributes rendered it appropriate to test the hypothesis on whether the increased level of income correlates with an increase in the quality of the environment. The United States was hence a good study to understand the subsequent phases of the Environmental Kuznets Curve.

2.2.2 Developing Economy: Vietnam

The developing economy that was selected is Vietnam due to the high rate of economic change and industrial growth observed in the country over the recent few decades. The country has witnessed tremendous growth in the level of income, production, and foreign trade integration since the introduction of economic reforms. Meanwhile, the pressure on the environment has increased due to industrialization and the energy requirement. Vietnam is hence a good case study of a lower-middle-income country in structural economic transition. The analysis of Vietnam and a developed nation enabled the research to compare the impacts of economic development at various levels on the environmental performance and whether there were differences in environmental performance by similar growth patterns.

2.3 Data Sources

The empirical analysis was done using secondary data. The World Bank data of GDP per capita were acquired in the form of constant 2015 US dollars to ascertain comparability across time and to eliminate the impacts of inflation. The data have been retrieved with the help of Our World in Data (Our World in Data, 2026a). The Our world in data platform was also used to retrieve environmental data, namely the dataset that reports on the amount of carbon dioxide per capita in metric tonnes per person (Our World in Data, 2026b). The two datasets offer yearly country-wide observations and are both publicly available to be used in research. The dataset was combined based on country identifiers and calendar years, after which the two datasets were put together to form a combined dataset that made economic growth and environmental indicators to be analyzed simultaneously.

2.4 Study Period

The comparison was done between 2003 and 2022, which gave twenty consecutive years of data of two countries. This period met the needs of the long-term evaluation of trends and at the same time allowed the data on both economic and environmental variables to be available throughout the two countries chosen. The chosen time frame also reflected big global economic trends, such as the transformations in energy systems technologies and the situations in the economy caused by the COVID-19 pandemic. The time constraint (one could consider only the last 20 years) helped the study to capture modern trends of economic development and environmental transformations and reduce discrepancies that might exist in very long historical data.

2.5 Variables

2.5.1 Economic Indicator

The measurement of economic development was in terms of GDP per capita in constant 2015 US dollar. The indicator is used to measure the quality of living and the economy of various countries where this measure is commonly applied in the daily performance of a country. The constant prices were used to compare the economic growth across time without inflation distorting the analysis. The reason why GDP per capita was chosen as a measure of economic achievement is that variations in economic productivity and structural transformation which are both key determinants in the environmental impact. The information was found in the World Bank dataset that is gathered by Our World in Data (Our World in Data, 2026a).

2.5.2 Environmental Indicator

The metric tonne of carbon dioxide per capita was used to determine the environmental impact. The indicator is the average quantity of carbon emissions that is generated per person in a country and it is often used to measure environmental pressure in terms of energy consumption and industrial activity. The reason the CO 2 emissions have been chosen is that this is a consistent and a universally available measure of environmental degradation with economic development. The quantification in terms of per capita was also used to ensure that the analysis accounted for the variance in population in the countries and that it could more easily compare environmental intensity at various levels of development (Our World in Data, 2026b).

2.6 Analytical Approach

2.6.1 Trend Analysis

The trend analysis was done to evaluate how the economic growth and environmental indicators have grown over the years in each country. Annual GDP per capita and carbon emission per capita data were charted to establish the trend and the change of the two throughout the period of the study. This was the most effective way, in which the research would record the increasing or decreasing pressure of the environment in relation to the increasing income. The analysis of the two countries in the same period of time brought out the fact that there was a slight variation with regards to the process of development and environmental results. The graphical comparison provided an initial level of descriptive view on how the economic and environmental variables were interacting with time.

2.6.2 Environmental Kuznets Curve Interpretation

The relationship between the growth of income and the degradation of the environment was interpreted in the Environmental Kuznets Curve framework. This framework postulates that environmental degradation will rise in the initial phase of economic growth but may reduce after the income levels rise beyond particular levels. The study evaluated the relationship between the observed trends of time-series patterns of GDP per capita and emissions and various stages of the EKC after analyzing the trends. This interpretation aided in establishing the fact that the developed economy was at a stage where economic growth was related to improvement of the environment, whilst the developing economy was still at an earlier level of industrial growth.

2.6.3 Comparative Development Analysis

There was a comparative analysis in order to analyze differences between the two economies that were selected. The research focused on the effect of the economic structure, the level of development and policy capability on the relationship between economic growth and environmental performance. Through the comparison of a high-income economy and the rapidly developing economy, the research could determine differences in the growth trends, the emission trends and policy implications. The comparison gave an idea of how environmental issues change in the various stages of economic growth and how nations with varying incomes can have varied ways of balancing between growth and sustainability.

3. Results

3.1 Economic Growth Trends

3.1.1 GDP Per Capita Growth in the United States

The United States also enjoyed a stable economic growth throughout the research. The GDP per capita grew by approximately USD 28 per cent in twenty years between 2003 and 2022, to about USD 63,886 in the year 2022. Even though periods of temporary stagnation were experienced during the financial crisis of 2008–2009 and the COVID-19 pandemic in 2020, the overall trend was positive. Following a slight fall in 2020, GDP per capita increased to USD 63, 206 in 2021 and then even more in 2022 (Table 1). Such findings imply that the United States experienced a consistent economic growth over the period of investigation hence its developed economic framework and good level of productivity.

Table 1. GDP Per Capita Growth in the United States (Constant 2015 US$), 2003–2022

Year	GDP per Capita (USD, constant 2015)	Key Economic Context
2003	49,663	Beginning of study period
2008	55,271	Pre-global financial crisis peak
2009	53,041	Impact of global financial crisis
2015	58,187	Stable post-crisis recovery
2019	62,993	Pre-COVID economic expansion
2020	60,509	Economic slowdown during COVID-19 pandemic
2021	63,206	Economic recovery following pandemic disruption
2022	63,886	Highest value during study period

Source: *Our World in Data (2026a), based on World Bank GDP per capita dataset.*

3.1.2 GDP Per Capita Growth in Vietnam

The growth rate of the economy in Vietnam was quite high relative to the United States. GDP per capita rose to about USD 1,419 in 2003 to about USD 3,618 in 2022, which implies that it has risen by over 150% throughout the years of the research. The statistics show the consistent increase due to the industrial growth, export-driven manufacturing, and the growing involvement in the international trade. Despite the slowdown in economic activity due to the COVID-19 pandemic, GDP per capita has also grown, and in 2022, it stands at USD 3,617, compared to USD 3,404 in 2020 (Table 2). These observations indicate that Vietnam has experienced a fast economic development and income improvement in its current industrializing process.

Table 2. GDP Per Capita Growth in Vietnam (Constant 2015 US$), 2003–2022

Year	GDP per Capita (USD, constant 2015)	Key Economic Context
2003	1,419	Beginning of study period
2008	1,962	Rapid industrial and export growth
2010	1,991	Continued economic expansion
2015	2,590	Strengthening manufacturing sector
2019	3,230	Strong pre-pandemic economic performance

2020	3,404	Economic slowdown during COVID-19 period
2021	3,566	Gradual economic recovery
2022	3,618	Highest value during study period

Source: *Our World in Data (2026a), based on World Bank GDP per capita dataset.*

3.1.3 Comparative Economic Development Patterns

In comparing the two economies, it is evident that there are differences in the levels of income and growth patterns. During the research duration, GDP per capita in the United States was significantly greater than in the case of Vietnam. Indicatively, the United States had a figure of USD 63,886 per capita in 2022, compared to around USD 3,618 in Vietnam, i.e. it was 17 times higher. The growth rate in Vietnam was, however much higher (Table 3). The GDP per capita of Vietnam rose by an average of 155% between 2003 and 2022, as compared to an average of 28% in the United States. This trend is typical of the developing economies that have been subjected to a rapid rate of catch-up growth in comparison to the advanced economies.

Table 3. Comparative GDP Per Capita Growth: United States vs Vietnam (2003–2022, Constant 2015 US$)

Country	**GDP per Capita 2003 (USD)**	**GDP per Capita 2022 (USD)**	**Absolute Increase (USD)**	**Percentage Growth (%)**
United States	49,663	63,886	14,223	~28%
Vietnam	1,419	3,618	2,199	~155%

Income Level Comparison (2022)

Indicator	**United States**	**Vietnam**
GDP per capita (USD, 2022)	63,886	3,618
Income ratio (US : Vietnam)	~17 : 1	—

Source: *Our World in Data (2026a), based on World Bank GDP per capita dataset.*

3.2 Environmental Impact Trends

3.2.1 CO_2 Emissions Per Capita in the United States

The emission rate of carbon dioxide per capita in the United States reduced significantly throughout the research period, even though the economy grew. In 2003, the emissions were estimated at 20.7 metric tonnes per person and in 2022, the emissions were estimated at 14.8 tonnes per person, which is a 29% decrease. An unusually steep drop happened in the year 2020 when the emissions dropped to about 13.9 tonnes per capita and this was mainly due to decreased transportation and industrial activity following the COVID-19 pandemic. Despite a minor recovery in 2021, the trend was negative in the long term (Figure 1). These results show that the United States has gradually decoupled economic growth and carbon emissions.

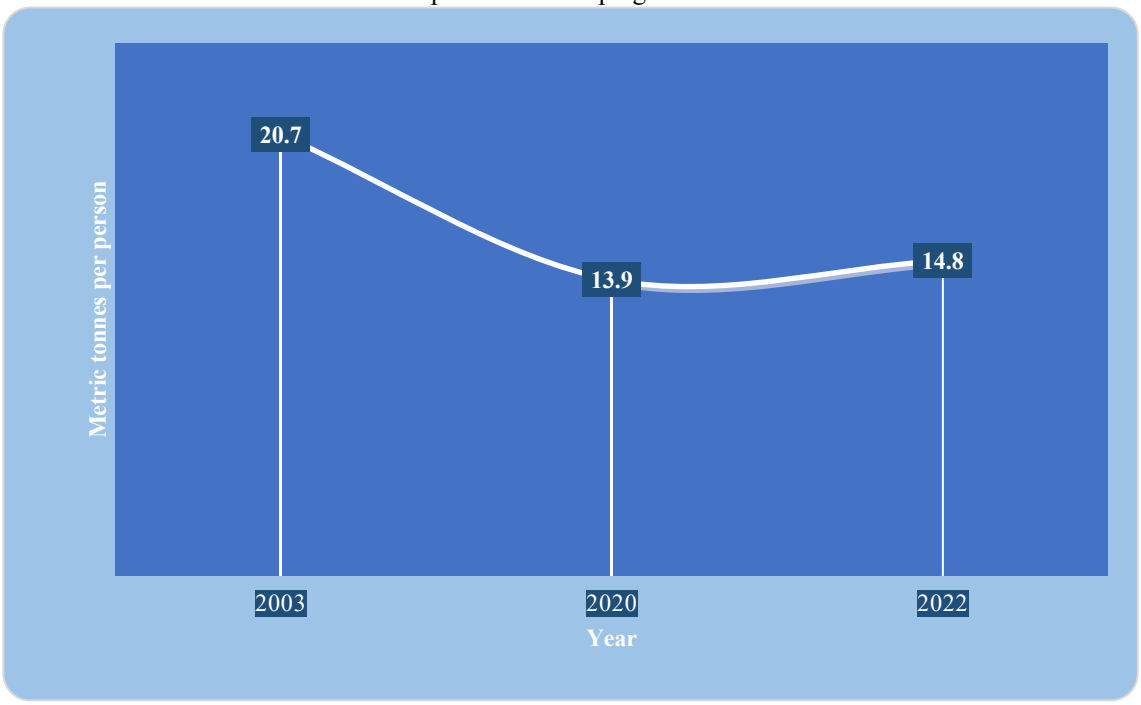

Figure 1. CO2 Emissions per Capita in the United States (Selected Years)

3.2.2 CO_2 Emissions Per Capita in Vietnam

As a comparison, the carbon emission per capita in Vietnam has been steadily rising over the same period. Emissions increased by about 230% between 2003 and 2022 as they went up to approximately 0.97 tonnes per person in 2003 and 3.24 tonnes per person in 2022. The fact that the emissions were increasing was also a close indication of the fact that Vietnam was growing its economy at a fast rate and its increasing energy demand. The emissions reached a maximum of about 3.70 tonnes per capita in 2020 and then fell a notch in 2021 and stabilized in 2022 (Figure 2). The general tendency shows that the growth of the economy in Vietnam has been surrounded by growing environmental pressure, which has mostly been caused by industrialization and the growth of electricity generation.

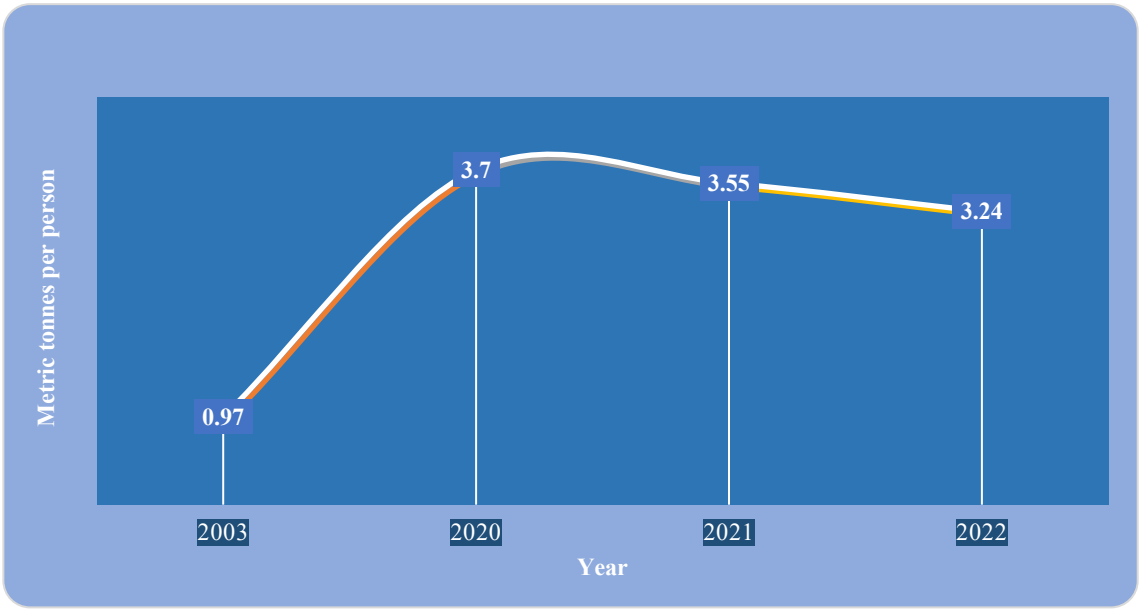

Figure 2. CO2 Emissions per Capita in Vietnam (Selected Years)

3.2.3 Comparative Environmental Trajectories

The two countries compared reveal significant disparities in environmental directions. The United States registered with a decreasing number of emissions per capita, whereas Vietnam witnessed a high rate of rising emissions. In the year 2003, the U.S. had

approximately 21 times more emission per capita than those of Vietnam, but this difference began to reduce slowly as Vietnam rose in its rate of emission. The U.S. had an estimated 14.8 tonnes per capita of emissions by the year 2022, whereas Vietnam had 3.24 tonnes. The United States continues to produce more per person, but the decreasing trend is positive, showing that the country has become more environmentally efficient; however, the increasing rate of emissions in Vietnam shows the environmental stress of the country at the initial stage of industrialization.

3.3 Environmental Kuznets Curve Interpretation

3.3.1 EKC Stage of the United States

The findings are that the United States has crossed the Kuznets Curve of the Environment. The GDP per capita grew by USD 49, 663 to USD 63, 886, and CO 2-emissions per capita decreased by 20.7 to 14.8 tonnes (Table 4). This trend means that the growth of the economy coincided with environmental development. This tendency is understandable by the subsequent phases of the EKC, during which technological development, energy conservation, and more stringent environmental standards minimize the pollution even in the context of the ongoing economic growth. These results imply that the United States has reached a post-industrial phase where economic growth is increasingly carbon-light.

Table 4. Economic Growth and CO_2 Emissions Trends in the United States (2003–2022)

Indicator	2003	2022	Change	Interpretation
GDP per capita (USD, constant 2015)	49,663	63,886	+14,223 (≈28% increase)	Continuous economic growth
CO_2 emissions per capita (tonnes)	20.7	14.8	−5.9 tonnes (≈29% decrease)	Declining environmental pressure
Growth–environment relationship	—	—	Economic growth with declining emissions	Evidence of decoupling

Source: *Our World in Data (2026a; 2026b), based on World Bank GDP per capita data and CO_2 emissions per capita dataset.*

3.3.2 EKC Stage of Vietnam

Vietnam's results reflect an earlier phase of the Environmental Kuznets Curve. GDP per capita increased from USD 1,419 in 2003 to USD 3,618 in 2022, while CO_2 emissions per capita rose simultaneously from 0.97 to 3.24 tonnes (Table 5). The strong positive relationship between income growth and emissions suggests that Vietnam remains in the industrialization stage of economic development. During this phase, rapid industrial expansion and energy consumption tend to increase environmental pressure. Although emissions declined slightly after 2020, the overall trend indicates that economic growth in Vietnam is still closely linked to rising environmental impact.

Table 5. Economic Growth and CO_2 Emissions Trends in Vietnam (2003–2022)

Indicator	2003	2022	Change	Interpretation
GDP per capita (USD, constant 2015)	1,419	3,618	+2,199 (≈155% increase)	Rapid economic growth
CO_2 emissions per capita (tonnes)	0.97	3.24	+2.27 tonnes (≈234% increase)	Rising environmental pressure

Growth–environment relationship	—	—	Economic growth with rising emissions	Evidence of industrialization stage

Source: Our World in Data (2026a; 2026b), based on World Bank GDP per capita data and CO_2 emissions per capita dataset.

3.3.3 Growth–Environment Relationship Across Development Stages

The analysis of the two countries explains the fluctuation in the linkage between economic growth and environmental quality at the developmental stages. In the United States, growth in GDP per capita was coupled with a fall in emissions, which indicated that decoupling between growth and environmental degradation had occurred. Conversely, Vietnam had been registering a correlation between growth and the environment, which means that both income and emissions were increasing at the same time. These results indicate the hypothesis of the Environmental Kuznets Curve, that environmental degradation is larger at the early stage of development but can decrease in the future when the countries obtain higher income and use more environmentally friendly technologies and stronger environmental policies.

4. Discussion

The findings show that the correlation between economic development and environmental quality is significantly different in the two economies that were chosen. GDP per capita in the United States was continuously growing over 2003-2022, and carbon emission per capita decreased, which indicated that economic growth was not only supported by the environmental performance. This trend implies that there is a certain amount of decoupling between carbon emission and economic output. The typical characteristics of such decoupling are technological progress, transition to service-based economy, and more effective environmental regulation. However, in Vietnam, both carbon emissions per capita and GDP per capita had a positive growth over the same time frame. This trend indicates that the growth in industrialization and the increase in the energy demand still put pressure on the environment. The high rate of growth in the production industry and infrastructural development has also been a likely cause of increased energy use, especially fossil energy. The results thus bring out the effects that various phases of economic development have on the correlation between income growth and environmental results. However, even though the developed economies can slowly decrease the intensity of emissions due to changes in technology and regulatory controls, in many cases, emerging economies pass through a stage where the rate of environmental degradation increases with the economic growth.The trends observed are in line with previous studies that have investigated the Environmental Kuznets Curve hypothesis. The EKC model predicts that, as countries become industrialised, the level of environmental degradation rises, but over time the level decreases as higher levels of income allow countries to invest in cleaner technologies and better-enforced environmental regulation (Grossman and Krueger, 1995). Future studies have proposed that this association is not always present and may depend on the capacity of the institutions, the level of technological innovation and policy frameworks (Stern, 2004). The United States also has evidence of the increased place of renewable energy in decreasing the intensity of carbon in developed economies (Buchholz, 2023). Research on the electricity industry also shows that large-scale generation firms are progressively shifting to low-carbon generation technologies as an element of the wider sustainability planning (Exelon Corporation, 2023). In the developing economies, the opening of the carbon pricing and emissions trading systems have been found to be one of the possible avenues of controlling the environment effects without affecting growth (ICAP, 2024). The recent introduction of a domestic emissions trading scheme by Vietnam demonstrates the trend of increasing the interest of emerging economies in the use of market-based environmental policy tools (Reuters, 2025). Another way in which corporate sustainability initiatives have contributed to aiding environmental changes is in the fast-industrialising economies (Vinamilk, 2023).The research has several limitations which should be stated despite the fact that it provides helpful insights. Firstly, the analysis was performed on two countries, which reduces the generality of the findings. Despite the fact that the United States and Vietnam are the two extremes of the economic development, the relationship of growth environment may be different in other nations, with various economic systems or policies. Second, the only environmental indicator that was utilized in the study was the CO 2 emissions per capita. Even though the concept of carbon emission is widely used in explaining the amount of environmental pressure, other key components of the environmental quality that the concept cannot capture include the loss of biodiversity, the air pollution and the water pollution. Third, the trend comparisons analysis was undertaken rather than that of econometric modeling. Despite the fact that it is an appropriate method of illustrating the overall tendencies, the methodology does not have the capacity to draw a causal conclusion regarding the factors that cause environmental

change. Finally, there are some extraneous shocks that can also influence the result, including the economic crisis or disruptions in the world, which would temporarily diminish the activity of the economy and the amount of emissions.The findings have a number of important policy implications. In the example of the developed economies, it is mentioned that economic growth is not necessarily the cause of increased environmental degradation. Instead, technological innovation, and investing in renewable sources of energy can reduce the intensity of emissions without reducing economic performance. Funding of low carbon technologies and clean energy infrastructure in the long term continues to remain the key to the furtherance of this trend. In the third world such as Vietnam, the results demonstrate that the high economic growth and environmental sustainability are challenged by the need to maintain balance. As the industrialisation expands, there is likely to be an increase in the demand of energy and emission against the environmental systems. However, early introduction of cleaner technologies and the application of market-based environmental policies would assist in reducing the environmental development costs. The policy formulations encouraging the use of renewable energy to invest in the energy sector, enhance energy efficiency, and encourage the environmental governance may help the developing economies to achieve the economic growth and decrease the intensity of emission over time. In the long-run, the inclusion of the environmental objectives into the economic planning can help the new economies to transition to the more sustainable development paths.

5. Conclusion

This study explored the correlation between economic growth and environmental quality by comparing the trend in GDP per capita and CO 2 per capita in the United States and Vietnam during 2003 to 2022. The results indicate a definite variation in the relationship between economic development and the environmental outcome in different stages of development. The growth of the economy in the United States was characterized by a gradual decrease in the carbon emissions per capita which means that the increase in the income level could accompany the enhancement of the environmental efficiency. This trend indicates that such factors as the technical development, more effective regulatory measures, and the economic reorganization have helped to decrease the intensity of emissions without reducing the pace of the economic growth. Conversely, what happened is that Vietnam had recorded both a rise in GDP per capita and carbon emission per capita concomitantly. The findings suggest that Vietnam is at an industrial growth phase where the economic growth is closely linked with increasing the demand on energy and environmental stress. In general, the comparative analysis confirms the view of the Environmental Kuznets Curve that the growth-environment curve changes with the development of an economy. Although, in the initial stages of industrialisation, developing economies might face a growing environmental degradation, the economies with a higher income might, eventually, decrease emissions due to technological advancement and related policymaking. The results also indicate the significance of the environmental governance, investment in the renewable energy and the use of market-based policy instruments in defining sustainable development pathways. Future studies can broaden this study by including a greater sample of nations with varying income levels and development patterns. Moreover, future research may incorporate various environmental parameters e.g. air pollution, energy density or the uptake of renewable energy to give a more comprehensive evaluation of environmental sustainability vis-a-vis economic development.

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