THE RELATIONSHIP BETWEEN TOURISM, RENEWABLE ENERGY AND ECONOMIC GROWTH IN AFRICA: EMPIRICAL STUDY WITH PANEL DATA

Le lien entre le tourisme, les énergies renouvelables et la croissance économique en Afrique :
Etude empirique avec des données de panel

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Abstract:

Faced with increased energy demand, the need to consume clean and sustainable energy for more environmentally friendly activities requires the transition to renewable energies. The tourism sector like any other sector integrates sustainability into its activities in order to contribute to sustainable development. The objective of our study is to empirically examine the role of energy transition in tourism performance in a panel of 48 African countries over a period of 1995 to 2015. The results indicate that the energy transition negatively impacts tourism.

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revenues. This leads us to conclude that the substitution of fossil fuels by renewable energies affects the tourism performance of African countries.

**Keywords:** Tourism, energy transition, economic growth, sustainable tourism, renewable energy.

**Résumé :**
Face à une demande énergétique accrue, la nécessité de consommer de l’énergie propre et durable pour des activités plus respectueuses de l’environnement, exige la transition vers des énergies renouvelables. Le secteur touristique comme tout autre secteur intègre la durabilité dans ses activités afin de contribuer au développement durable. L’objectif de notre étude est d’examiner empiriquement le rôle de la transition énergétique dans la performance touristique dans un panel de 48 pays Africains d’une durée de 1995 à 2015. Les résultats indiquent que la transition énergétique impacte négativement les recettes touristiques. Ce qui nous amène à conclure que la substitution des énergies fossiles par les énergies renouvelables heurte la performance touristique des pays africains.

**Mots clés :** Tourisme, transition énergétique, croissance économique, tourisme durable, énergie renouvelable.
1. Introduction:

In recent decades, the tourism industry has become an important sector for generating growth since it represents 10% of the world's gross domestic product (UNWTO-a, 2019), as well as modernizing remote areas and accelerating their development. However, despite its positive effects on growth and development, the tourism sector has negative effects that threaten the planet in particular because of the increased use of fossil fuels in the majority of tourism activities, and in return the tourism sector is strongly threatened by its climatic changes, in particular by extreme weather events which can contribute to security problems, water shortages as well as increased insurance costs, which impact on the attractiveness of destinations and consequently reduce economic opportunities for countries.

Various studies have shown that the consumption of renewable energies has less environmental impact than conventional energy sources (PNUMA, 2003), which leads researchers to study the link between the transition to renewable energies and its impact on the environment. Attractiveness of tourists and therefore impact on the development and growth of destination countries. Other studies have shown that the contribution to sustainable tourism is not beneficial for all countries, and that it depends on the level of development and growth.

Our study is based on an empirical analysis which is interested in studying the link between renewable energies, tourism and economic growth, and more specifically the role that the transition to renewable energies plays on the attractiveness of tourists, we integrate as moderating variable economic growth. We formulate the central question of our study as follows: To what extent does the energy transition impact the tourism performance of African countries?

To answer our problem, we will organize our study as follows: The first part will focus on providing a literature review that addresses previous studies on the link between tourism, renewable energies and economic growth, then we will move on to a second part to study econometrically the role of the transition to renewable energies in the tourism performance of African countries.

2. Tourism, renewable energy and economic growth: Literature review

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We start first by developing the various hypotheses confirmed in the literature which deals with the relationship between the consumption of renewable energies and economic growth. The objective of the studies was to examine the direction of causality between the two variables, in other words, to determine whether economic growth leads to an increase in energy consumption or vice versa. Hypotheses of growth, conservation, feedback and neutrality were confirmed. The growth hypothesis confirms the existence of a unidirectional relationship from renewable energy consumption to economic growth (Chen et al. 2020, Kouton. J, 2020, Maji et al. 2019, Asif et al. 2021, Kassi et al., 2021, Rahman and velayuthan, 2019). The impact of economic growth on the consumption of renewable energies (conservation hypothesis) is confirmed (Kassi et al. 2020, Saidi et al. 2019). The feedback hypothesis validates the two-way relationship between renewable energy consumption and economic growth (Aydin, M., 2019, Zhang and Zang, 2021), and other researchers who confirm the neutrality hypothesis between consumption renewable energy and economic growth (Keshavarzian et al. 2021, Tuna and Tuna, 2019, Menegaki, A.N. 2011).

Tourism in the field of sustainable development has required extensive study to determine the role of energy in the tourism industry (Zhang and Gao, 2016). The Brundtland Commission defined sustainable development as follows: it is development that allows the present generation to meet their needs without compromising the needs of future generations (Brundtland Report 1987). Therefore, sustainable tourism has been suggested to secure future benefits while mitigating the adverse effects of tourism activities on the scarcity of natural resources and on the environment.

Different activities in the tourist sector have been considered as causes of pollution, for example the construction of infrastructures such as hotels, restaurants, golf courses, etc. tourist activities that require the use of energy that affects the global climate (Agarwal et al. 2019, Zhang and Gao, 2016). Faced with the need to consume energy, which is an important element for economic growth (Roudi et al. 2018), the transition to the consumption of renewable energies is the solution to meet energy needs while mitigating CO2 emissions. related to the tourism industry (Lu et al. 2019).
The tourism sector is highly dependent on the energy sector. Starting with transport to accommodation and lighting which require high energy consumption (Becken, 2003). Researchers like Katircioglu (2014) and Katircioglu, Feridun and Kilinc (2014) have demonstrated that the tourism sector has positive effects in mitigating CO2 emissions and climate change, while other researchers have endorsed the opposite, as an example Brahmasrene (2013) and Tang, Zhong and Ng (2017) who demonstrated that tourism has negative effects on the environment and climate change and that this sector is among the main contributors of greenhouse gas emissions greenhouse and energy consumption. The critical implications of the causality between energy consumption and economic growth have prompted tourism scholars to study the causality between tourism, economic growth and energy consumption. Several researchers like Zhang and Liu (2019) and Zhang and Zhang (2020) Zhang and Gao (2016) have explored the relationship between tourism, energy consumption and economic growth, in order to analyze the link between the variables and to provide recommendations for policy makers. According to Katircioglu, S. T. (2014), tourism development in Turkey contributes to significant increases not only in income and energy consumption, but also in CO2 emissions and climate change, which requires finding solutions in order to meet the expectations of sustainable development policies.

The impact of the transition to renewable energies on tourism performance according to several researchers depends on the growth and income of the country, which implies that the contribution to sustainable tourism is not always beneficial. Murshed, M. et al (2020) found that undergoing an energy transition helps to improve the integrated development of tourism, which helps to ensure the sustainability of the international tourism sector in Bangladesh. According to the study by Bali et al. (2018) the relationship between renewable energy and tourism is bidirectional. Kostakis and Sardianou, (2012) the willingness to pay for a stay in a hotel that uses renewable energy instead of fossil fuels in its activities is higher for the middle class.

3. Empirical research design:

3.1. Description and data sources:

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Our empirical analysis is based on panel data from 48 African countries over the period 1995-2015. The selection of the sample is due to the availability of data on the transition to renewable energy provided by the World Bank. All data on energy transition, economic growth and tourism revenues are provided by the World Bank database. The sample countries are: South Africa, Ivory Coast, Kenya, Niger, Algeria, Djibouti, Lesotho, Nigeria, Angola, Egypt, Liberia, Uganda, Benin, Eritrea, Libya, Rwanda, Botswana, Eswatini, Madagascar, Sao Tome and Principe, Burkina Faso, Ethiopia, Malawi, Senegal, Burundi, Gabon, Mali, Sierra Leone, Cabo Verde, Gambia, Morocco, Sudan, Cameroon, Ghana, Mauritius, Tanzania, Comoros, Guinea, Mauritania, Togo, Congo, Rep. req., Equatorial Guinea, Mozambique, Tunisia, Congo, Guinea-Bissau, Namibia and Zimbabwe.

3.2. Research Questions:

Inspired by the literature review and aiming to study the role of the energy transition towards renewable energies in the tourist attractiveness of African countries, we formulate the central research question as follows: to what extent does the energy transition impact the performance tourism in African countries?

To answer the main question, this article aims to answer the following sub-research questions:

- Does the transition to renewable energies improve or deteriorate the performance of the tourism sector in Africa?

- Is this impact moderated by the level of economic growth in African countries?

To answer the research question above, we conduct an empirical analysis using econometric modeling as presented below.

3.3. Description of variables:

The endogenous variable to be explained: tourism revenues as a percentage of total exports. According to our research objective, we aim to identify the effect of energy transition on tourism performance in African countries. Therefore, tourism revenues as a percentage of total exports is the proxy variable usually used by empirical researchers to answer this type of
research question. The World Bank defines tourism revenues as all international tourism expenditure by incoming international visitors, including payments to national carriers for international transport. These expenses include any other prepayment made for goods and services received in the country of destination. They may also include expenditures made by visitors for the day, except when these are large enough to warrant separate classification. For some countries, they do not include expenditure for passenger transport. Their share in exports is calculated as a ratio for exports of goods and services, which include all transactions between residents of a country and the rest of the world through which general goods, goods sent for processing or in reparation, monetary gold and services of residents change hands and become the property of non-residents of the country.

The exogenous explanatory variable: percentage of renewable energy consumption

The most relevant proxy variable for describing the energy transition is the consumption of renewable energies as a percentage of total energy consumption.

The moderating variable: economic growth in annual percentage

The moderating variable that can modify the impact of the energy transition on the tourism performance of African countries is economic growth in annual percentage. This type of variable is a good indicator of the level of development, institutional quality and termination of economies in the face of exogenous hazards. It is defined as the annual percentage rate of GDP growth at market prices based on constant local currencies. Aggregate data is based on constant 2010 US dollars. GDP is the sum of the gross value added of all resident producers in an economy plus any taxes on products and minus any subsidies not included in the value of products. It is calculated without making deductions for the depreciation of manufactured goods or the loss in value or degradation of natural resources.

3.4. Empirical model:

To identify the role played by the energy transition in the tourism performance of African countries, moderated by economic growth, the research hypothesis is formulated in the form of a linear model as below:

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\[ TR_{it} = \alpha + \beta_1 ET_{it} + \beta_2 (ET \cdot EG)_{it} + \varepsilon_{it} \]

ET: designates the consumption of renewable energies as a percentage in country \( i \) in year \( t \).
TR: denotes tourism revenue as a percentage of total exports in country \( i \) in year \( t \).
EG: denotes the annual economic growth of GDP in percentage in country \( i \) in year \( t \).
\( \alpha \): denotes the fixed effects of each country to control for the omitted factors relatively stable over time and \( \varepsilon \) is the normally distributed error term.

3.5. Research hypotheses:

Following the main research question, the main hypothesis is formulated under the premise that the energy transition has a role in the tourism performance of African countries. To validate this general hypothesis, we aim to confirm the sub-hypotheses that are drawn from the literature review and formulated by the equations and the research question above. The research hypotheses and sub-hypotheses are presented as scholarship:

H1: the transition to renewable energies has a positive impact on tourism revenues as a percentage of exports

H2: economic growth positively moderates the impact of the energy transition on tourism performance

3.6. Estimation method:

This sample consists of panel data where \( N=48 \) countries and \( T=21 \) (from 1995 to 2015). Therefore, the most appropriate estimation method is RWLS (Robust Weighted Least Squares) widely used when the variables are ratios. Estimation techniques is that of M-estimate. The covariance type for the estimate is the Huber type with Welsch function for the weight. The scale estimate used is Huber.

3.7. Results and discussion:

Figure: graphic illustration

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According to the graphic illustration and the empirical results, it turns out that the energy transition negatively impacts tourism revenues as a percentage of total exports at the significance level of 1%. This leads us to invalidate hypothesis H1 and conclude that the substitution of fossil fuels by renewable energies affects the tourist performance of African countries, which is perfectly reasonable because of the economic infrastructure of African countries, which is not still resilient to the energy transition, which is proving costly and damaging the competitiveness of the African tourism sector compared to its competitors. Moreover, economic growth positively moderates the effect of the energy transition on tourism.

Table: empirical results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>Z-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>19.75820***</td>
<td>0.122252</td>
<td>161.6188</td>
</tr>
<tr>
<td>TR</td>
<td>-0.121376***</td>
<td>0.001998</td>
<td>-60.75726</td>
</tr>
<tr>
<td>TR*EG</td>
<td>0.001604***</td>
<td>0.000156</td>
<td>10.31382</td>
</tr>
<tr>
<td>Adjusted Rw²</td>
<td>0.071956</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rn² statistic</td>
<td>3959.434***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: ***, **, * indicate a significant level at 1%, 5% and 10% respectively. Estimation method: RWLS with M-estimate. The covariance type for the estimate is the Huber type with Welsch function for the weight. Scale rating used is Huber.

Source: authors' estimates.
revenues at the 1% threshold, which leads us to confirm hypothesis H2 because the level of development and the size of the economy help the country in its transition to renewable energies by mitigating its perverse effects on tourism competitiveness. Overall, the model is significant since the Rn2-statistic is significant at the 1% level with a significantly positive constant.

4. Conclusion:

Tourism, like any other sector, integrates sustainability into its activities in order to contribute to the deployment of the necessary measures to protect our environment and give a good image of the integration of countries in the protection of our planet. The tourism sector has negative effects that threaten the planet in particular because of the increased use of fossil fuels in the majority of its tourist activities. As a result, sustainable tourism requires a transition to renewable energies which will make it possible to obtain the necessary energies and contribute to sustainable development. The high cost of installing its energies is a major obstacle in the face of developing countries that rely on tourism as a source of wealth. The objective of our study is to empirically examine the role of energy transition in tourism performance in a panel of 48 African countries lasting from 1995 to 2015. The results indicate that the transition to renewable energies negatively impacts on tourist revenues, which leads us to conclude that the substitution of fossil fuels by renewable energies hurts the tourist performance of African countries, which is perfectly reasonable because of the high costs of installing its energies that African countries do not are unable to support.

References:


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Sustainability of International Inbound Tourism Demand in South Asia. Sustainability, 12(20), 8341.


Transport-related CO2 Emissions of the Tourism Sector – Modelling Results, World Tourism Organization (UNWTO) (2019)


