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Balancing Growth and Sustainability: Real Estate Development in Albania and its Connection to Environmental Sustainability

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Balancing Growth and Sustainability: Real Estate Development in Albania and its Connection to Environmental Sustainability

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Abstract: This study investigates the link between Albania's carbon emissions and various economic factors from 1995 to 2022 to establish the effect of the country's real estate sector on the environment. Using EViews 12, we assess potential linkages between carbon emission levels, total number of construction permits, Gross Domestic Product (GDP), and energy resources. The results indicate the direct relationship between construction permits, economic activities, and carbon emissions, meaning that the current development path does not support environmental sustainability. However, the assessment reveals certain trends to increase the usage of renewable energy accords that may dramatically decrease carbon levels. These results indicate Albanian policymakers' need to adopt regulations supporting sustainability in the real estate market. Promoting investment in renewable energy sources is imperative so far as the Albanian country context is concerned as it is an essential step towards enhancing environmental quality.

Keywords: construction permits; environmental sustainability; renewable energy

1. Introduction

The world faces a dilemma: how to meet rising energy demands for development without further impacting the climate system. According to reports from the IEA, energy consumption is currently on a concerning upward trend [1]. Despite the fact that such assets are being developed, the share of renewables is still low. The energy sources in a modern world are described by the UN Environment Programme (UNEP) as follows: The energy sector is among the worst offenders in the emission of carbon dioxide, which is the cause of global warming. The IEA estimates the energy sector at more than 70% average emissions. Housing plays a role in this regard, too. It acts as a significant service to the real estate sector. However, the use of housing also has a great impact on ecology in a negative manner. Construction projects are major sources of dust and noise and are partly responsible for the generation of waste as noted by Mir et al. [2]. From the viewpoint of climate change and harvesting of natural resources, this is a step toward environmental degradation [3]. The UN Environment Programme [4] has expounded more concern with sustainability in construction and green buildings. This has been attributed to awareness of the profound effects of the buildings and construction sector on the environment through releasing fifty percent greenhouse gas emissions and above. The stated report also focuses on how green building initiatives can ease climate change, decrease energy consumption and enhance sustainability.

This research article is a discourse on the relationship between hedonism, real estate and quality environment. The research aims to establish ways of evaluating energy usage and carbon dioxide emission and the overall economic impact associated with the real estate business. Such a diverse approach will pose questions about construction and development negatively influencing the environment, besides discovering how the real estate business might build a better world with less bad influence on the environment and yet make profits.

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Pang et al. [5] noted that real estate investment is equally important in the development of the economy, where it acts as a new production factor that enhances economic growth. While they could record tremendous growth, this growth was accompanied by one or many challenges, particularly in the energy consumption patterns. Buildings alone account for the highest level of energy use within the real estate sector. Managing energy consumption and adopting effective conservation measures in real estate is critical for ensuring a sustainable future and a stronger economy.

The real estate industry in Albania plays a significant role in providing employment opportunities, investment, and enhancing the country's GDP. The prospect for growth has been boosted in recent years by factors such as urbanization, improvement in infrastructural systems, approved real estate legislation, and international capital [6]. Still, problems related to energy consumption and environmental protection become urgent during this growth. A considerable amount of energy is used by the real estate industry concerning construction techniques, design, and infrastructure that may be inefficient. This has become more evident when analyzing other cases such as China, as prior research has focused on the correlation between energy intensity and economic development [7]. According to Musonda et al. [8], steps must be taken to promote the use of green buildings and encourage the adoption of energy-efficient technologies to help meet global energy demand reduction goals and lower the real estate sector's carbon footprint. Additionally, the need to establish an economic and environmental framework is emphasized as a key driver for Albania's growth, aligning it with sustainable development objectives.

Many studies that have sought to conduct empirical studies to assess environmental performance in the real estate sector are confined to gaps as most do not incorporate time series data, making it challenging to identify any variations in the subjects under study Wilkinson et al. [9]. The different methods used to measure usability and assess collected data in these studies often introduce heterogeneity, which can hinder the ability to draw broad conclusions or conduct extensive meta-analyses [10]. The study by Shahbaz et al. [11] provides causality feedback between economic growth and renewable energy consumption; meaning while the consumption of renewable energy leads to economic growth also the increase in economic growth leads to the enhanced usage of renewable energy sources. To complement existing research, this paper aims to estimate fresh empirical data using an improved ARDL cointegration model, which is particularly well-suited to the Albanian market context. Following McNown et al. [12], this new test – referred to after this as the "ARDL test" – has several benefits over the before-mentioned cointegration tests including the one proposed by Pesaran [13], especially for size constraints. Besides, this research also employed the techniques of Zivot et al. [14] as well as Clemente et al. [15] to help consider structural adjustments that may exist in the Albanian data.

2. Review of the Literature

2.1. Equity in the Environment and Renewable Energy

The need to reduce CO2 emissions has become the driving force to adopt clean sources of energy hence increasing research focus on energy and environmental economics. Some literature argues that renewable energy (RE) possesses the attribute of solving the problem of global warming while other studies argue that RE possesses the attribute of slowing down the economy. A fresher version of the study concerning the effect of both RE and non-RE resources in the economy exists. However, a clear direction of causality is still scarce. This includes analyzing the relationships between pollution, sustainable and/or non-sustainable energy, and development [16].

To assess the "state of the environment," various indicators such as carbon dioxide emissions have been utilized, along with measures that reflect environmental outcomes, often referred to as positive measures, such as ecological footprint (EF) and material footprint [17].

In a quantitative analysis, Dogan [18] employs the panel error correction model to analyze the correlation between renewable and non-renewable energy and growth. The study demonstrates how and to what extent both energy sources impact economic performance to corroborate the assertion that energy management plays a key role in stimulating economic growth.

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According to Pesaran [19], the role of renewable energy in the reduction of CO2 emissions and attainment of the SDGs in EU nations is evident. This relationship is best captured by the Pooled Mean Group (PMG) model used by the author to make this determination. Regarding the environmental effects of energy utilization, Qudrat-Ullah et al. [20] argue that conventional energy likely hurts the environment, whereas renewable energy positively contributes to improving environmental quality.

In Albania, prior research scarce works that have investigated the impact of renewable energy consumption on environmental quality. Based on the literature reviewed above, it can be suggested that a rising percentage of RE will result in an enhanced environment in Albania. More studies are required to establish the relationship between RE consumption and environmental impact investing in specific data from Albania.

2.2. Environmental Equality Analysis of the Real Estate Market

Research efforts are increasingly being directed toward this area, highlighting aspects of environmental justice alongside the adoption of renewable energy sources.

Equal opportunities for people in the context of the environment within the real estate market are becoming recognized as a critical factor in sustainable city development. When cities aim to shift to renewable energy sources, it is crucial to address concerns in obtaining these sources for disadvantaged groups. Sovacool et al. [21] looks at energy justice about low carbon transitions and calls for policies that will ensure that everyone has access to clean energy. It emphasizes that without intentional steps, renewable energy could further marginalize disadvantaged populations, deepening socio-economic inequality.

Incorporating environmental equality analysis as a core element of sustainable real estate development supports an ESG model, which includes 52 indicators organized into six clusters. These indicators assess the environmental and social costs of investment decisions, enhancing understanding of the financial value of sustainability initiatives, particularly in the real estate sector [22].

2.3. Environmental Equality to Economic Development

Numerous authors have examined the effects of economic development on environmental degradation across regions globally. According to the study by Sikder et al. [23] these results suggest that further policy should focus on the synergistic impacts of GDP Per capita, industrialization, energy intensity, and urbanization on CO2 emissions for developing countries, where economic development and sustainability on the development agenda should be achievable in harmony. Ilyas et al. [24] have argued that energy promotes economic development. It also explains how the long-term use of the Environmental Kuznets Curve illustrates that renewable energy adoption in Southeast Asia reduces environmental damages while enhancing economic and social growth and achievement of SDGs. As stated by Pradhan et al. [25] it has also highlighted the need to promote renewable energy and energy efficiency for environmental equity while striving for economic growth. Altogether, the results of the study show the importance of considering these dynamics in policy strategies for sustainable development with minimal environmental consequences.

Several recent authors stress that economic development and environmental equity are accomplices in developing countries and that sustainable development is incompatible with industrialization. For example, a 2023-based study carried out on the BRICS countries reveals that as much as renewable energy and technology can support sustainability, unfettered economic growth can result in increased environmental degradation [26]. In the same way, international trade and the FDI also endorsed economic development. However, it constitutes the environmental degradation means in several regions mainly for economic development but ignores ecological concerns [27].

3. Methodology

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The contribution of this research is in the assessment of the impact that the real estate sector has on Albania's notion of environmental sustainability. This research will use EViews 12 to compare CO_2 emissions with other variables such as the number of building permits, GDP, and renewable and non-renewable resources. The data from 1995-2022 is going to be used in EViews 12 to estimate how these variables namely, ln CO_{2it} (carbon emissions), ln CP_{it} (total construction permits that have been issued), ln GDP_{it} (constant 2015 US$), ln RE This contribution is an attempt to provide insights into how the real estate industry and, economic growth and energy-related activities affect Albania's environment.

The theoretical framework guiding this investigation is represented by the following equation:

$$\ln CO_{2it}=\beta_0+\beta_1 \ln CP_{it}+\beta_2 \ln GDP_{it}+\beta_3 \ln RE_{it}+\beta_4 \ln NRE_{it}+ \varepsilon_t \quad (1)$$

In this research work, the major data and information are as follows, with the description of data and their sources provided in Table 1.

Table 1. Specifics of the Variables.

The variable's description	Abbreviation	Metric Unit	Information source
Emissions of carbon dioxide	CO_2	tCO_2 / Capita	IEA Data Service
Construction Permit	CP	Number of building permits approved for buildings	Institute of Statistics (INSTAT)
Gross domestic product	GDP	US dollars (constant in 2015)	Indicators of World Development
Renewable energy consumption	RE	%	World Development Indicators
Non-Renewable Energy utilization	NRE	Thousand tons of oil equivalent	World Development Indicators

[1] Source: Authors.

Unit Root and Co-integration Analysis

This study employed the unit root tests for structural breaks which include Zivot et al. [14] and Clemente et al. [15]. The advantage of such tests is that they indicate whether the time series data include trends and breaks, which are important in co-integration tests.

The analysis of co-integration was conducted with the use of a novel bootstrap ARDL approach that examines the long-run variables' interaction. This method also works as an improvement over the conventional co-integration tests since it aims at McNown et al. [12] in the sense that it incorporates additional t-statistics for distinguishing between certain "degenerate cases."

These degenerate cases occur when the F-statistic, (used in co-integration) is significant but the t-statistics for the dependent and the lagged independent variable are contrasting. This point is resolved by the bootstrap ARDL test as it entails an additional t-statistic that results in more reliable conclusions of co-integration.

In co-integration analysis, Jahanger et al. [28] consider specific degenerate cases where the F-statistic shows significance, while the t-statistic of the dependent variable and the lagged independent variable paint a different picture. This problem is solved using the bootstrap ARDL test which involves an addition of a t-statistic, thereby providing more adequate evidence of co-integration.

The following is the ARDL test expression:

$$\Delta \ \ln CO_2 it=\alpha_0+\sum_{i=1}^{p} \beta_1 \Delta \ln CO_{2\ t\text{-}k}+ \sum_{i=1}^{r} \beta_2 \Delta \ln CP_{\ t\text{-}k}+ \sum_{i=1}^{p} \beta_3 \Delta \ln GDP_{\ t\text{-}k} + \sum_{i=1}^{r} \beta_4 \Delta \ln RE_{\ t\text{-}k} + \sum_{i=1}^{p} \beta_5 \Delta \ \ln NRE_{\ t\text{-}k}+ \gamma_1 \ln CO_{2\ t\text{-}k}+ \gamma_2 \ln CP_{\ t\text{-}1}+ \gamma_3 \ln GDP_{\ t\text{-}1}+ \gamma_4 \ln RE_{\ t\text{-}1}+ \gamma_5 \ln NRE_{\ t\text{-}1}+ wECT_{t\text{-}1}+\varepsilon_{1t}$$

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Equation (2) represents a dynamic model explaining the change in the logarithm of carbon dioxide emissions (ΔlnCO2it) over time.

The equation consists of several components:

- The constant term ($\alpha 0$) represents the baseline level of CO_2 emissions.
- The lagged differences in the logarithm of CO_2 emissions. ($\Delta lnCO2_{t-j}$) are denoted by β_1, indicating the influence of past changes in emissions on current emissions.
- Similarly, β_2, β_3, β_4, and β_5 are represented by the lag differences of other variables such as Δln GDP_{t-k}, Δln CP_{t-k}, Δln RE_{t-k}, and Δln NRE_{t-k}. The impact of these variables weighs in emissions at the present impends from these coefficients.
- The coefficients γ_1, γ_2, γ_3, γ_4, γ_5 capture the effect of the logarithm of the respective variables ($lnCO_{2\ t-k}$, $lnCP_{t-1}$, $lnGDP_{t-1}$, $lnRE_{t-1}$, $lnNRE_{t-1}$) in the previous period on current emissions, suggesting long-term relationships.
- The error correction term (ω ECT_{t-1}) reflects the speed at which the system adjusts to deviations from long-term equilibrium.
- $\varepsilon 1t$ represents the error term, capturing unexplained variation in carbon dioxide emissions not accounted for by the model.

In conclusion, Equation (2) provides a complete framework for understanding the circumstances that affect carbon dioxide and fluctuations in the variable, including both the short and long terms as well as relationships between factors.

The Granger causality test is used in this work to find causation in its most basic form by capturing both short- and long-term temporal dependency between the series. In this context, the symbol ECTerm describes deviations in the short term from the long-term state. Equations (3–7) represent the Error Correction Model (ECM), useful for studying the behavior of these causal factors.

$$\Delta \ln CO_{2it}=\alpha_0+\sum_{i=1}^{p} \beta_1 \Delta \ln CO_{2\ t-k}+ \sum_{i=1}^{q} \beta_2 \Delta \ln CP_{t-k}+\sum_{i=1}^{q} \beta_3 \Delta \ln GDP_{t-k} + \sum_{i=1}^{q} \beta_4 \Delta \ln RE_{t-k} + \sum_{i=1}^{q} \beta_5 \Delta \ln NRE_{t-k}+w\ ECT_{t-1}+\varepsilon_{1t} \quad (3)$$

$$\Delta \ln CP_{it}=\alpha_0+\sum_{i=1}^{p} \beta_1 \Delta \ln CP_{t-k}+ \sum_{i=1}^{q} \beta_2 \Delta \ln CO_{2\ t-k} + \sum_{i=1}^{q} \beta_3 \Delta \ln GDP_{t-k} + \sum_{i=1}^{q} \beta_4 \Delta \ln RE_{t-k} + \sum_{i=1}^{q} \beta 5 \Delta \ln NRE_{t-k}+w\ ECT_{t-1}+\varepsilon_{1t} \quad (4)$$

$$\Delta \ln GDP_{it}=\alpha_0+\sum_{i=1}^{p} \beta_1 \Delta \ln GDP_{t-k}+ \sum_{i=1}^{q} \beta_2 \Delta \ln CO_{2\ t-k} + \sum_{i=1}^{q} \beta_3 \Delta \ln CP_{t-k} + \sum_{i=1}^{q} \beta_4 \Delta \ln RE_{t-k} + \sum_{i=1}^{q} \beta_5 \Delta \ln NRE_{t-k}+w\ ECT_{t-1}+\varepsilon_{1t} \quad (5)$$

$$\Delta \ln RE_{it}=\alpha_0+\sum_{i=1}^{p} \beta_1 \Delta \ln RE_{t-k}+ \sum_{i=1}^{q} \beta_2 \Delta \ln CO_{2\ t-k} + \sum_{i=1}^{q} \beta_3 \Delta \ln CP_{t-k} + \sum_{i=1}^{q} \beta_4 \Delta \ln GDP_{t-k} + \sum_{i=1}^{q} \beta_5 \Delta \ln NRE_{t-k}+w\ ECT_{t-1}+\varepsilon_{1t} \quad (6)$$

$$\Delta \ln NRE_{it}=\alpha_0+\sum_{i=1}^{p} \beta_1 \Delta \ln NRE_{t-k}+ \sum_{i=1}^{q} \beta_2 \Delta \ln CO_{2\ t-k} + \sum_{i=1}^{q} \beta_3 \Delta \ln CP_{t-k} + \sum_{i=1}^{q} \beta_4 \Delta \ln GDP_{t-k} + \sum_{i=1}^{q} \beta_5 \Delta \ln RE_{t-j}+w\ ECT_{t-1}+\varepsilon_{1t} \quad (7)$$

where $\omega ECTt-1$ is the lag ECT and Δ denotes the "first difference.".

4. Empirical Results and Interpretation

Table 2. The ZA unit root assessment's conclusions.

Variable	Level		First Differences	
	t-Statistic	DSB[1]	t-Statistic	DSB[1]
lnCO2it	-4.765	1999	-5.886**	2000
$lnCP_{it}$	-4.447	2006	-14.558**	1999
ln GDP_{it}	-1.726	2021	-6.241**	1999
ln RE_{it}	-4.26	2021	-4.956**	2009
ln NRE_{it}	-5.153	1998	-7.371**	1999

Note: "** significance of the variables at 5 % level. DSB[1] is acrostic for the dates of structural break". Source: Authors by Eviews 12.

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This evidence shows that using the Zivot-Andrews unit root test, we observe that ln CO_2, ln CP, ln GDP, ln RE, and ln NRE are non-stationary at level one. In addition, these variables remain non-stationary even when differentiated first and subsequently second. This suggests that these variables are endogenized and first-order fixed (Δ). Therefore, the research offers the confident assertion that all these variables are endogenous at the I (1) level, after considering the structural break that has been noted earlier in the time series data. Structural breaks are identified at various points in time, with many around the late 1990s to early 2000s, indicating significant economic or policy changes during that period affecting these serie.

Table 3. ARDL results.

Variables	Coefficient	t -Statistic	p-value
ln CP_t	0.500	3.500	0.001
ln GDP	2.221	5.001	0.000
ln RE_t	-0.252	-2.800	0.010
ln NRE_t	1.992	4.502	0.000
ln CP_t	0.750	3.002	0.005
ln GDP	1.131	3.500	0.002
ln RE_t	-0.440	-3.000	0.005
ln NRE_t	1.445	3.800	0.001
ECT_{t-1}	-0.045	-4.500	0.000

Source: Authors by Eviews 12.

Construction permits have increased over the years. They have caused a rise in carbon emissions. Furthermore, more construction means more pollution has been released into the air.

GDP: The results showed a connection between GDP and carbon emissions. This relationship existed in both short and long terms.

Renewable Energy use became essential amid these changes. High levels of renewable energy have major impacts on reducing carbon emissions significantly in both short and long runs.

Carbon emissions by non-renewable energy sources have a very direct impact on the degrees of both the short-lived and the permanent. As they show, the negative influence is demonstrable: it modifies policies and molds further energy choices.

ECTt-1 value indicated something significant as well. It indicated how production functions needed time to adjust a long-run equilibrium. The study found an adjustment speed of approximately 4.5% each period.

5. Results and Implications for Policy

This study aims highlighting the environmental issues of the economic development in Albania. The research suggests a significant correlation between economic development and construction activity and carbon emissions in terms of gross domestic product and building permits. This implies that these factors are harmful to the environment in Albania. However, as revealed during the analysis of Albania's environmental circumstances, the country can significantly improve the quality of the environment through the improved use of renewable energy. The qualitative study also pointed out how relevant renewable energy is in achieving sustainable development an aspect that assists in decreasing carbon emissions.

Policy Recommendations

These emerging conclusions lead to the following policy recommendations for the Albanian government:

- Prioritize Renewable Energy Investment: Promote the profile of renewable energies, by increasing the installation of wind, hydro, and solar power facilities. This will be useful for guaranteeing energy security and energy independence, also helping CO_2 emissions considerably.

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- Sustainable Construction Practices: Help actualize sustainable construction practices to the real estate developers and other construction stakeholders. This can involve the utilization of sustainable materials, advocating for energy-efficient structures, and possibilities of green building codes.
- Financial Incentives: Any real estate firms that apply renewable energy and green architectural design in their facilities should have tax deductions, subsidies, rebates, or other favorable treatments.
- Regulatory Framework: Regulate the construction sector minimizing environmental effects and enhancing implementation of policies through the adoption of several regulatory instruments. Such measures could entail conducting EIA on new projects and coming up with more stringent measures on how waste should be dealt with.
- Public Awareness: To increase the level of consciousness on the part of citizens about environmental problems associated with construction and the possibility of a sustainable lifestyle. To do this, citizens must be informed on how to save energy and the need to demand energy-efficient projects to be developed.
- Inter-Ministry Collaboration: Ensure good coordination between the various government departments especially those in charge of construction/infrastructure, finance, and environment. This will guarantee the safety of sustainability development with an integrated approach.

Future Research

Besides, data limitations might be an issue for Albania beyond the period under consideration as it was an issue in the original study. Further research is recommended to:

- Expand the time frame: The advantage of looking at data in the long term, so the trends can be highlighted more easily as they partially intensify with time.
- Regional Analysis: As a next step one should look for regional differences in environment within the country that may be affected.
- Alternative Techniques: Apply cross-sectional, and time-series analysis methods to test the relationship between the real estate market and environmental quality better sustainability in its economic development.

Further research would be utilized to connect the performance of environmental growth to the economic growth of Albania and other recommendations would be more useful in achieving

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