



Green Jobs and Employment Growth: Global Analysis of Policy Impacts and Investment Trends

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Abstract. This study explores the pivotal role of green jobs in promoting employment growth and economic development on a global scale. Using secondary data from international organisations such as the OECD, ILO, and IRENA, the research examines trends in green job creation and the impact of green policies across a range of countries from 2010 to 2020. Linear regression, Pearson correlation, logistic regression, and time series analysis were employed to evaluate the relationship between green jobs, economic growth, and policy strength. The findings reveal that countries with comprehensive green policies and significant investments in green technologies experience higher employment growth and economic development, particularly in sectors like renewable energy and energy efficiency. However, the study highlights challenges faced by developing countries, where weaker green policies and lower investment hinder job creation. The research underscores the need for stronger international support and adaptive policy frameworks to accelerate the green transition in these regions. This study provides valuable insights for policymakers seeking to harness the potential of green jobs as a driver for sustainable economic development.

Keywords: Green jobs, Employment growth, Green policies, Green technology investment, Renewable energy, OECD, ILO, IRENA.

1 Introduction

In recent decades, global challenges related to climate change and environmental degradation have driven countries to adopt more sustainable approaches to economic development. One of the most significant paradigms in this regard is the green economy, which emphasizes low-carbon, resource-efficient, and socially inclusive growth. Central to the green economy is the concept of green jobs, defined by the International Labour Organization (ILO) as jobs that contribute to the preservation or restoration of the environment. These jobs span a wide array of sectors, from emerging industries such as renewable energy to traditional sectors undergoing transformation through eco-friendly innovations [1].

The development of green jobs is crucial not only for mitigating environmental impacts but also for fostering new employment opportunities and supporting broader economic development. A report from the Organisation for Economic Co-operation and Development (OECD) highlights that the renewable energy sector alone has generated millions of new jobs in recent years [2]. Other sectors, such as waste

management, energy efficiency, and water resource management, have also contributed significantly to job creation. For instance, the International Renewable Energy Agency (IRENA) reports that jobs in the renewable energy sector grew from 11 million in 2018 to 12 million in 2020, with solar and wind energy playing pivotal roles in this expansion [3]. However, despite these positive trends, uncertainty remains about the broader impact of green jobs on economic development. Much of the existing literature focuses on specific sectors or regions, failing to provide a comprehensive global perspective on the economic contributions of green jobs [4].

This study seeks to fill this gap by examining the role of green jobs in driving both employment growth and economic development on a global scale. The research focuses on identifying worldwide trends in green job creation and assessing the impact of green policies on employment and economic progress in different countries. For instance, nations with robust green policies, such as Germany and Denmark, have experienced notable increases in both green job creation and economic development, while countries with less developed policies have seen slower growth in these areas [5]. Germany's *Energiewende* (energy transition policy), for example, has been instrumental in creating thousands of jobs in the renewable energy sector while simultaneously contributing to economic development [6]. Conversely, nations like India, which are in the early stages of green policy development, face challenges in achieving similar job and economic growth in their green sectors [7]. Understanding how different policy frameworks influence job creation and economic growth is crucial for crafting effective strategies that promote sustainable employment and development globally.

Historically, research on green jobs has concentrated on specific sectors such as renewable energy or energy efficiency. IRENA estimates that the global transition to renewable energy could create over 42 million jobs worldwide by 2050 [8]. Similarly, energy efficiency measures are projected to generate an additional 6 million jobs by mid-century, particularly in sectors such as building retrofits, transport, and industry [9]. These sectors are critical to the decarbonization strategies of many countries, as outlined in their national commitments to the Paris Agreement. However, while most studies focus on sectoral impacts, they often overlook the holistic influence of green jobs on national and regional economic development. Recent research has emphasized the need for more comprehensive approaches that integrate cross-sectoral labor market data to fully understand the potential of green jobs in advancing employment and economic growth [10].

A notable gap in the current research is the lack of cross-country comparisons regarding green policies and their effectiveness in fostering green job creation and economic development. While developed countries have implemented green policies such as renewable energy subsidies and green investment incentives, which have directly boosted job creation, the comparative effectiveness of these policies across different economic contexts remains underexplored. For instance, Denmark's progressive green policies have resulted in the creation of 85,000 green jobs, particularly in the wind energy sector, contributing both to employment growth and economic advancement [11]. However, few studies have rigorously compared these policy impacts across developed and developing economies. This study aims to bridge that gap by comparing the effectiveness of green policies in various countries and

their impact on both job creation and economic growth, drawing valuable policy lessons for both developed and developing nations.

Additionally, the role of green jobs in post-crisis economic recovery is a focal point of this research. The global financial crisis of 2008 and the COVID-19 pandemic have highlighted the need for economies to integrate sustainability into their recovery plans. Many countries have included green elements in their stimulus packages as part of broader recovery efforts. For instance, the European Union (EU), through its European Green Deal, has committed billions of euros to promote the green economy as a cornerstone of its post-pandemic recovery strategy [12]. Similarly, South Korea and Japan have adopted green recovery strategies focusing on renewable energy, green mobility, and sustainable infrastructure projects [13]. Despite these initiatives, research evaluating the effectiveness of green recovery strategies in fostering both sustainable job growth and long-term economic development remains limited. This study will explore how investments in green jobs can not only accelerate economic recovery but also create stable, long-term employment and contribute to sustainable economic growth.

In sum, the primary objective of this research is to provide a comprehensive understanding of the role of green jobs in driving both employment growth and economic development. The study will utilize secondary data from international organizations such as the OECD, ILO, and Eurostat to measure the impact of green jobs on employment and economic progress across different countries [14]. Additionally, a comparative analysis will examine how green policies influence job creation and economic development, offering insights into best practices for supporting sustainable growth. The findings from this research are expected to inform policy recommendations that will help countries worldwide adopt and strengthen their green policies to promote inclusive and sustainable employment and economic development.

This research represents a significant contribution to the existing literature by offering a holistic view of the contribution of green jobs to the global economy. Furthermore, it underscores the importance of cross-sectoral and cross-national analysis to better understand the potential of green jobs in driving both employment growth and economic development. Ultimately, the research aims to provide actionable recommendations that support the transition to a greener economy while maximizing the socio-economic benefits for society at large.

2 **Literatur Review**

The concept of green jobs has emerged as a central pillar in the global push for sustainable economic development, particularly in the context of climate change mitigation and low-carbon growth. According to the International Labour Organization (ILO), green jobs contribute to environmental conservation, improved energy efficiency, and the application of eco-friendly technologies for better resource management [1]. These jobs span various sectors, including renewable energy, waste management, and sustainable agriculture, each playing a critical role in supporting both economic growth and environmental preservation. This link between green jobs

and economic development is increasingly evident, particularly in countries with comprehensive green policy frameworks.

A report by the Organisation for Economic Co-operation and Development (OECD) highlights the role of renewable energy and waste management in fostering green innovation, which in turn contributes significantly to both job creation and economic growth [5]. Moreover, the International Renewable Energy Agency (IRENA) projects that the renewable energy sector alone could generate over 42 million jobs worldwide by 2050, underscoring the substantial economic benefits of transitioning to a greener economy [3]. Despite these positive projections, however, there remains a need for a more nuanced understanding of how green jobs affect overall employment growth and economic development, particularly across different national and regional contexts.

Research by Müller and Schmid demonstrated that green jobs accounted for up to 10% of new employment in the European Union (EU) over the past decade, with renewable energy being a key driver of this trend [4]. The study also noted that green sectors tend to exhibit greater resilience to global economic shocks compared to traditional industries. However, as Jones and Roberts point out, some traditional sectors, such as fossil fuel extraction, have faced significant job losses due to the transition towards a green economy [6]. This creates potential imbalances in the labor market that must be addressed through targeted policies to mitigate job displacement in vulnerable industries.

Green policies, particularly those supporting renewable energy and eco-friendly innovation, have proven instrumental in driving job creation in sustainable sectors. For instance, Germany's *Energiewende* policy has successfully generated thousands of jobs in the renewable energy sector, showcasing how strong policy frameworks can not only facilitate employment growth but also bolster overall economic development [2]. This aligns with research by Hauff and Clausnitzer, who argue that countries with robust and integrated green policies tend to experience more substantial job creation and economic benefits compared to those with limited or narrowly focused green initiatives [7].

However, the effects of green policies on employment growth vary widely across different economic contexts. A study by Smith and Brown suggests that countries with narrowly focused green policies, such as those prioritizing renewable energy without addressing other sectors, tend to experience slower job growth and weaker economic development outcomes [8]. Conversely, in developing economies such as India and Brazil, where the transition to a green economy is still in its early stages, green policies have often failed to generate sufficient jobs to compensate for losses in traditional sectors like mining and fossil fuels [9]. This highlights the importance of crafting adaptive green policies that are responsive to the specific economic and infrastructural realities of each country.

Green jobs have also played a pivotal role in post-crisis economic recovery, particularly following the global financial crisis of 2008 and the more recent COVID-19 pandemic. Countries like those in the European Union have incorporated green recovery strategies into their economic stimulus packages, aiming not only to restore economic stability but also to promote long-term sustainable growth. Through initiatives like the European Green Deal, billions of euros have been committed to promoting green recovery, with a focus on creating jobs in renewable energy and

green infrastructure [10]. This approach has proven effective, as evidenced by the European Commission's findings, which suggest that green infrastructure investments have helped drive employment growth in countries with well-established green policies [11].

Despite these encouraging trends, the literature suggests that the effectiveness of green policies in fostering both job creation and economic development is not uniform across all countries. Developing countries, in particular, often face challenges related to technological readiness, infrastructural capacity, and policy implementation. As Hauff and Clausnitzer emphasize, while green jobs hold immense potential for driving economic recovery and sustainable growth, their impact varies depending on local conditions and the strength of national green policy frameworks [7]. This reinforces the need for adaptive, context-specific green policies that can maximize employment and economic benefits in diverse settings.

Based on the literature discussed, this research formulates two main hypotheses as follows:

H1: Comprehensive green policies positively influence employment growth and economic development.

H2: Countries that implement strong, integrated green policies experience more significant employment and economic growth compared to countries that adopt weaker or sector-specific green policies.

H3: Green jobs contribute to reducing economic inequality by providing employment opportunities across different skill levels and regions, particularly in developing countries.

3 Method

This study adopts a quantitative research approach to explore the relationships between green jobs, economic development, employment growth, and the influence of green policies and investments. The research relies on secondary data from several reputable international sources, including the Organisation for Economic Co-operation and Development (OECD), the International Labour Organization (ILO), and the International Renewable Energy Agency (IRENA). The dataset encompasses variables such as the number of green jobs, overall employment growth, economic development indicators, the strength of green policies, and investments in green technologies across a range of countries.

The primary dataset focuses on the year 2020, with a broader analytical range extending from 2010 to 2020 to capture long-term trends in green job creation, policy impact, and their relationship with economic development. Data from the OECD Green Growth Indicators are used to assess the impact of green policies on both employment growth and economic development in OECD member countries. This dataset provides insights into the effect of policies such as renewable energy subsidies, tax incentives for green investments, and energy efficiency programs on economic outcomes and job creation across various sectors. Similarly, the ILO Green Jobs Programme offers data on green jobs in key sectors like renewable energy, energy efficiency, and waste management, providing a global perspective that includes both developed and developing economies. To supplement this, data from

IRENA reports are integrated to provide a detailed analysis of job creation in the renewable energy sector, particularly in wind, solar, and hydroelectric power.

The study employs several statistical techniques to analyze the relationship between green jobs, economic development, and the strength of green policies. Linear regression analysis is used to assess the relationship between the number of green jobs and both overall employment growth and economic development. This method provides quantitative estimates of how increases in green jobs correlate with broader employment and economic development trends. The coefficients from the regression model help quantify the strength of these relationships, illustrating the significant role of green jobs in driving not only employment growth but also long-term economic development. The analysis aligns with previous research that highlights the importance of green jobs in stimulating economic activity and supporting sustainable growth.

In addition to linear regression, Pearson's correlation coefficient is employed to measure the relationship between investment in green technology and the creation of green jobs. The analysis reveals a strong positive correlation, confirming that countries with higher investments in green technologies, such as renewable energy infrastructure and eco-innovation, experience significant growth in green employment. This relationship demonstrates the central role that green investments play in creating job opportunities while supporting economic development, as previously documented in various studies on sustainable development.

To further evaluate the connection between green policies and job creation, logistic regression analysis is conducted to examine the likelihood that countries with a higher number of green jobs are associated with stronger and more comprehensive green policies. This method assesses whether the probability of implementing robust green policies increases with the expansion of the green job market. The findings from the logistic regression model indicate that countries with well-developed green job sectors, such as Germany, are more likely to implement and sustain comprehensive green policies. This analysis highlights the importance of policy support in fostering green job growth and driving sustainable economic development.

In order to track changes over time, time series analysis is applied to the dataset, covering the period from 2010 to 2020. This approach allows the study to identify trends, fluctuations, and external factors—such as the global financial crisis of 2008 and the COVID-19 pandemic—that have impacted green job creation and economic development. Time series analysis offers a longitudinal perspective on the sustainability of green job growth, revealing how periods of economic downturn or insufficient policy support can result in volatility in the green job market. By providing insights into how green job markets respond to economic challenges, this analysis underscores the critical role of policy intervention in stabilizing employment and promoting long-term economic resilience.

This study applies a comprehensive analytical framework to investigate the dynamics between green jobs, green policies, investments in green technology, and their collective impact on employment growth and economic development. The statistical techniques utilized provide a robust basis for understanding how green jobs contribute not only to the labor market but also to broader economic advancement. The findings offer critical insights for policymakers seeking to promote sustainable growth through investment in green jobs and green technologies, while also

underscoring the importance of adaptive, context-specific policies that address the unique challenges faced by different economies.

In conclusion, this research employs a combination of linear regression, Pearson’s correlation, logistic regression, and time series analysis to examine the complex relationships between green jobs, economic development, and green policies. This multifaceted approach enables a deeper understanding of how green job creation, supported by effective policies and investments, drives both employment growth and sustainable economic development on a global scale.

4 Result and Discussion

The results of this study, based on secondary data analysis from the OECD, ILO, and IRENA, provide substantial evidence supporting the hypothesis that green jobs play a pivotal role in driving both employment growth and economic development. Various statistical methods were employed to explore the relationships between green jobs, green policies, investments in green technologies, and their impact on national economies. Below is a detailed analysis of the findings, with the relevant tables summarising the key outcomes.

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics of the core variables used in this study. The data highlights the variation in green job creation, policy strength, and investments in green technologies across different countries.

Table 1. Descriptive Analysis

Variable	Mean	Min	Median	Max	Standard Deviation
Green Jobs (in thousands)	371.4	100	350	600	159.94
Employment Growth (%)	1.33	0.8	1.5	2.0	0.44
Economic Growth (GDP %)	-1.64	-7.0	-2.2	4.0	3.36
Green Policy Strength (0-10)	7.43	6	7	9	1.12
Investment in Green Tech (Billion USD)	130.00	50	150	250	68.17

These statistics indicate that countries with stronger green policies and higher investments in green technologies tend to have higher levels of green job creation. The variation across countries reflects different commitments to policies and investments.

4.2 Linear Regression Analysis

A linear regression analysis was conducted to examine the relationship between green jobs, economic growth, and employment growth. The results are presented in Table 2..

Table 2. Linear Regression Analysis Results

Variable	Coefficient	Intercept	R-squared	Mean Squared Error (MSE)
Green Jobs vs. Economic Growth	5.87×10^{-6}	-3.56	88	10.20
Green Jobs vs. Employment Growth	2.08×10^{-6}	0.63	695	54

The analysis shows that for every increase of 100,000 green jobs, there is a slight increase in both economic and employment growth. The R-squared value for employment growth (0.695) indicates that green jobs have a strong explanatory power for employment growth, while the relationship with economic growth is weaker, with an R-squared of 0.088. Countries with strong green policies, such as Germany and Denmark, have successfully increased employment through investments in renewable energy and energy efficiency technologies. These findings are consistent with the research of Müller and Schmid, who demonstrated that green jobs significantly contribute to job creation in the renewable energy sector in Europe [4].

4.3 Pearson Correlation Analysis

A Pearson correlation analysis was conducted to assess the relationship between investments in green technology and green job creation. The results are presented in Table 3.

Table 3. Pearson Correlation Analysis Results

Variable	Pearson Correlation	p-value
Green Jobs vs. Investment in Green Tech	0.969	< 0.001

The Pearson correlation coefficient of 0.969 indicates a very strong relationship between green jobs and investments in green technology. This positive relationship supports previous research by Smith and Brown, which emphasised the importance of green technology investment as a key driver of job creation in the renewable energy and energy efficiency sectors [8].

4.4 Logistic Regression Analysis

A logistic regression analysis was conducted to evaluate whether countries with a higher number of green jobs are more likely to implement stronger green policies. The results are summarised in Table 4.

Table 4. Logistic Regression Analysis Results

Variable	Coefficient	Intercept
Green Jobs	1.01×10^{-7}	-4.29

The logistic regression results indicate that countries with a higher number of green jobs are more likely to implement strong green policies. These findings support previous literature suggesting that countries with comprehensive green policies have a higher likelihood of sustaining job growth in green sectors [7]. This is particularly evident in European countries, where strong green policies, such as the European Green Deal, have driven job creation in sectors like renewable energy and waste management [10].

4.5 Time Series Analysis

A time series analysis was conducted to track the evolution of green job creation from 2010 to 2020. Table 5 presents the results of the time series analysis..

Table 5. Time Series Analysis Results

Variable	Coefficient	Intercept	R-squared
Year (2020 data)	0	69	0.0

The time series analysis does not show significant changes in trends for the analyzed period. However, these findings reflect limitations in data coverage. Research by IRENA estimates that with stronger green policies in the future, the trend of green job creation in the renewable energy sector is expected to rise significantly [3]. More comprehensive longitudinal data in the coming years will provide a clearer picture of long-term green job creation trends.

The findings of this study highlight the crucial role of green policies in fostering the creation of green jobs, which in turn drive employment growth across nations. Countries that have adopted more robust and comprehensive green policies, alongside substantial investments in green technologies, have consistently shown higher growth in green sector employment. As demonstrated by Jones and Roberts, well-designed and strategically implemented green policies create an environment that promotes the expansion of renewable energy and energy efficiency sectors, subsequently leading to the creation of sustainable jobs [6].

Nevertheless, significant challenges persist, particularly in developing countries such as India and Brazil, where green policies are generally weaker, and investments in green technologies remain lower. The logistic regression results of this study reveal

that countries with weaker green policies are less likely to experience substantial job creation in green sectors. This underscores the necessity for enhanced international support and targeted investments to help these nations strengthen their green policy frameworks and realise the potential of green job growth.

Furthermore, although green jobs are seen as a key driver for economic recovery in the post-COVID-19 era, the time series analysis indicates that a notable increase in green job creation has not yet materialised in many developing countries. This observation aligns with existing literature, which emphasises that developing countries require more significant investment and global assistance to accelerate their green transitions and stimulate employment growth in the green economy [9].

5 Conclusion

The findings of this study reveal that green jobs, supported by comprehensive green policies and significant investments in green technologies, are critical in driving both employment growth and economic development on a global scale. Countries with strong policy frameworks, such as Germany and Denmark, have shown that well-designed green policies can foster substantial job creation in sectors like renewable energy and energy efficiency. The positive relationship between green job creation and economic growth, though varying across countries, underscores the importance of continued investment and policy support to sustain this growth. This study confirms that green jobs contribute meaningfully to employment growth, particularly in countries with robust green policies, and align with the broader objectives of sustainable economic development.

However, several limitations were identified in this research, which provide avenues for future studies. First, while this study offers a global perspective, data availability and consistency across developing countries remain limited. Future research could benefit from more comprehensive longitudinal datasets, especially in developing economies where green policies are still in their infancy. Additionally, further exploration is required into the socio-economic impacts of green jobs, such as their role in reducing inequality or fostering inclusivity across skill levels and regions. Policymakers should focus on tailoring green policies to local conditions and providing targeted international support to enhance green job creation, particularly in developing nations where the green transition is slower. This study recommends continued global cooperation and increased investments in green technologies to ensure the equitable distribution of green jobs and sustainable economic growth worldwide.

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