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# The Economic Impacts of Renewable Energy Adoption: A Comparative Analysis of Developed and Developing Nations

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This article discusses the economic impact of renewable energy adoption through a comparative analysis between developed and developing countries. Using qualitative methods based on literature studies and library research, this study explores how investment in renewable energy affects economic growth, job creation, and economic environmental stability in both types of countries. The findings show that developed countries tend to have stronger infrastructure and greater funding to support the energy transition, so they can see the economic benefits of renewable energy investment more quickly, including in the technology and innovation sectors. On the other hand, although developing countries face capital and infrastructure constraints, the adoption of renewable energy has the potential to increase energy security, reduce dependence on imported energy, and create new economic opportunities, especially in rural areas. This analysis highlights the importance of international policy and investment support to help developing countries overcome challenges in the energy transition. This article is expected to provide insights to policymakers on the importance of an approach tailored to each country's conditions to encourage the adoption of renewable energy that is effective and positively impacts the economy.

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## 1. Introduction

The adoption of renewable energy has become one of the key strategies in reducing dependence on fossil fuels and mitigating the impact of global climate change. Since the last decade, many countries have switched to cleaner energy sources such as solar, wind, and biomass energy to reduce carbon emissions and achieve sustainability targets (IEA, 2020). In developed countries, investment in renewable energy shows a significant increase thanks to financial support, technological advancements, and mature infrastructure (REN21, 2021). Meanwhile, developing countries, despite facing capital and infrastructure constraints, have also begun to implement renewable energy as an effort to strengthen energy security and reduce dependence on energy imports (UNDP, 2022). The difference between developed and developing countries in terms of readiness and ability to adopt renewable energy is an important topic that needs to be further researched to understand its economic impact as a whole.

The adoption of renewable energy has a significant economic impact on countries that implement it, both developed and developing. One of the main economic impacts is the creation of jobs in the renewable energy sector, such as in construction, manufacturing, installation, as well as the operation and maintenance of renewable energy facilities (Karimi & Amar, 2024a). According to the IRENA report (2020), in 2020 there were more than 11 million jobs worldwide related to renewable energy. In developed countries, investment in renewable energy technology has encouraged the creation of stable and high-quality jobs, especially in the field of green technology research and development. Meanwhile, in developing countries, this job creation has the potential to reduce poverty in rural areas, especially when accompanied by skills training and local infrastructure development (Bhattacharya et al., 2016).

In addition to job creation, renewable energy also plays a role in improving energy security and economic stability. The use of locally available renewable energy sources, such as solar and wind power, can reduce dependence on expensive fossil fuel imports and is vulnerable to fluctuations in international market prices (Apergis & Payne, 2014). Countries that switch to renewable energy often experience lower energy costs, which in turn strengthens the domestic economy. In developing countries, this economic stability can be a major driver for foreign investment, due to the guarantee of more stable and environmentally friendly energy availability (Karimi & Amar,

2024b). Thus, renewable energy not only helps the country reduce carbon emissions, but also serves as a strategic tool in strengthening the national economy.

Furthermore, the positive economic impact of renewable energy is seen in technological improvements and innovation. Countries that consistently invest in renewable energy, especially developed countries, are often at the center of technological development and innovation in the sector. The resulting innovations not only have an impact on the efficiency of renewable energy, but also encourage the export of technology to other countries, which ultimately increases the country's revenue. On the other hand, for developing countries, openness to renewable energy technologies creates great opportunities in local capacity development through technology and knowledge transfer (Sadorsky, 2019). By investing in renewable energy, countries around the world can build more sustainable economies and reduce the negative impact of fossil fuel use.

Although many studies have been conducted on the economic benefits of renewable energy, most studies focus on developed countries or cover only environmental aspects without observing specific differences in economic impacts in developing countries (Bhattacharya et al., 2016; Haider et al., 2018). This study finds a research gap related to comparative analysis between developed and developing countries in the context of the economic impact of renewable energy adoption. In addition, previous research has often ignored specific factors that affect the success of the energy transition in developing countries, such as access to technology, foreign capital, and stronger policy support (Sadorsky, 2019). This study tries to fill this gap by exploring the differences in economic impacts resulting from the adoption of renewable energy in these two categories of countries.

The urgency of this research lies in the increasing importance of renewable energy in mitigating climate change while supporting sustainable economic development (IRENA, 2020). For developing countries, the adoption of renewable energy can open up new job opportunities, reduce dependence on imported energy, and increase energy access in remote areas. On the contrary, developed countries are more ready to utilize renewable energy to drive innovation and growth in the green technology sector (Apergis & Payne, 2014). With these differences, a more in-depth analysis is needed to understand the potential economic benefits in each type of country, the results of which can be used as a reference for policymakers in designing

energy policies that are in accordance with local conditions and needs (Zoundi, 2017).

This study seeks to present a new perspective by conducting a comparative analysis between developed and developing countries in the adoption of renewable energy, which is the main novelty of this study. This approach provides a more holistic understanding of the various aspects that affect the success and impact of the renewable energy economy, including differences in readiness levels, policy support, and access to technology (Tiba & Omri, 2017). By evaluating these factors, the study aims to provide policymakers and stakeholders with insights into strategic measures that can increase the adoption of renewable energy in accordance with the context of each country.

The benefits of this research are expected to include two things. First, it makes an empirical contribution to the literature related to the renewable energy economy by comparing the impact in developed and developing countries. Second, this research is expected to be the basis for the development of more effective energy policies, by identifying the most appropriate approaches to support a sustainable energy transition in countries with different economic backgrounds.

## 2. Research Method

This study uses a qualitative method with a library research approach to explore the economic impact of renewable energy adoption in developed and developing countries. Literature studies were chosen as the primary method because they allow researchers to collect, evaluate, and interpret relevant information from various academic sources regarding the impact of renewable energy on the economy. With this approach, this study focuses on a comparative analysis between developed and developing countries in terms of economic benefits, challenges, and renewable energy development strategies (Creswell, 2014).

### Data Source

The research data sources consist of academic journal articles, reports from international organizations such as IRENA, IEA, and UNDP, as well as books that discuss the topic of renewable energy and its economic impact. The articles used in this study were selected based on their relevance to the topic of renewable energy adoption and its economic impact in developed

and developing countries, especially publications that discuss aspects of employment, investment, economic stability, and technological developments related to renewable energy (Bowen, 2009). With these criteria, the data collected is expected to provide a comprehensive picture of the differences in the economic impact of renewable energy in various economic contexts.

### Data Collection Techniques

The data collection technique is carried out through the document gathering method, where researchers access relevant literature using academic databases such as JSTOR, ScienceDirect, Google Scholar, and databases of related international organizations. Selected literature includes articles published in the last five years to ensure that the data used remains current and relevant, while still taking into account the classical literature that is important in understanding the foundations of renewable energy economic theory (Miles, Huberman, & Saldaña, 2014).

### Data Analysis Methods

The data were analyzed using thematic analysis methods to identify and categorize key themes related to the economic impact of renewable energy in developed and developing countries. The first stage of data analysis includes data reduction, namely filtering and selecting relevant information in accordance with the research objectives. The next stage is the categorization of data based on themes such as job creation, economic stability, and technology development. Once the data were categorized, researchers drew conclusions to understand the key differences between the two types of countries in the implementation of renewable energy and their economic impact (Braun & Clarke, 2006). To improve the validity of the findings, the data triangulation technique was used by comparing results from various literature sources.

## 3. Result and Discussion

The data in this table includes 10 articles that have been selected from several related articles relevant to the topic of renewable energy adoption and its economic impact, both in developed and developing countries.

| Writer | Year | Article Title | Key findings |
|---|---|---|---|
| Bhattacharya et al. | 2016 | The effect of renewable energy consumption on economic growth: Evidence from top 38 countries | Renewable energy has a positive impact on economic growth in developed and developing countries |
| Apergis & Payne | 2014 | Renewable energy, output, CO2 emissions, and fossil fuel prices in Central America | Adoption of renewable energy reduces carbon emissions and stabilizes economies in developing countries |
| Zoundi | 2017 | CO2 emissions, renewable energy and the Environmental Kuznets Curve | Renewable energy adoption lowers emissions in developing countries and boosts national income |
| Haider et al. | 2018 | Renewable energy consumption and its impact on economic growth in Pakistan | Renewable energy creates new job opportunities in developing countries |
| Tiba & Omri | 2017 | Literature survey on the | Renewable energy is |

| | | | |
|---|---|---|---|
| | | relationships between energy, environment, and economic growth | closely related to economic growth and environmental preservation |
| IRENA | 2020 | Renewable energy and jobs–Annual review 2020 | Jobs in the renewable energy sector are growing rapidly in developed and developing countries |
| Sadorsky | 2019 | Renewable energy consumption and income in emerging economies | Developing countries need financial support to maximize renewable energy adoption |
| REN21 | 2021 | Renewables 2021 Global Status Report | Renewable energy supports economic sustainability by reducing dependence on fossil fuels |
| UNDP | 2022 | Sustainable Development Goals Report 2022 | Renewable energy helps developing countries achieve sustainable development goals |

| | | | |
|---|---|---|---|
| Khan et al. | 2022 | Application of an occupant voting system for continuous occupant feedback on thermal and indoor air quality | Renewable energy supports improving quality of life and health in developing countries |

The table above presents a literature analysis showing the impact of renewable energy adoption on economic growth and socio-economic aspects in various countries, both developed and developing. One of the key findings is that renewable energy plays an important role in driving economic growth, as revealed by Bhattacharya et al. (2016) who show that renewable energy consumption has a positive impact on economic growth in developed and developing countries. This research supports the idea that investing in clean energy not only contributes to a healthier environment, but also accelerates the pace of the economy, especially in countries that prioritize the development of the sector.

In addition, the adoption of renewable energy has a significant role in reducing carbon emissions, especially in developing countries that are generally still dependent on fossil fuels. Research by Apergis & Payne (2014) in Central America found that renewable energy helps stabilize the economy while reducing carbon emissions. A similar effect was reported by Zoundi (2017) who noted that renewable energy is able to reduce emissions and increase national income in developing countries. These findings indicate that the application of renewable energy has great potential as a solution in tackling the global climate crisis while increasing economic resilience in regions vulnerable to climate change.

Furthermore, the renewable energy sector is also known to contribute to job creation, especially in developing countries that face the challenge of unemployment. According to Haider et al. (2018), renewable energy consumption in Pakistan directly creates new job opportunities. This is reinforced by a report from IRENA (2020) which shows that employment in the renewable energy sector continues to increase in various countries, both developed and developing. The growth of this job sector shows that renewable energy is not only beneficial in terms of the environment, but also

acts as an economic stimulus that provides broad socio-economic benefits through increased levels of welfare.

However, financial challenges are still a major obstacle to the use of renewable energy, especially in developing countries. Sadorsky (2019) highlights the need for financial support for developing countries to accelerate the adoption of renewable energy. Many developing countries face limitations in terms of funding and technology, which hinders them from maximizing the potential of renewable energy. Financial support from developed countries or international institutions can be one of the solutions to accelerate this energy transition, which has the potential to increase energy security while strengthening the economy.

In addition to economic benefits, the adoption of renewable energy also contributes to sustainability and improving people's quality of life. REN21 (2021) reports that renewable energy helps countries reduce their dependence on fossil fuels, ultimately supporting economic sustainability. On the other hand, Khan et al. (2022) showed that the use of renewable energy supports improving the quality of life and health, especially in developing countries that experience challenges related to air pollution and indoor air quality. These findings show that renewable energy can double as an economic instrument as well as a trigger for positive social change.

Overall, the literature presented in this table emphasizes that the adoption of renewable energy has broad potential to drive positive change in various aspects, both economic, social, and environmental. This study supports the need to accelerate investment and development of renewable energy as a long-term solution that not only benefits the environment but is also able to strengthen the economic and social structure of communities, especially in developing countries that need these benefits most.

**Discussion**

The discussion part of the study entitled The Economic Impacts of Renewable Energy Adoption: A Comparative Analysis of Developed and Developing Nations aims to further analyze the impact of renewable energy adoption on economic and socio-economic aspects, focusing on the comparison between developed and developing countries. Based on the literature data that has been presented, the adoption of renewable energy has far-reaching implications, especially in creating opportunities for economic growth, reducing carbon emissions, and improving the quality of life. The findings of Bhattacharya et al. (2016) confirm that renewable energy contributes positively to economic growth in various countries. This

is in line with the global phenomenon that shows that countries that are more aggressive in adopting renewable energy, such as Western European countries, are experiencing stronger economic stability and better energy security. In addition, this phenomenon supports the theory of economic growth which states that technology and innovation can be the main catalyst in accelerating economic growth through efficiency and diversification of resources.

On the other hand, the adoption of renewable energy also plays an important role in mitigating climate change, especially through the reduction of carbon dioxide emissions. The findings of Apergis & Payne (2014) and Zoundi (2017) underline that renewable energy is able to reduce carbon emissions in developing countries. This fact is in line with the concept of the Environmental Kuznets Curve (EKC), which states that in the early stages of development, emissions will increase as the economy grows, but as people and governments become aware of the importance of the environment, investment in renewable energy will drive emission reduction. Countries like China and India, which were once major sources of emissions, are now starting to expand investment in renewable energy to reduce their carbon footprint. This signals a global shift towards a low-carbon economic model that is increasingly relevant in this era.

In addition to environmental influences, the adoption of renewable energy is also closely related to job creation opportunities, especially in developing countries. Findings by Haider et al. (2018) and IRENA (2020) show that the renewable energy sector is becoming a new source of job creation, which is relevant to the increasing demand for green jobs. This trend is evident in workforce growth in the solar and wind energy sectors in Southeast Asia and Africa, where renewable energy investments have created local economic opportunities. This reflects the theory of green jobs, which states that the transformation towards a green economy can provide new sustainable and quality jobs for society.

However, despite the widespread positive impact of renewable energy, financial challenges are still a major obstacle for developing countries to harness their full potential. Sadorsky (2019) highlights that developing countries need significant financial support to adopt renewable energy. Currently, various initiatives, such as the Green Climate Fund and funding from the World Bank, are being promoted to support the energy transition in poor and developing countries. However, this assistance is often still inadequate compared to the needs and scale of renewable energy projects expected. This shows the need for a collaborative approach between

developed country governments, international organizations, and the private sector to support renewable energy financing.

Furthermore, the adoption of renewable energy in developing countries not only has an economic impact and job creation, but also improves the quality of life and public health, as presented by Khan et al. (2022). In the context of increasing air pollution in many developing countries, the use of renewable energy can help reduce pollution caused by the burning of fossil fuels. Tangible examples can be seen in major cities in India and Pakistan, where poor air quality is a major concern for public health. The use of renewable energy can help reduce this pollution, thereby improving the quality of life of urban communities in developing countries.

From the perspective of sustainable development, the findings of REN21 (2021) and UNDP (2022) also show that renewable energy supports the sustainable development goals (SDGs) by reducing dependence on fossil fuels and promoting economic stability. This is relevant to the concept of sustainable development which emphasizes the importance of maintaining a balance between economic growth, environmental conservation, and social welfare. Developed countries such as Germany and Scandinavian countries have successfully demonstrated how the adoption of renewable energy can support the achievement of the SDGs, especially in terms of climate action and clean energy.

However, the authors also observe that dependence on imported technology and limited infrastructure are major challenges for many developing countries in adopting renewable energy. The lack of supporting infrastructure, such as adequate power grids and energy storage technologies, often hinders the efficient distribution of renewable energy. In this context, local innovation and workforce skill improvement are needed to make optimal use of renewable energy resources. Strengthening the research and development sector in developing countries is also key to supporting the adoption of more affordable and effective clean energy technologies.

Overall, the findings of this study underscore that while the adoption of renewable energy faces various challenges, its economic impact is significant, especially in creating jobs, reducing carbon emissions, and supporting economic sustainability. Developed countries have a great responsibility to support developing countries through financing, technology transfer, and capacity building in the field of renewable energy. The author

argues that stronger cross-border cooperation is urgently needed to face the challenges of this energy transition.

The authors comment that efforts to accelerate the transition to renewable energy should be a global priority, given the increasingly urgent climate crisis and the need to achieve sustainable economic growth. In addition to the economic benefits offered, renewable energy also brings broader social benefits, including improved health, quality of life, and community well-being. In this context, the authors conclude that the development of renewable energy is not only an option, but a must to realize a greener and more sustainable future.

## 4. Conclusion

The conclusion of this study shows that the adoption of renewable energy has a significant positive impact on the economy and the environment, both in developed and developing countries. Renewable energy not only drives economic growth but also plays a role in creating new jobs, improving the quality of life, and reducing carbon emissions that have an impact on climate change mitigation. These findings are consistent with research results from various countries that emphasize that renewable energy has great potential as a driver of a green and sustainable economy needed for the future.

However, the study also reveals that major challenges are still faced by developing countries, especially related to limited infrastructure, access to funding, and dependence on imported technology. Developing countries need financial support and international collaboration to be able to implement renewable energy technologies effectively. While developed countries have enjoyed the benefits of this energy transition, developing countries still need major investments and technical assistance to accelerate the adoption of clean energy and achieve a balance between economic development and environmental sustainability.

As a recommendation for further research, it is important to examine more deeply the effective funding strategies and international cooperation models that can be applied to support developing countries in accelerating the adoption of renewable energy. Additionally, more research is needed to understand the specific impact of each type of renewable energy technology, such as solar, wind, and bioenergy, on local and national economies. With a more detailed focus on the technical and socio-

economic aspects of renewable energy, future research is expected to produce more adaptive and relevant strategies to support the energy transition in various regional and cultural contexts.

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