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Towards Sustainability: The Potential of Green Jobs in India's Economic Transformation

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ABSTRACT

Green jobs encompass roles focused on energy efficiency, waste management, conservation, and renewable energy. This study investigates the various facets of greening the Indian economy, emphasizing the critical role of green jobs as a catalyst for sustainable development and assessing their significance and reach. It evaluates the current state of green employment in India by analyzing public awareness of these jobs and the effectiveness of existing programs and policies in fostering a green workforce. Preliminary findings indicate a significant lack of awareness among the general population regarding their socio-economic implications. The study also explores potential solutions to the challenges of integrating green jobs into India's economy, along with the obstacles to implementing these policies. As the global community intensifies efforts to combat climate change, India has a unique opportunity to emerge as a leader in green innovation and sustainable development. Transitioning to a green economy is not only economically essential but also a shared responsibility to ensure global sustainability and the well-being of future generations.

Keywords: *Green economy, Sustainable Development, Green Jobs, Environmental Conservation, Renewable Energy.*

JEL Classification

1. Introduction

Green jobs refer to employment opportunities that promote environmental sustainability and tackle climate change challenges. These roles are generally linked to industries that emphasize eco-friendly practices, resource efficiency, and the reduction of carbon emissions. The primary objective of green jobs is to foster economic growth while minimizing environmental harm (Jacob et al., 2015). These positions are directly associated with activities that positively impact the environment, including sectors like renewable energy, energy efficiency, waste management, sustainable agriculture, conservation, and pollution control. A significant number of green jobs exist within the renewable energy sector, focusing on solar, wind, hydropower, geothermal, and biomass energy, all aimed at decreasing reliance on fossil fuels. Green jobs also include positions that enhance energy efficiency across buildings, transportation, and industrial processes by developing and implementing

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technologies and practices that lower energy consumption. Roles related to conserving natural resources and biodiversity, such as forestry, wildlife management, and ecosystem restoration, are considered green jobs. In agriculture, practices that promote sustainability and minimize environmental impact, including organic farming, agro-ecology, and permaculture, fall under this category. Jobs in waste management and recycling also contribute to reducing environmental impacts by encouraging recycling, composting, and sustainable waste practices. Additionally, the construction and building sectors can advance sustainability through green building practices, utilizing energy-efficient materials and designs (Cardoso et al., 2019). Green jobs further include roles in environmental education, policy advocacy, and research, where professionals aim to raise awareness, develop policies, and conduct research to address environmental issues. These jobs are vital for transitioning to a more sustainable, low-carbon economy, offering not only environmental protection but also avenues for economic growth, employment, innovation, and social well-being. As global efforts to combat climate change and environmental challenges intensify, the significance of green jobs is expected to increase.

Transitioning to a green economy often necessitates investments in renewable energy, energy efficiency, sustainable agriculture, and other eco-friendly sectors. Such investments can generate numerous jobs, providing significant employment opportunities, especially beneficial for a developing and densely populated country like India, which currently has an unemployment rate of 6.6 percent per annum. Green jobs contribute to economic diversification by broadening employment opportunities beyond traditional sectors, enhancing the resilience of developing economies against external shocks, such as commodity price fluctuations (Jacob, 2015). Many green jobs help promote cleaner air, water, and overall environmental health. For instance, jobs in renewable energy and pollution control can lead to better public health outcomes, thereby reducing healthcare costs and enhancing overall workforce well-being—an essential factor for long-term economic development. Green jobs, especially in sustainable agriculture, can alleviate poverty by providing income opportunities to rural communities. In India, where about 44 percent of the population is engaged in agriculture and related activities, this could yield positive social and economic effects.

Development theories, like Lewis' theory, suggest a strategic shift in policy focus for predominantly agricultural developing and underdeveloped nations, advocating for a systematic reallocation of labour from agriculture to industry, and eventually to the service sector. This sequential transition is believed to offer a more sustainable growth path, similar to that seen in many developed countries. India has also adopted this strategy post-independence, implementing reforms to align with this developmental model. In recent years, the need to integrate economic growth with environmental sustainability and social progress has become increasingly clear. Despite notable economic advancements during the Tenth Five-Year Plan, benefits have not sufficiently reached lower-income

groups, and challenges in ensuring quality employment remain significant. This has led to a growing acknowledgment of the necessity to prioritize a green approach and pursue sustainable development, recognizing the interconnection between economic, environmental, and social goals.

To summarize the diverse research on green job creation and sustainable development initiatives, various scholars have investigated the intersection of environmental objectives and economic policies across different regions and sectors. Sulich and Sołoducho-Pelc (2022) studied the emergence of green jobs within the circular economy across 28 EU countries from 2009 to 2019, using linear regression analysis and Eurostat data to explore how certain Sustainable Development Goals affected labor market dynamics. Arnedo et al. (2021) outlined economic strategies under the European Green Deal Framework and Spain's recovery plan, focusing on the tourism sector's potential for creating green jobs. Despite sustainability efforts by major Spanish hotel chains regarding waste management and well-being initiatives, the study found limited growth in green job opportunities in the hotel sector. Bassi and Guidolin (2021) examined the scope and impact of green employment within the circular economy, particularly in small and medium enterprises (SMEs) in the EU, highlighting a significant correlation between green jobs, environmental skills, and circular economy practices. Sulich et al. (2020) analyzed strategies for transitioning to greener economies, revealing differing rates of youth employment in green sectors across various European countries, with higher proportions in Poland and Belgium compared to the Czech Republic. They concluded that a stronger emphasis on green economy initiatives offers promising job prospects, particularly for young individuals entering the workforce. Ismail et al. (2019) aimed to enhance job competencies among technicians in Malaysia's transportation sector in alignment with sustainable development goals, contributing to a more environmentally conscious workforce. Gailhard & Bojnec (2019) investigated how green economy measures could foster job creation in the agricultural sector, focusing on Slovenia's experience from 2007 to 2014 and assessing the impact of agri-environmental measures on rural development and labor utilization in large dairy and field crop farms under green policy initiatives.

Objective of the study

Existing research provides strong evidence that green jobs hold significant economic potential, including job creation, reducing inequality, and contributing to GDP growth. In India, which faces numerous socio-economic and environmental challenges, increasing awareness and promotion of green jobs could help achieve two key sustainable development goals: Decent Work and Economic Growth, and No Poverty. The country has made notable progress in the renewable energy sector, particularly in solar and wind energy (Govindan, M., & Bhanot, J., 2014). Expanding renewable

energy projects can generate a considerable number of jobs, encompassing manufacturing, installation, maintenance, and operation.

Given India's substantial agricultural sector, promoting sustainable agricultural practices can also create employment while ensuring long-term food security. This includes positions in organic farming, agroecology, and the implementation of eco-friendly farming methods. With water scarcity being a pressing issue in many regions, green jobs focused on water management, conservation, and efficient irrigation can address both environmental and employment challenges (Azad, R., & Chakraborty, S., 2018). Furthermore, the green economy offers opportunities for entrepreneurship, fostering the establishment of small and medium-sized enterprises (SMEs) in sectors like renewable energy, sustainable agriculture, and eco-friendly technologies, which can lead to diverse job opportunities (Matta, J. R., 2009).

To fully harness these benefits, it is crucial for society to understand the concept of green jobs, including their costs and benefits, potential impacts, and adaptability. Without widespread awareness, maximizing this potential becomes challenging. This research aims to explore the scope and significance of green jobs within the Indian economy, taking into account public awareness. Awareness is essential for promoting the adoption of green practices, increasing demand for eco-friendly products and services, influencing policy decisions, encouraging skill development, tackling environmental issues, and fostering innovation. Additionally, the gaps in existing literature regarding awareness of green jobs drive the need for deeper investigation, particularly in the context of a developing country like India.

Data and Methodology

This section begins by detailing the data used in the study. Primary data was collected through a structured questionnaire distributed via social media, using a convenience sampling method. The survey aimed to evaluate participants' knowledge, attitudes, and perceptions regarding green jobs, sustainability, and environmental conservation, covering topics like familiarity with green industries and willingness to support green careers. A total of 132 responses were gathered, serving as a pilot study for further research in this area. The data was analyzed using Ordinary Least Squares (OLS) regression to assess how various factors—such as respondents' gender, employment status, education and age—influence awareness of green jobs. The dependent variable is a "composite index" calculated as a weighted average of sixteen key dimensions of green job awareness, with weights derived from Eigenvalues obtained through Principal Component Analysis (PCA). These dimensions encompass perceptions related to green jobs and their benefits for the environment and economic development. The awareness index meets the standard criteria for composite indices. The OLS

regression analysis utilized the awareness index as the dependent variable and the z-scores of the predictors as independent variables to ensure comparability. A summary of the responses and OLS regression results follows in the next section.

Findings

Of the 132 responses collected, nearly 60 percent of the participants are male, and about half fall within the 25 to 34 years age range. Additionally, 47 percent of the respondents hold a master's degree as their highest qualification, while 66 percent are formally employed. Table 1 presents the descriptive statistics for the predictor variables, illustrating key information that has informed the study's hypotheses.

Table 1: Descriptive Statistics of Predictor Variables

	Gender	Age (Years)	Educational Qualification	Employment Status
Mean	0.59	30.64	15.55	0.70
Standard Error	0.04	0.86	0.25	0.03
Median	1	30	17	1
Mode	1	30	17	1
Standard Deviation	0.49	9.95	2.95	0.45
Sample Variance	0.24	99.07	8.73	0.20
Kurtosis	-1.86	0.36	0.45	1.19
Skewness	-0.40	0.93	-0.47	-0.90
Range	1	40	12	1

Minimum	0	20	10	0
Maximum	1	60	22	1
Sum	79	4045	2053	93
Count	132	132	132	132

Source: authors' own calculation

Table 2 displays the percentage of respondents who recognize the impact of green jobs on various societal aspects. This serves as a positive indicator of their awareness.

Table 2: Attitude towards Green Jobs

Questions	% of samples who have agreed
Green jobs are effective to stop environmental degradation	72%
Govt. support is essential in promoting green jobs	77%
Green jobs are important for overall well being	78%
Green jobs are essential for long term economic growth and development	78%
Consumers can pressurize companies to adopt green practices	71%
Education and awareness are the keys to promote green jobs	82%
Green jobs foster social inclusion and equity	81%

Source: authors' own calculation

The higher percentages shown in the table suggest a greater awareness of green jobs among respondents. These indicators, along with additional basic knowledge about green jobs, have been combined to create a "composite awareness index," which serves as the dependent variable in the regression analysis.

Hypothesis 1: Women in India are more informed and concerned about green jobs

Hypothesis 2: Employment status affects the green job awareness significantly

Hypothesis 3: Green jobs awareness in India is more prevalent in the younger age group

Now, the predictor variables of the analysis i.e. age, gender, employment status and educational qualification are expected to be significantly correlated and rightly so, as the hypotheses could not be

formed otherwise. But we need to confirm how serious this multi-collinearity is. In order to understand that first we calculate the correlation matrix for all the predictors. Table 3 represents this.

Table 3: Correlation Matrix of the Predictors

	Gender	Age (Years)	Educational Qualification	Employment Status
Gender	1			
Age (Years)	-0.10	1		
Educational Qualification	-0.20	0.56	1	
Employment Status	-0.12	0.57	0.56	1

Source: authors' own calculation

The table indicates a positive correlation between employment status and age, as well as between educational qualifications and age. The correlation coefficients align with the expected outcomes and are consistent with the hypotheses proposed.

Table 4: OLS Regression Results

Predictors	Coefficients
Constant	3.308***
	(0.049)
Gender	-0.048
	(0.051)
Employment Status	0.147**
	(0.064)
Education	-0.1552**
	(0.065)
Age	-0.0287

	(0.064)
R-squared	0.418
No. of Observations	132

*, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Preliminary findings of Table 4 indicate that employment status and education are significant factors influencing awareness of green jobs. However, the third hypothesis is only weakly supported. The negative sign of the education coefficient suggests that higher education is associated with lower awareness of green jobs, which seems counterintuitive and contradicts existing literature. A plausible explanation for this outcome is the strong correlation between age and education. Younger respondents, who generally have lower education levels, tend to be more informed about green jobs. This interpretation supports the validity of our third hypothesis. Conversely, gender does not appear to significantly affect awareness of green jobs.

Conclusion

This paper highlights the significant impact of age, education, and employment on awareness of green jobs in India. The analysis clearly shows that these factors play a key role in shaping individuals' understanding and engagement with environmentally sustainable job opportunities. The findings emphasize the need for targeted educational initiatives and outreach programs tailored to various demographic groups to improve awareness and interest in green jobs. Additionally, policies promoting green sectors should address the diverse needs of the workforce, factoring in age, educational background, and employment status. As India moves toward a more sustainable future, it is crucial to tackle disparities in green job awareness to cultivate a skilled and environmentally aware workforce. By leveraging education and employment strategies designed for different demographics, India can open new avenues for green growth and make a meaningful contribution to global sustainability efforts.

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