

A TRANSITION TOWARDS GREEN JOBS FOR THE ENERGY SECTOR IN PAKISTAN



Pakistan Institute of Development Economics

By

Ms. Syeda Hadika Jamshaid
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Supervisor

Dr. Karim Khan
Dr. Ghulam Samad

MPhil Environmental Economics
PIDE School of Economics
Pakistan Institute of Development Economics,
Islamabad
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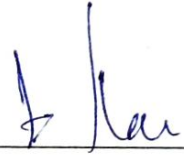
Pakistan Institute of Development Economics

Pakistan Institute of Development Economics
P.O. Box 1091, Islamabad, Pakistan


CERTIFICATE

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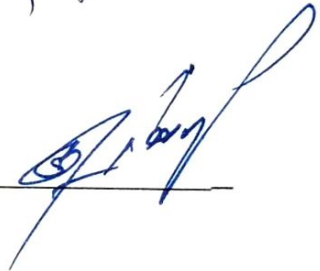
Supervisor: Dr. Karim Khan

Signature: 

External Examiner: Dr. Aneel Salman

Signature: 

Head,
PIDE School of Economics: Dr. Shujaat Farooq

Signature: 

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Name of Student
Syeda Hadika Jamshaid

Abstract

This study is set to explore and analyze the potential opportunities of green jobs and sustainable development for the energy sector in Pakistan. Given that the concept of Sustainable Development has become a necessary part of the global agenda and as such is unavoidable for everyone on the planet, the research on how to work towards it in a more effective and efficient way is an ongoing exercise in various fields. Innovative solutions are being researched for, in all spheres of life; whether it has to do with eradicating poverty, improving healthcare outcomes, promoting education or combating climate change implications. A relatively new take on studying and consequently promoting sustainable development in developing countries is to examine the influence of new “green” policies and test how they could be used for improving outcomes. Considering the lack of literature available on the subject in the Pakistani context, this study attempts to fill the gap by recognizing factors that contribute positively to sustainable growth, analyzing the current status of the green sector in the country, with a particular focus on the energy sector and then further devising ways to inculcate them in national policies and to promote them. This will be achieved through a mixed research methodology of case studies, primary surveys and secondary desk research. The aim of the research methodology is to find evidence of positive causal linkages between an increase in green jobs within economic, social, and environmental components. The study also analyzes the nature of existing green jobs within the renewable energy sector (including whether they qualify as decent work), as well as the skills required by the energy workforce to transition towards greening their jobs. These findings contribute to the idea that the government is on the right path with its promotion of green activities.

Keywords: *green jobs, Renewable Energy, Sustainable Development, Energy, Pakistan, Decent work, Coal to Clean, Energy Transition, Climate Change.*

1 INTRODUCTION

1.1 Introduction

Sustainable Development is a concept that has gained immense global recognition in the last five decades and is still becoming yet more relevant in the political climate. The fundamental idea is to live and encourage the utilization of Planet Earth's resources in a way that does not harm our environment and preserves said resources for utilization by the future generations. Pakistan is one of the lowest contributors to global climate change but has consistently ranked in the top ten most vulnerable countries to climate change (GermanWatch, 2020). With the immense emphasis placed on working towards the Sustainable Development Goals (SDGs) and Pakistan's precarious position and vulnerability, it is of paramount importance to look for newer, innovative solutions to mitigate climate change. This is important because sustainability is interlinked strongly with climate change and vulnerability. Promoting narratives through research on the importance of sustainability will result in more active efforts to improve such practices, which can then lead to direct and indirect effects, such as improving poverty levels, healthcare outcomes and promoting education, amongst others. In accordance with these aims and with the intention to gradually integrate climate change related initiatives into national policies and strategies, it is crucial to identify and understand which measures lead to positive outcomes. The Global call for decarbonization followed by commitments in International Climate Summits has fueled clean energy transitions worldwide with large scale industries rapidly switching to cleaner solutions for power generation and consumption. Although this shift has rightly created hundreds and thousands of job opportunities however it is imperative to ensure that this transition remains just and ensures the sustainable development promised due to green job creation. This paper also tries to understand the nature of green vacancies already created in the country's nascent RE industry and to assess whether all green jobs are decent jobs. As opportunities arise so does the requirement of employee benefits, up-to-date knowledge, hands on experience and specialized skill learning programs to incentivize the transition to green technology. We further analyze the skills required by the energy sector employees to effectively transition to clean energy.

Thus, the purpose of this paper is to explain the connection between sustainability and green jobs and its importance in Pakistan, how the popularity and proliferation of green jobs depends on whether these jobs are viewed as 'decent', and how a transition towards green jobs could be accelerated.

1.2 Objectives

Increasingly, the label "green" is being connected to multiple sectors, which is apt because there is greater knowledge about how sustainable initiatives are necessary. One way of doing this is by introducing 'green jobs', which will be defined more comprehensively later in the paper, but overarchingly relate to jobs that have a strong social justice and sustainability element to them. Considering the lack of literature and research available on the subject, this study attempts to fill the gap by recognizing factors that contribute positively to sustainable growth, analyzing case studies from other countries, reviewing the current status of green jobs in Pakistan and then further devising ways in which national policies and entrepreneurial agendas can be augmented to include

a strong sustainability element. Thus, the main research objectives of this paper are summarized as follows:

- Define green Jobs, how they are being promoted globally and establishing a link to how they feed into the sustainable development agenda
- Identify green jobs potential in Pakistan and establish causal links with improving the environment and reducing the country's climate vulnerability using case study analysis.
- Highlight distinct variables for sustainable development that are applicable to Pakistan across multiple sectors to promote future investigation into the subject.
- Analyze the current conditions and potential of green jobs within the energy sector to understand and develop a framework to proliferate possibilities in the green industry

The paper is structured into five parts; comprising of a literature review, a comparative analysis, the situational context, findings from the studies and recommendations. They are divided as follows:

1. The first chapter highlights the main objectives and scope of the paper. It also defines concepts including and related to green jobs in general as well as for the sectors relevant in the Pakistani context.
2. The second chapter addresses the question of German practices in relation with proliferation of green jobs and exactly how the relationship is being furthered, studied, and tested.
3. Chapter 3 gives a detailed overview of a theoretical framework that could be used to define and examine the different components of sustainable development, with various examples from existing literature. It also considers factors that would be relevant for the Pakistani context and could form the basis of future studies. It also discuss the design of survey created to garner information around the nature of green jobs within the renewable energy sector in Pakistan and the skills required within the sector for a green job transition.
4. Chapter 4 goes on to touch upon the mechanisms of different relevant studies, look at Pakistani evidence and elaborate on its results, and demonstrate findings from a couple of surveys conducted regarding nature of green jobs and upskilling required to transition to green jobs.
5. The concluding chapter attempts to make recommendations as well as discuss shortcomings so as to effectuate expansion of the green sector.

It is important to specify here that Germany has been chosen as a case study as opposed to other countries, because it better suits the aim of the research objective, where the primary goal is to formulate a plan to promote sustainability in different sectors in Pakistan through the prevalence of green jobs. While Germany and Pakistan do not fall under a similar economic and political landscape, Germany has a strong focus of 'improving employability' and how this can be achieved through what is defined as a 'suitable job' (Bazzani, 2017). By using a similar argument, this paper aims to exhibit how green jobs, employability and 'suitable' jobs are interlinked. German Courts usually consider any job as suitable due to the 'unlimited acceptability of work' (Bazzani, 2017), and following a similar blueprint will be the focus of this novel paper, which aims to transform the understanding of 'green jobs' in Pakistan. The pathway to green can be an effective way of tackling

global challenges like poverty and rising unemployment by adopting policies that cater to employee protection. It is important for development in its current context, to be not only cognizant of just modern technological requirements but also worker rights and needs in order to meet the challenges of emerging trends and growth goals.

1.3 Significance of the Research

It is important to note that no such research, one that attempts to establish causal links between green jobs, sustainable development and ‘decent jobs’, has been undertaken in Pakistan before. However, it has become a necessity, given our commitment to the global agenda surrounding climate change, employment rights, child rights and gender equality issues. Pakistan is signatory to multiple commitments which include the following:

1. The Convention on Biological Diversity
2. International Convention to Combat Desertification in Countries Experiencing Drought and/or Desertification (1997)
3. The United Nations Framework Convention on Climate Change (UNFCCC)
4. The Discrimination Convention (1958), Convention of the Rights of the Child (1990)
5. The Equal Remuneration Convention (1951)
6. Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) in 1996
7. The Beijing Platform for Action of Gender Equality and the Sustainable Goals

Given these agreements, this paper aims to bridge how to put promises into action, thus an important objective is to affirm the various advantages that stem from promotion of the green agenda and influence future policies to work in the same direction, despite the data limitations that exist in the Pakistani context. The research in this paper acts a micro-study which can become a foundation through which further study in the sustainability field can be done building on more extensive parameters, as the country gradually makes progress with more sophisticated data collection.

Proof of Pakistan’s commitment to and ambitions for the SDGs can evidently be seen in the National Climate Change Policy 2021 (Ministry of Climate Change, 2021) and the revised 2021 Nationally Determined Contributions (NDCs) (Government of Pakistan, 2021), which further highlights the need for such a study. Keeping up with the spirit of combating climate change in an all-inclusive and extensive manner, the NCCP identifies the susceptibilities of major sectors, such as agriculture, forestry, health, biodiversity, and proposes objective-wise categorized policy measures for all of them. It does so with a very comprehensive approach, so as to stress on the importance of implementing both adaptation and mitigation strategies that Pakistan requires. Similarly, considering the severity of the climate emergency and the volatile position of Pakistan in terms of its climate-related vulnerability, the NDCs propose rather enthusiastic high priority actions for the agenda 2030. These include a 50% reduction of projected emissions by 2030, the complete ban on imported coal, moratorium on new coal plants, 60% of all energy generation to be renewable by 2030, 30% of all vehicles to be electric by 2030, and increment of protected areas

from 12% to 15% by 2023. As such, it has inevitably become imperative to take an inventory of outcomes stemming from these initiatives.

1.4 Green Definitions

For the purpose of this study, the factors we take under examination have to do with the ‘green’ sector both globally as well as in Pakistan. Concepts relevant to this include growth in the green economy, or green growth, through means of creation of green jobs and facilitation of green entrepreneurship. Although a universal and concrete definition does not exist, jobs are generally regarded as green if they focus on occupations with an identifiable environmental goal, or if the industry as a whole produces environmentally friendly products. One of the first definitions of green jobs put forward by OECD (1999) describes them as **“activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products and services that reduce environmental risk and minimize pollution and resources”**.

A green economy, the definition of which has evolved, consists of green jobs which are premised on a three-fold definition that has been put forth by Georgetown University (2010) that:

- 1) A social justice/worker-centered definition which makes green contingent on its potential to address environmental inequality,
- 2) A renewable energy efficiency definition, which defines green as activities in the clean energy sectors, and
- 3) A broad environmental definition, which defines green as anything related to environmental protection and quality.

In congruence with this, “Green Entrepreneurship” has been loosely defined as combining environmental and social concerns with entrepreneurial ideals. More generally, it includes businesses whose sole objective is not profit making but the core business model addresses an environmental or social issue (OECD, 2011). As such, a green job would include environmentally friendly production technologies, offering green products and services, working on reducing greenhouse gas emissions, taking initiatives to decrease pollution, or promoting community support activities. In addition to being environmentally beneficial, another necessary criterion for green jobs is for them to be considered “decent jobs” as well. According to ILO, a ‘decent job’ is defined as being productive, delivering a fair income, providing safety in the workplace, ensuring social protection for families, having potential for personal development and social integration, allowing freedom to express their concerns, organize and participate in the decisions that affect their lives, and granting equality of opportunity and treatment irrespective of gender (ILO, 2022). For the purpose of this paper, both the criteria are being considered. In addition to this, the research methodology of this paper also includes a survey which was conducted across renewable energy sites in Pakistan to dissect the definition of ‘decent jobs’ further for a better understanding on how perceptions of green jobs are. The purpose of the survey was to find out if green jobs, whether fully green or not, - are considered ‘decent’ as well. This is discussed in detail in the fourth chapter.

2 LITERATURE REVIEW

For the purpose of exploring how growth in the green sector impacts sustainable development, this section takes a look at available literature around green jobs in Pakistan, particularly for the Forestry and Renewable Energy sector, due to their non binary nature of jobs. This section also further explores global literature around German administrative and policy initiatives that can be useful in setting up an example for Pakistan and potential lessons to be incorporated into a nascent green jobs market. It constitutes a comparative analysis, including for laws and policies under the wider spectrum of green jobs. While Germany has initiatives that can be replicated in Pakistan, it is important to acknowledge that the selection of the German case study is to help formulate a long-term plan that brings in the green economy into the fore and helps to replace the traditional sectors that are damaging to the environment.

2.1 Green Jobs – Pakistan Overview

Following from the discussion regarding the NCCP and NDCs, this section summarizes the current status of green jobs in Pakistan, with a focus on two majorly green industries. This has been done to avoid possible inclusion of brown jobs from seemingly green sectors; considering Pakistan does not have perfectly segregated data with reference to green jobs, it is safest to consider the two industries that can wholly be considered green.

Pakistan has adapted to the global climate change emergency and put in place mechanisms to not only counter future disasters, but also try and put women and girls on the agenda. In 2017, Pakistan established the Ministry of Climate Change (MoCC). The national ministry is the avenue through which climate change related interventions take place. The MoCC envisions to mainstream climate change in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development. Several projects by MoCC such as the ‘Green Stimulus’, TBTT, Recharge Pakistan etc. are based on development of green jobs. In addition to this, there are multiple international and local NGOs that are financing initiatives related to climate resilience. All these interventions are gender responsive to ensure proper addressal of problems faced by the communities as well as fair and equal distribution of benefits.

2.1.1 Forestry

Given the global efforts towards going green in all fields, the concept is also rapidly gaining traction in Pakistan, mostly on account of government initiatives and donor-based advocacy and endorsement. One example of this was the Billion Trees Afforestation Project (BTAP) carried out during 2014-18 aimed at promoting the “Green Growth Initiative” in the Khyber Pakhtunkhwa province. The project focused on a diverse set of objectives including; increasing mass plantation areas, plantation alongside roads as well as canals and railway tracks, capacity building, reclamation of saline and waterlogged areas, rehabilitation of degraded watersheds, and establishment of nurseries. Furthermore, the BTAP also led to creation of 8,000 jobs for both farmers and entrepreneurs and was well praised by international organizations (Khan et al., 2017).

After the success of the BTAP, in 2019 the government announced implementation of the Ten Billion Tree Tsunami Programme (Ministry of Climate Change, 2021) to encourage afforestation

all over the country as part of the “Green Stimulus Package” over the next four years. The said Package has been arranged in collaboration with the World Bank with the aim of creating more green jobs, planting more trees, and preserving national parks. Moreover, it is to include discussions regarding commencing a “Debt for Nature” swap scheme that would effectively link debt retirement with quantifiable performance on biodiversity protection (Khan, 2021). The figure below by IUCN showcases the commitments made towards this project in 2018.

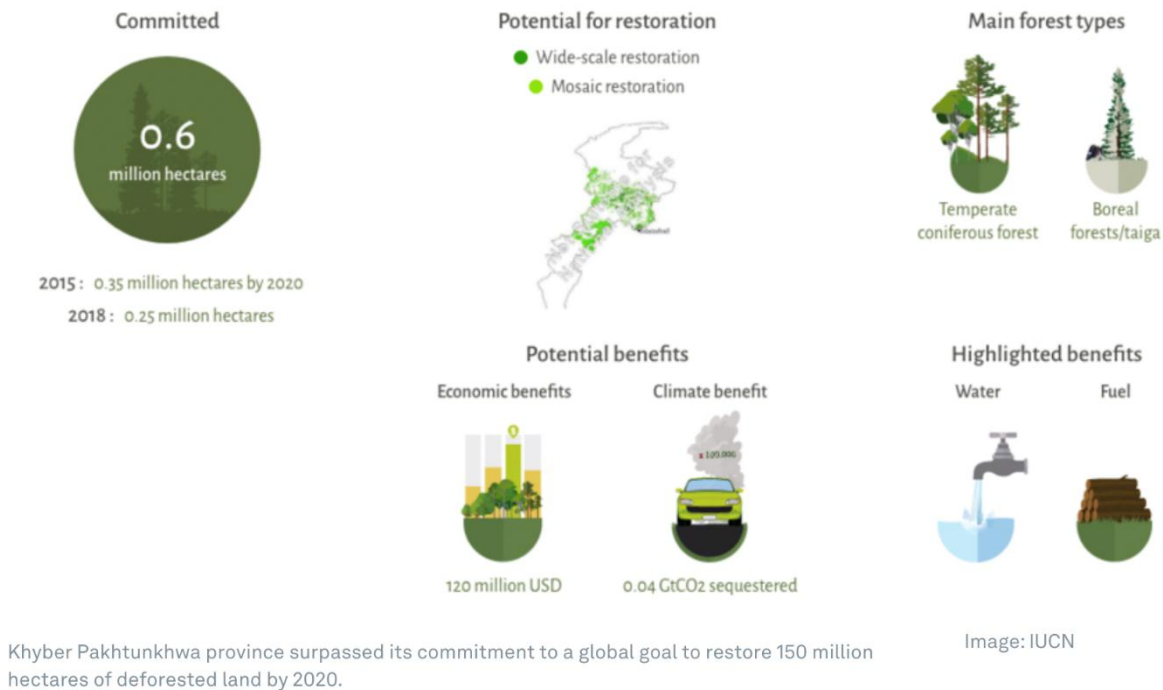


Figure 1 KPK Commitments towards forestry goals

In 2021, the initiative generated 84,609 daily wage jobs across the country in various green spheres, and in 2022 was expected to cross more than 200,000 green jobs.

According to a fact sheet by the ILO, in 2016, 42.3% of total employment was in the agriculture, forestry, and fishing sector which has been on a decreasing trend ever since but has the potential to grow (2021). The report basically highlights the fact that there exist opportunities for green job creation across all three industries.

2.1.2 Renewable energy

The fact sheet also comments on the potential of the renewable energy sector in creating green jobs (ILO, 2021). Given the urgency of the political situation, with energy and fuel shortages and inflation in prices, moving towards renewable energy is not only preferred, but necessary. The figure below shows the reason for the energy crisis and how renewable energy can rectify this.

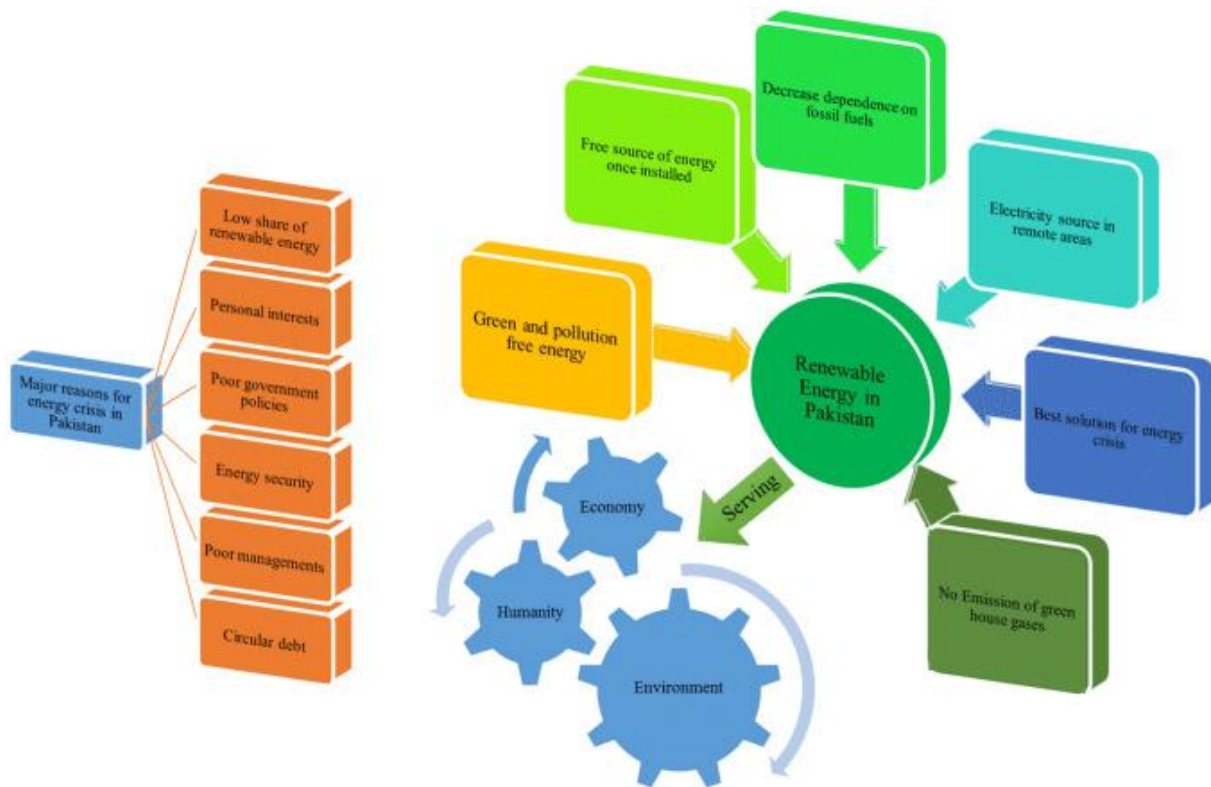


Figure 2 Energy crisis and renewable energy

Source: Rafique, 2017

The demand of electricity grows annually, with figures till 2018 showing an upward demand but not nearly enough supply. Thus, promoting green jobs will help create jobs, and also provide relief to the government and people alike.

The factsheet summarizes that the renewable energy share as part of overall consumption dropped from 50.9% in 2000 to 46.5% in 2015 even though electricity generation from renewable sources was increasing in absolute terms. Moreover, the renewable energy sector employed approximately 73,000 people in 2018, also stressing over the fact that this number could and should be increased.

In addition to this, after Pakistan’s ambitious declaration in the recent NDCs regarding generating 60% of the electricity in the country from renewable sources like solar, wind, and hydropower by 2030 as compared to 24% in 2018 (IRENA, 2018), it is expected that the share of renewable energy jobs would generally increase in near future.

2.2 An Analysis of Germany’s transition to Green Jobs and lessons for Pakistan

2.2.1 Green Jobs

This section largely deals with the data and subsequent findings published in a report (Cedefpop, 2018), regarding green skill needs in Germany, while also alluding to general environmental employment and development of green policies. Considering green jobs made up approximately 5.2% of overall employment in 2012, the report provides the following break up with respect to specific sectors; 62.8% through environmental services provision, 19.3% from production of

environmental goods, and 17.9% connected to the use of renewable energies. Furthermore, among the 1.8 Mn green jobs of the goods and services; 57% were from service sectors, 18.4% from basic industries (energy and water supply, mining and quarrying) and waste management as well as environmental clean-up, 11% in manufacturing, 10% in construction, and 4% in agriculture and forestry. In 2016, 27.5%, the highest share of environmental occupations was in water supply and waste water management, a total of 22.2% jobs in environmental technology and renewable energy use, 17.9% in waste management, 13.6% in environmental administration and consulting, 12.1% in conservation of nature and landscape, and 6.7% in geology, biology, and meteorology.

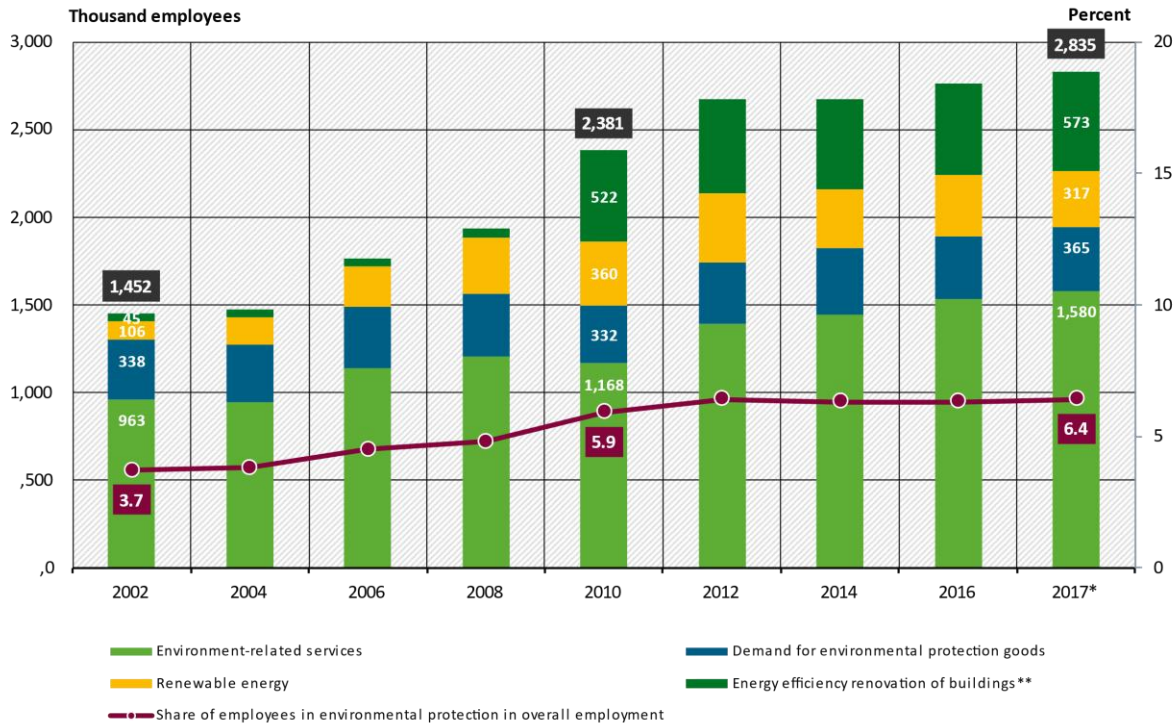


Figure 3 German green jobs trend

Given above is a graph by the German Federal Agency for the Environment (UBA) that shows the trend of increases in green jobs over time. According to UBA data published in 2020, as of 2017, 2.835 million people in Germany work for environmental protection (Federal Environmental Agency, 2020). With the sector-wise break up being 56% for environment related services, 13% in environmental protection goods, 11% for renewable energies and 20% can be attributed to energy-efficient building refurbishment. Overall, the share of green jobs in total employment has been increasing in the last two decades and is expected to increase in coming years, given Germany’s new policies and commitment to the SDGs.

For the case study analysis in the following section, a German case is explored to set an example of measures that can be used. Additionally, examples of applicable measures from Bangladesh, Nepal, and India that can be easily transferred to the Pakistani situation are also touched upon.

2.2.2 National Plans and Policies of Germany for promotion of Green Jobs

Germany is one of the global pioneering nations in adopting environmental protection policies and pursuing sustainable development. It began integrating sustainability in its agenda as early as 2002, when its first National Sustainable Development Strategy was published (The Federal Government, 2022). Ever since then, the Strategy gets updated and revised every four to five years and is complemented by regular progress reports that give a more detailed review of the indicators. The last two revisions, in 2016 and 2021, have been particularly significant as they harmonized more cohesively with the SDGs, especially in the aftermath of the Covid-19 pandemic.

A key feature of the 2021 update is that it highlights Principles for Sustainable Development that, since 2018, have been made mandatory for all ministries to follow when formulating policies and while making impact assessments (The Federal Government, 2021). The principles attempt to encompass the significance of sustainability as an overarching goal for all governance decisions:

- Strengthen the natural resource base on which life depends
- Preserve and enhance social cohesion in an open society
- Strengthen sustainable economic activity
- Assume global responsibility
- Use education, science, and innovation as drivers of sustainable development

These principles could potentially explain how Germany's new policies are sustainability-centric and would give the rest of the countries a good example of a framework to follow during the policy-making process.

In addition to this, while placing the utmost importance on achieving the Agenda 2030, the Strategy also identifies six key areas of transformation that are currently lagging but are crucial for the cause. These include human well-being, circular economy, energy transition and climate action, sustainable agriculture and food systems, sustainable building and transformation of transportation, and lastly, pollutant-free environment. The Strategy then delves into detailed plans for all six areas; how each one is connected to the other synergistically and can lead to overall improvement. This recognition of areas that require the most work is also beneficial in the sense that it provides the country with a sense of direction and priorities on all three levels, international, regional, and national. Pakistan can use these pillars on which to build up its policies on, specifically in introducing a circular economy, which can be done easily by the adoption of the green economy model.

Compared to Germany, Pakistan's National Sustainable Development Strategy (NSDS) was first published in 2012 in recognition of global challenges (Government of Pakistan & UNDP, 2012). However, there were no updates made to this strategy in light of the SDGs and Agenda 2030. Instead, a new National SDGs Framework for Pakistan was approved in 2018 after the Parliament passed a resolution to adopt the 2030 Agenda in February 2016 (Government of Pakistan & UNDP, 2018). Although this framework highlights the specific goals and their indicators, while also prioritizing them in order of urgency, it leaves a lot of room for subjectivity where implementation of particular remedial policies is concerned. Here, using the pillars that Germany has implemented

can be an excellent initiative to have broader goals defined. There is also an absence of clear mandates for particular departments and how they can contribute to the proper and successful implementation. This lack of coordination can be rectified if proper parameters of implementing sustainable plans could be devised. This is especially true considering that most of this implementation has to be on a provincial level which also requires adoption of a similar framework but contextualized for every province, a struggle within a country where each province has its own autonomy over most subjects under the 18th Amendment of the Constitution. It is also important to note that no further revisions to the document have been made after the Covid-19 pandemic to take into account its resulting damage. Currently, the two most relevant documents for Pakistan's aims regarding sustainable development are the updated Climate Change Policy 2021 and the 2021 NDCs document, which have both been discussed above. This highlights another issue prevalent in Pakistan; duplication of documents and policies which often leads to confusion regarding roles, responsibilities and accountability of institutions along with implementation challenges.

2.2.3 Environmental Performance Indicator (EPI)

According to the EPI report published in 2020, Germany ranks 10th out of 180 countries whereas Pakistan ranks 142nd, with aggregate scores of 77.2 and 33.1 out of a 100 respectively (Wendling et al., 2020). This score takes into account environmental health variables such as air quality, sanitation and drinking water, waste management facilities, and also ecosystem vitality factors such as climate change, pollution emissions, agriculture activities, and fisheries. The ranking basically provides us with an estimate of how well the countries are progressing towards reaching their established environmental targets and can also help governments recognize problem areas in order to design policy initiatives accordingly.

2.3 Adoption Potential of German Laws and Policies for Pakistan

This section provides a summary of specific laws and policies that have helped Germany work towards its various environment related goals. Picking our policies that can be adapted and adopted in Pakistan could be an excellent lesson in best practice sharing. The most relevant of laws which governs all industrial activities is the German Federal Emission Control Act (BImSchG) that aims to protect the environment from air, noise and water pollution, by limiting or avoiding emissions (Federal Environmental Agency, 2020). It does so in conjunction with two additional governing frameworks; the Technical Guidelines on Noise (TA Lärm) and the Technical Guidelines on Air Quality (TA Luft).

In congruence with EU's framework for Greenhouse Gas Emission Allowance Trading Act (TEHG), Germany also introduced its own act establishing a national greenhouse gas emission trading system in 2019 as part of the 2030 climate package, known as Fuel Emissions Trading Act (BEHG), specifically for the heating and transport sectors, which establishes a cap-and-trade system for the number of permitted emissions (Metschke & Woltering, 2021). Having more regional cooperation with similar agendas is a methodology Pakistan would benefit from introducing.

With respect to issues of soil, all activities are governed by the Federal Soil Protection Act (BBodSchG) and the Federal Soil Protection Ordinance (BBodSchV); these laws particularly

apply to harmful soil changes and contaminated sites that could potentially deteriorate soil quality and instructs on how to control damage and restore or improve soil (FAO, 2021).

Similarly, groundwater protection falls under the Federal Water Act (WHG) which states that certain practices with possible detrimental effects on natural water resources require permission and are subject to certain provisions (German Law Archive, 2000).

Perhaps the most important of all legislations has been the Climate Protection Act (KSG) which was first established in 2019 and then updated in 2021 to introduce more ambitious goals (Appunn & Wettengel, 2021). Not only does the revision reduce timelines to achieve goals, such as 2030 target for emission cuts to be at 65 rather than 55 percent, it also aims to reduce greenhouse gas emissions, and promote efficient and renewable energy through sector-specific laws and regulations.

A summary of relevant policies (Grantham Research Institute, 2022) conducive to growth in the green sector is given below:

Table 1 List of German Laws and Lessons for Pakistan

Policy	Main Aims	Practices Pakistan can Adopt
Climate Action Plan 2050	Outlines the process for achieving the nations climate targets for all sectors in line with the Paris Agreement. It provides emissions targets for sectors by 2030 and provides the necessary pathways. It also includes mechanisms for monitoring progress and adapting to the dynamism of climate change, in line with the five-yearly stocktake of the NDCs.	A comprehensive dialogue amongst different sectors about how coordination can take place and ways that inter-sectoral cooperation can take place, with overarching goals in mind that are most relevant to Pakistan.
Economic stimulus package – passed in 2020	The package covers numerous aspects of public transport initiatives: <ul style="list-style-type: none"> • Support for future investments by manufacturers and suppliers in the automotive industry. • Expansion and electrifying the rail network. • Making clean cars cheaper. • Modernizing and greenification of bus and truck fleet. • Promoting R&D in the field of electromobility. • Promotion of electric vehicles by federal funding. 	Pakistan can start to fund research in how fewer resources can be utilized for an effective economic stimulus package. By using best practices and contextualizing these practices, a more nuanced and well-thought our package of reforms can be introduced within the limits of the economic profit Pakistan makes. Pakistan already has the National Electric Vehicle Policy 2019 that incentivizes a phased approach for achieving the penetration of electric vehicles.

		This can be improved through R&D
Germany's Integrated National Energy and Climate Plan - passed in 2019	Focuses on plans for five areas mandated by the EU; energy security, energy efficiency, decarbonization, internal energy markets and research, innovation and competitiveness.	While some initiatives that the Global North is taking are not attainable in Pakistan, testing and implementing micro-projects in specific communities can be a way to help marginalized parts of the countries. By including the local communities in these conversations might help to find localized solutions by leveraging on global practices.
Energy Industry Act (EnWG) - amended 2021	Establishes the basic principles of laws pertinent to energy.	Since Pakistan has a ministry dedicated to energy, using research to have Acts like these shows the seriousness with which Pakistan is taking its global commitments. It also lays the groundwork for any future investments in the country.
Renewable Energy Sources Act (EEG) - amended in 2021	Goal of generating 35% of electricity supply from renewable energy resources by 2020, 40-45% by 2025, 55-60% by 2035 and 80% by 2050.	Similar initiatives are already in place in Pakistan such as the National Electricity Policy 2021, Alternative and Renewable Energy and Policy 2019. Refining these policies based on the German laws is a lesson transfer exercise that Pakistan can follow.
Offshore Wind Energy Act - amended in 2020	Target to increase wind energy to production (offshore) to 15 gigawatts during 2021 and 2030.	Specific provinces can generate more wind energy. Utilizing and funding production plants in these areas and then negotiating how energy will be distributed to the whole country.

The major takeaway from Germany's example is the fact that its commitment to going green is visible in all recent laws and policies for various sectors, which illustrates that sustainability goals need to be made a priority in the national agenda very emphatically and then should be translated into implementable, localized solutions on multiple levels for there to be progress. It is also important to note that the measures summarized above have been paramount in Germany's advance towards sustainable development. Inevitably, the adoption of such policies has not only directly impacted sustainability but also indirectly led to "greening" of jobs which resulted in the expanse of the green sector. Pakistan can borrow from the lessons Germany has learnt, and move

towards making the green economy popular and thus transitioning these green jobs as ‘decent jobs.’ This is further explained by the research studies discussed below.

2.4 Case Studies

2.4.1 Germany

With respect to the influence of growth in the green sector on development; one such study was published by Janser (2018), which provides a detailed overview regarding the “greening” of jobs in Germany and its impact on the economic dimension of sustainable development, more specifically, employment and wage scales. Janser describes the “greening” of jobs as a combination of increase in two factors, environmentally friendly requirements within occupations and demand for employees in such occupations; greening of occupations and employment, respectively. The study focuses on three main areas of research; developing an indicator to measure the extent of increase in green jobs in Germany, analyzing the occupational, sector-wise and regional distribution of these jobs, and establishing a causal link between increase in green jobs and labor market outcomes.

For the first purpose, the indicator devised by the author is known as a task-based ‘greenness-of-jobs index’ (goji); the main idea is to study the increase in share of the total number of all requirements, that are termed green, for all individual occupations. In an unprecedented approach, Janser uses yearly data from 2006 and 2011 to 2016 provided by the German Federal Employment Agency and performs text mining algorithms on it. This is also supplemented by a green task dictionary that has been composed to provide a list of green occupations. Consequently, the variations of the goji show that not only the extent of the greenness of individual jobs increased in the time period, but the number of green jobs overall increased too. For the second purpose, the same data is used but further analyzed to show the distribution of green jobs based on occupations, sectors, and regions. The conclusions from this data showed an overall increase in the goji at all levels of aggregation, however, to varying degrees. For example, some industries showed larger growth rates in green jobs and some regions showed higher green employment rates than others. For the third purpose, cross-sectional and panel data regressions are applied on the data to reach significant conclusions about the causal link. The results reveal that an increase in green jobs is positively correlated with employment growth and also leads to a slight increase in wage growth over time. Although there are some deficiencies within the study, for example, it does not cover all green jobs, it is evident that the outcomes and insights gained from this research are crucial for sustainable development and can be beneficially used to frame future green policies for Germany as well as other countries.

Since Pakistan does not have data available to work on a goji index that could show the increase in green jobs, this study attempts to estimate the potential increase in green jobs by using the I-O model below.

2.4.2 Bangladesh

For the purpose of basing this comparative analysis on a more equal footing, this paper also considers a green jobs report from Bangladesh. Without delving into particular details regarding

policies and implementation by the South Asian counterpart, this section is more focused on how it was able to kick-start the “greening” of economy and which practical measures can prove relevant for Pakistan as well.

According to a report published by ILO (Rahman, 2011), Bangladesh started with their green jobs initiative back in 2008 with a stock-take of various seemingly green jobs in particular industries followed by an action plan for the country to work on increasing them. This inventory of jobs focused on five industries, namely; waste management, renewable energy, construction, agriculture, and forestry, basically those most likely to be linked green jobs, in order to figure out exactly which jobs could be considered green and which could be transformed to become green. Particularly for the agriculture and forestry industries, activities were further segregated based on their impact on the environment and scope of further green jobs creation; those that were considered wholly green were then analyzed in detail to figure out the exact number of people employed and the potential for further opportunities. The report also discusses research initiatives and successful public-private-civil organization partnerships that helped promote green sector expansion and worked on reducing climate change impact on agriculture. Conclusively, this can be considered a very useful example to launch initiatives that support green job expansion.

Although not at the scale required, this stock take of jobs can easily be done for the TBTP and is attempted below.

2.4.3 India

For most developing countries, agriculture and forestry take the centre stage in the economy and are also majority employers. One example of this is India, where approximately 400 million people are part of the forestry sector. An interesting feature of this workforce is the fact that women also play an equally important role in these informal subsistence contributions and in some cases are the main breadwinners in many rural households. Where men are inclined towards commercial forestry, women are more concerned with forest management which includes ensuring a regular supply of firewood, fodder, water, and other. Interestingly, women are also more likely to be able to identify and use forest plants and trees considering their preference for planting trees as an alternative to walking long distances to gather firewood.

Given that the Indian society is traditionally a patriarchal one, women are subject to gender-biased treatment in terms of their social and political rights, inheritance rights, access to and use of household resources, and right to education. Moreover, the female contribution to the primary economy is further hindered by socio-economic issues such as seasonal unemployment, unplanned motherhood, poverty, and illiteracy.

In 1990, the Indian government came up with the Joint Forest Management Regime; an initiative which formed partnerships between the communities and with government forest departments to manage forests. Realising that existing policies were gender insensitive and highlighting the importance of women’s role in the forestry sector, the new forest management framework requires that 50% of the oversight board and one-third of community committees be composed of women. As a result of this mandate, women’s vulnerability to urbanization and climate issues has considerably reduced as they are increasingly becoming more involved in the management of

forests. Encouraged for their roles as both laborers and entrepreneurs, women are also seen managing small green businesses based on forest and agricultural products.

2.4.4 Nepal

In order to deal with the devastating impacts of the COVID-19 pandemic, Nepal adopted the Green, Resilient and Inclusive development (GRID) approach in 2021. Challenges faced by the country included; unemployment, high vulnerability to climate change, threats of environmental degradation, low rates of inclusion, and large infrastructure gaps. The GRID approach utilizes a new and different perspective for managing risk and development: shifting from a reactionary response system to a more proactive recovery plan for goals such as green growth, climate action, and sustainable development.

In collaboration with the Government of Nepal, development partners such as the World Bank and UK FCDO have encouraged the use of the GRID approach as an overarching strategy to align financial and non-financial support. For aiding particular sectors, these donor partners have already pledged \$3.2 billion and additionally identified up to \$4.2 billion for potential future support. The country's GRID approach includes various strategic initiatives, like Nationally Determined Contributions and its 2020 Relief, Recovery, and Resilience (3R) Plan. This high-level partnership and subsequent step towards implementation of GRID at such a large scale serves as an important signpost for the Government to draw up its GRID Strategic Action Plan for the future. Its main aims are:

- Re-confirmation, coordination, and planning of expansion of broad financial and non-financial support to Nepal's development objectives.
- Encourage further discussion on potential priority investments, incentives (markets and policies), institutional actions, and information needed to support Nepal's GRID transition.
- Signing of the Kathmandu Joint Declaration on GRID.

2.5 Conclusion

With Pakistan setting its course to recover from the COVID crisis and the recent flooding, a range of green job initiatives need to be scaled up and mainstreamed as a recovery route. It already aimed to create 200,000 new green jobs by the 2022 under its ecological protection and restoration projects. Under the government's flagship 10 Billion Tree Tsunami project — a five-year tree-planting program launched in 2018 — around 85000 jobs have been created, mostly in guarding forests, eco-tourism and planting saplings.

"Green stimulus" initiative for post-coronavirus recovery is expected to partly address the problem by boosting eco-tourism and involving communities in running national parks — 15 of which were established in 2021.

Other interventions such as Eco-system Restoration Initiative (ESRI) for (i) facilitating transition towards environmentally resilient Pakistan by main streaming adaptation and mitigation through ecologically targeted initiatives; and (ii) attaining Land Degradation Neutrality (LDN) by

restoring at least 30% of degraded forest, 5% of degraded cropland, 6% of degraded grassland (rangeland) and 10% of degraded wetlands in Pakistan, can also serve as avenues for green job creation.

Further policy landscape will need to be provided, in line with the case studies explored above, where the right enabling environment and legislation, particularly through the National Climate Change Policy and NDCs will serve as the cornerstone of a transition towards green jobs across different sectors in Pakistan.

3 THEORETICAL FRAMEWORK

3.1 Sustainable Development

Rather than adopting an overarching view of Sustainable Development, in order to study the effects discernably, this study first delves into the different dimensions that constitute sustainable development. Discussing the growing concerns of firms as well as customers regarding the “green” aspect of goods and services, in their recent study, Gupta and Dharwal (2021) put forward a conceptual framework that connects green entrepreneurship to sustainable development. The framework shows a rather extensive approach to sustainable development that is centered on three pillars, which are showcased below. A similar model is used in this paper, where sustainability and green jobs are analyzed through these lenses for the energy sector in Pakistan.

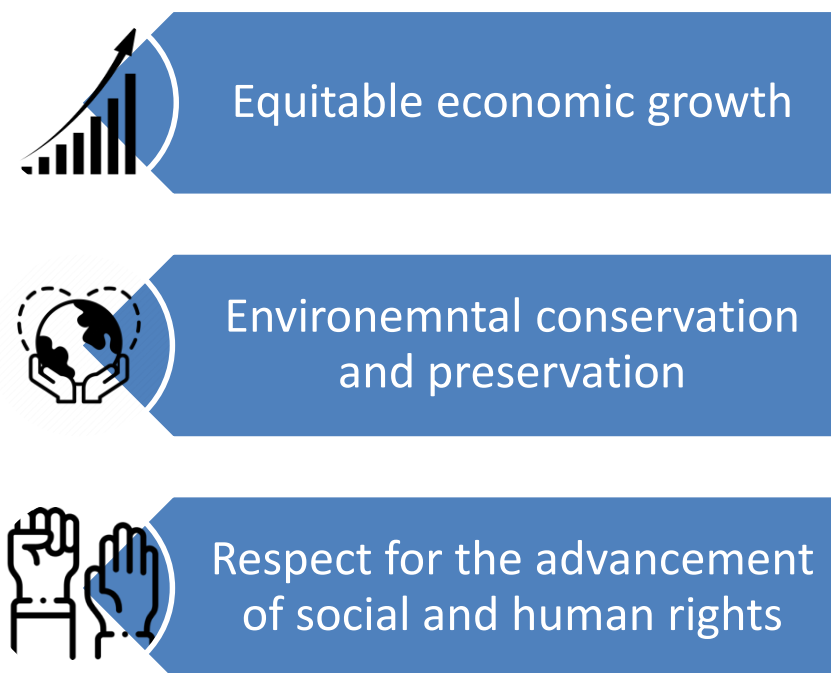


Figure 4 Pillars of Sustainable Development

Albeit discussed in the context of studying a single business entity rather than the overall economy, Gülçin and Yağmur (2018) also define an analytical tool known as the Sustainability Performance Evaluation as the “aggregate negative or positive bottom line of economic, environmental and social impacts of an entity against a defined baseline”. The notion of segregating the concept in order to study and analyze it better began with the Triple Bottom Line (TBL) concept coined by Elkington (1997) to address sustainability issues. Primarily, this comprised of the planet, people, and profits and did not garner much popularity up until it was refined by Carter and Rogers (2008) a decade later, to refer to environmental, social, and economic factors respectively. Although there have been various debates among the academia regarding the efficacy of the TBL approach (Loviscek, 2021), with studies suggesting that the concept is limited, incomplete and requires more dimensions to fully encompass the complexities of sustainable development (Tseng et al., 2020); for the purpose of this paper, the social, economic and environmental dimensions are deemed adequately comprehensive. This is because Pakistan needs to concentrate of specific elements,

become better at them, and then consequently use this as a launching pad for future investment. These three elements are discussed in greater detail below where key literature and frameworks deploying these dimensions are studied and a similar model to be referred to as a sample, is derived for Pakistan.

3.1.1 Economic Dimension

It is generally accepted that since the Industrial Revolution the first and foremost purpose of a business has been to be able to generate profits. However, this idea now remains relevant exclusively for the economic aspect of sustainable development. Solely from a business perspective, Svensson and Wagner (2015) also discuss factors such as cost reduction, remaining competitive in the market, establishing a corporate brand and other financial decisions as key to enhancing the economic dimension. From an overarching perspective, to study the impact on the economic dimension, a number of macroeconomic indicators can be used. One example of this is job creation or the change in employment rates; as summarized in a report by OECD (Kruse et al., 2017), in the long run, an increase in green jobs should be able to off-set job destruction in the sectors with large environmental footprints, i.e., ‘brown’ sectors and result in a net job gain.

In a policy brief by the ILO (Harsdorff & Phillips, 2013), three assessment tools were proposed to evaluate the employment potential offered by green jobs; i) Inventories, surveys and employment factors, that basically use all three ways to count jobs at a specific time and then measure changes in them over time, ii) Input- Output analysis and Social Accounting Matrices, that use a matrix or table listing all subsectors in an economy and detailing how outputs from one sector are used as inputs in others to estimate the effect on employment of an increase in demand for a green service or product in the short term, and iii) Computable General Equilibrium models that combine empirical data- in the form of I- O tables or SAMs- with a series of economic equations designed to comprehensively capture the dynamism and complexity of an entire economy and allow long term analysis.

Another economic indicator that can be used in this scenario is the number of loans given out to the green sector or the general trend in green loan growth rate. Considering that the State Bank of Pakistan, under instructions by International Finance Corporation, introduced the Green Banking Guidelines in 2017 in order to promote lending to green businesses and introduce risk management processes to measure environmental risks that can be generated from various business activities (SBP, 2017); it is assumed that increase in such loans would be conducive for sustainable development initiatives. Moreover, green banking, which broadly refers to conducting financial transactions using ways that help the environment and associating with stakeholders that promote the same, has been widely discussed in financial literature as a necessary course of action for sustainable development (Mumtaz et al., 2019). A similar research conducted to study the growth rate of green loans in Pakistan came to the conclusion that green loans have been steadily increasing since 2013 (Afridi et al., 2021).

3.1.2 Social Dimension

The social aspect of sustainable development deals with the overall well-being of the population and has often been deemed as the hardest to quantify in terms of assessment (Omann &

Spangenberg, 2002). This difficulty has been explained by the fact that social indicators are difficult to isolate and mostly interdependent on the economic and environmental factors (Colantonio, 2007). Nevertheless, attempts have been made to come up with specific indicators as well as evaluative models to study the social dimension. From a business perspective, Khan et. al (2016) recognizes various indicators that can reflect on social factors; basic need fulfillment of employees (fair wages, benefits, safe working conditions etc.), social recognition, empowerment, freedom and control, and contribution to the community. An interesting study by Reddy et. al (2014) proposes a cross-functional framework known as the Social Sustainability Evaluation Matrix (SSEM) that incorporates four components (socio-individual, socio-institutional, socio-economic and socio-environmental), each with its own set of indicators, in order to quantify the positive or negative impacts of a measure. Another study (Biczyńska, 2015) designed to analyze the social sustainability for a specific city over time centered on four basic measures to indicate progress, namely; rate of homicides, multidimensional indicator of life conditions, the Gini coefficient, and the Human Development Index. Studying this perfectly complements the economic indicators mentioned above.

3.1.3 Environmental Dimension

The environmental aspect of sustainable development deals with reducing the harm to the environment and actively participating in processes that offer remedial solutions to the damage that has already be done. The two most popular tools used worldwide for environmental evaluation are Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA). EIA is defined as a system of evaluation which takes into account potential environmental impacts of a proposed project or development, while also considering the associated socio-economic, cultural and human-health impacts (Convention on Biological Diversity, 2010). Sadler and Verheem (1999) define SEA as a standardized, methodical and broad-ranging procedure of recognizing and assessing the environmental consequences of proposed plans and policies. Using similar assessment tools, various studies have been conducted to evaluate the environmental impact of specific industries such as the manufacturing industry (Zhang, 2010) and energy systems (Santoyo-Castelazo & Azapagic, 2014). From a business perspective, factors that affect the environmental dimension include the carbon footprint of the firm, initiatives introduced by firm to reduce impact on the natural environment, and product dematerialization (Svensson & Wagner, 2015).

Studying this triad of dimensions is important and significant because it paves the way for more holistic approaches to be formulated. As mentioned in this paper, there is lack of coordination between sectors within the policies and initiatives in Pakistan currently. By showing the intricate and obvious link between these three variables is a novel attempt in Pakistan. This paper uses the limited information available in Pakistan and supplements it with surveys conducted for energy sector through primary data collection.

3.2 Relevant Variables

In line with the review of literature above, variables used in this paper to form the basis of future studies for each dimension are listed below and further discussed in detail.

1. Employment rate and Green loan growth rate for the economic dimension,
2. Poverty, Education, and Health trends based on geography for the social dimension, and
3. Forest cover along with air quality data for the environmental dimension.

3.2.1 Economic Dimension

The most straightforward variable for the economic dimension is the change in employment rates. The general expectation in this scenario is that an increase in jobs in the green sector should boost employment rates in the long run even if jobs in brown sectors are decreasing or being replaced.

Another economic indicator that could be considered relevant to establish the link between green jobs and economic advancement is the general trend in green loans growth rate. The main idea is very simple; whenever a new industry/sector flourishes the number of loans given out to that particular industry or ancillary industries naturally increases. As per the literature discussion above, it is fairly evident that as a result of recent policies adopted by the SBP, there has been an increasing trend in green loans growth over the years. . This is demonstrated in the figure below.

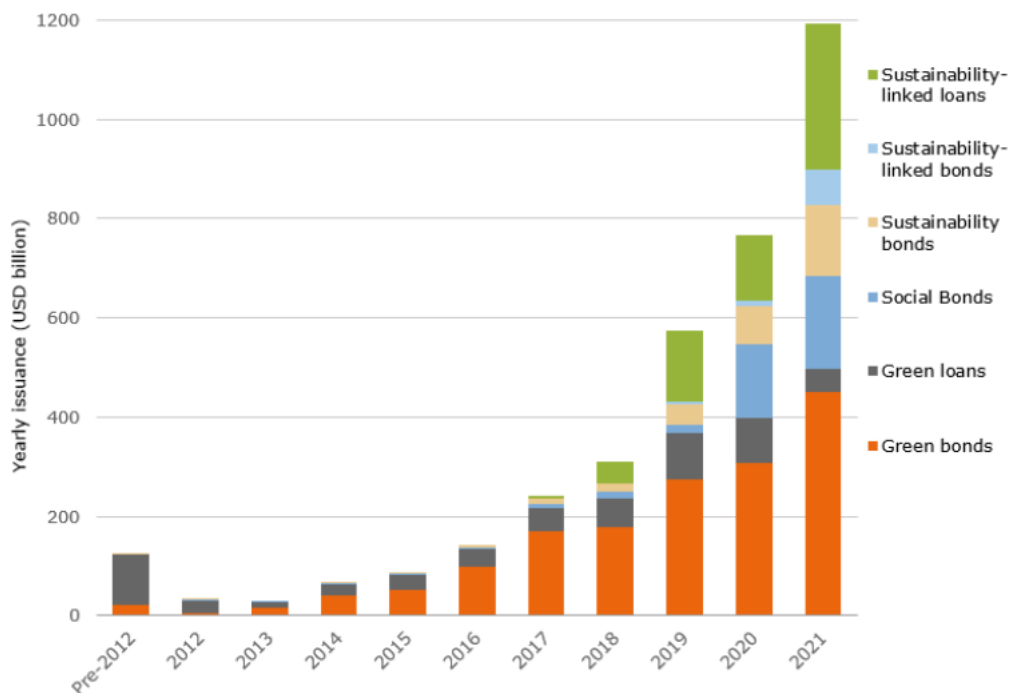


Figure 5 Sustainable loans and bonds issued

Source: (Razauskaite and Fetzer, 2021).

Dependent on whether or not industry specific data is available for loans, this variable can add value to the analysis.

3.2.2 Social Dimension

As discussed in Chapter 1, the social dimension is explicitly difficult to isolate and assess due to the large number of factors, including economic as well as environmental ones, affecting it in various but simultaneous ways. In most studies, the following generic parameters are taken into

consideration; poverty line trends, healthcare as percentage of total government expenditure, and education as percentage of total government expenditure. The main issue with using such broad indicators is that control variables are introduced in the model – to make sure that only the causal relationships are being studied and any other factors that contribute to social development have been held constant. These factors may include but are not limited to annual growth rate, education, city size, awareness regarding sustainability, geographical location, and basic service provision. As in the Saudi Arabian case study (Alwakid et al., 2021), even in international examples of similar studies conducted to highlight the social indicators specifically, control variables are used to hold constant the effects of irrelevant factors, so as to focus on the impact of green jobs only.

3.2.3 Environmental Dimension

The environmental aspect of sustainable development is given increasingly more importance nowadays, both before as well as after the execution of a project/task. Two variables that can be considered for this are; changes in forest cover and changes in Air Quality Index, given the nature of jobs under consideration, the two variables are to be based on geographically segregated data.

One example of such a study with regards to forestry was published in 2020, which basically used multi-temporal satellite data of sub-tropical pine forests of Azad Jammu & Kashmir to assess and comment on the changes in forest area from 1989–2018, forest cover percentage and carbon stock (Khan et al., 2020). A similar study with regards to the changes in AQI was carried out in Lahore in 2021, specifically targeting the air quality surrounding Municipal Solid Waste Management Sites (Raza et al., 2021). Although this study was based on real time data collection, it can easily be replaced by time series AQI data available from secondary resources. Despite the fact that the scope of these two studies dealt with much smaller geographical areas and consequently lesser data, it is proposed that for future studies, similar methodologies be followed to study the impact on both variables over time.

3.3 Survey Design for Green Jobs in the Energy Sector

The qualitative and quantitative survey and questionnaire developed for green jobs in the Energy sector, is provided in Appendix A. By utilizing the methodology developed above, the questionnaire aimed to ascertain all three dimensions and pillars of sustainable development while analyzing the creation of green jobs in the sector. Further, it was observed that even the classification of green jobs, especially reviewed with the lens of social dimensions and through the pillar of advancement of human rights, needed more data collection for ascertaining whether green sector jobs can be classified as green jobs. It was important to review if the green jobs, even within the inherently green renewable energy sector could classify as a decent job as well. Surveys and interviews were conducted regarding decent jobs in the renewable energy sector as well as questions were posed around the skills required to transition from fossil-based energy production (brown jobs) to renewable energy production (green jobs) for the energy sector workforce in the country. This provided a unique opportunity to ascertain the associations of pillars of sustainable development with green jobs and how it could be accelerated in a just and equitable manner. The survey (Appendix A) was designed such that various aspects that go into

making a job ‘decent’ were looked at, including; adequate salary, bonuses, medical allowances, job security, messing, transportation, and residence.

The organizations and individuals that were reached out for this survey and interview included energy and policy think tanks, Renewable Energy developers in Pakistan, energy engineers, oil and gas companies, energy sector employees energy justice civil society organizations as well as locals residing in Sindh regions near coal and renewable energy plants. Responses were gathered from nine active RE plants in Pakistan, and 24 individual respondents, including representatives from industry, government, regulatory bodies, trade representatives, as well as NGOs and think tanks.

4 RESEARCH AND FINDINGS

Given that segregated data for green jobs in Pakistan is not available, this study relies on case study analysis for examples and additionally primary research on two inherently green sectors of the economy to understand the impact that green jobs are having on sustainable development by utilizing the methodology established above.

With respect to the forestry sector, the green jobs created at provincial level have been presented in the table 5 below. The highest number of green jobs are present in KP, followed by AJ & K, Sindh, Punjab and Balochistan respectively. The data shows less female labor force participation in green sector which needs to be focused on for creating an inclusive labor force market. It is also important to note that the highest number of female labor force participation is in skilled labor.

As is evident, quite a substantial bit of the data required for a study similar to the Bangladesh case study discussed above is available for the TBTTP; job types have been clearly categorized and the increase/decreases have been kept a track of. However, at this point there is a dire need to see whether all the jobs created in forestry sector are decent jobs or not. This can be done by gathering job descriptive data for tasks undertaken by each category. After this has been established, it can pave the way for creation of greener as well as more jobs.

Equally concerning is the discrimination observed in the data below with regards to female integration into green jobs. Only 1% of the jobs created have been filled in by females, which raises the question of delinking sustainable development with green jobs due to its inapplicability on an important and vulnerable gender group as well as social and human right issues and challenges.

Table 2 Green jobs in forestry sector at provincial level

Provision of Green Jobs under Forestry Component, TBTTP (2019-20 till 3rd Quarter 2021-22)							
Province / Territory	Gender	Green Jobs (Man Month)					G.Total
		Caretaker	Guard	Daily Wager	Skilled Labour	Total	
Punjab	Male	1,384	1	41689	0	43,074	43079
	Female	0	0	5	0	5	
Sindh	Male	366	-	64674	76054	141,094	149572
	Female	0	0	4476	4003	8479	
KP	Male	134,431	222,31 2	139241	3530	499,514	499723
	Female	79	0	118	11	208	

Balochistan	Male	2,240	49	1117	5766	9,173	9183
	Female	0	0	10	0	10	
AJ&K	Male	20,699	1,742	109764	39693	171,899	171932
	Female	33	0	0	0	33	
GB	Male	4,828	247	510	2	5,587	5675
	Female	0	0	83	5	88	
Total Male		163,948	224,352	356,994	125,045	870,340	879,163
Total Male %		99.932	100.000	98.703	96.886	98.996	
Total Female		112	0	4,692	4,019	8,823	
Total Female %		0.068	0.000	1.297	3.114	1.004	
Grand Total		164,060	224,352	361,687	129,064	879,163	

Source: Ministry of Climate Change Data (TBTP)

4.1 Green Job Surveys - Renewable Energy Sector

Another component of the research methodology was a survey aimed at collecting primary data around job creation within the renewable energy sector, an inherently green sector that qualifies the criterion of sustainable development on economic and environmental fronts. One particular qualification that needed to be ascertained was its acceptance as a decent job, which was a primary focus of the questionnaire designed for the survey. In order to understand the nature of green jobs created in the renewable energy industry and to assess whether all green jobs are decent jobs, surveys were undertaken across industrial sites to look at direct, indirect and induced jobs. The survey (Appendix A) was designed such that various aspects that go into making a job ‘decent’ were looked at, including; adequate salary, bonuses, medical allowances, job security, messing, transportation, and residence.

4.1.1 Findings

Direct Jobs:

On average, a total of 30 Direct jobs were found to have been created on a single RE site. The table 6 below shows the factors taken into account for considering a Direct job to be DECENT. The data is collected from employees of the Operation & Maintenance contractors for RE plants, since client teams were mostly based off site, were either foreign employees, or well generally well taken care of, with a discernible separate strata.

Table 3 Direct jobs data from RE sites

Employee	Salary Or Daily Wage	Allowance	Bonus (Yearly)	Medical	Pick N Drop	Job Security	Messing	Residence
Plant Managers	Salary	No	1	Yes	Yes	Yes	Yes	Yes
Security Manager	Salary	No	1	Yes	Yes	Yes	Yes	Yes
Site Lead Engineers	Salary	No	1	Yes	Yes	Yes	Yes	Yes
Trainee Engineers	Salary	No	1	Yes	Yes	Yes	Yes	Yes
HSE Engineer	Salary	No	1	Yes	Yes	Yes	Yes	Yes
Admin/Accounts	Salary	No	1	Yes	Yes	Yes	Yes	Yes
Mess Staff	Salary but underpaid	No	1	Yes	No	No	Yes	Yes
Helpers	Daily Wage	No	0	No	No	No	Yes	N/A

From the Data Collected from the Survey, a brief breakdown of Direct Green Jobs is presented below. Moderately decent jobs were defined as those, which failed at a few metrics around provision of needs such as insurances, messing etc. but the employee was allowed to meet these needs through provision of a decent salary.

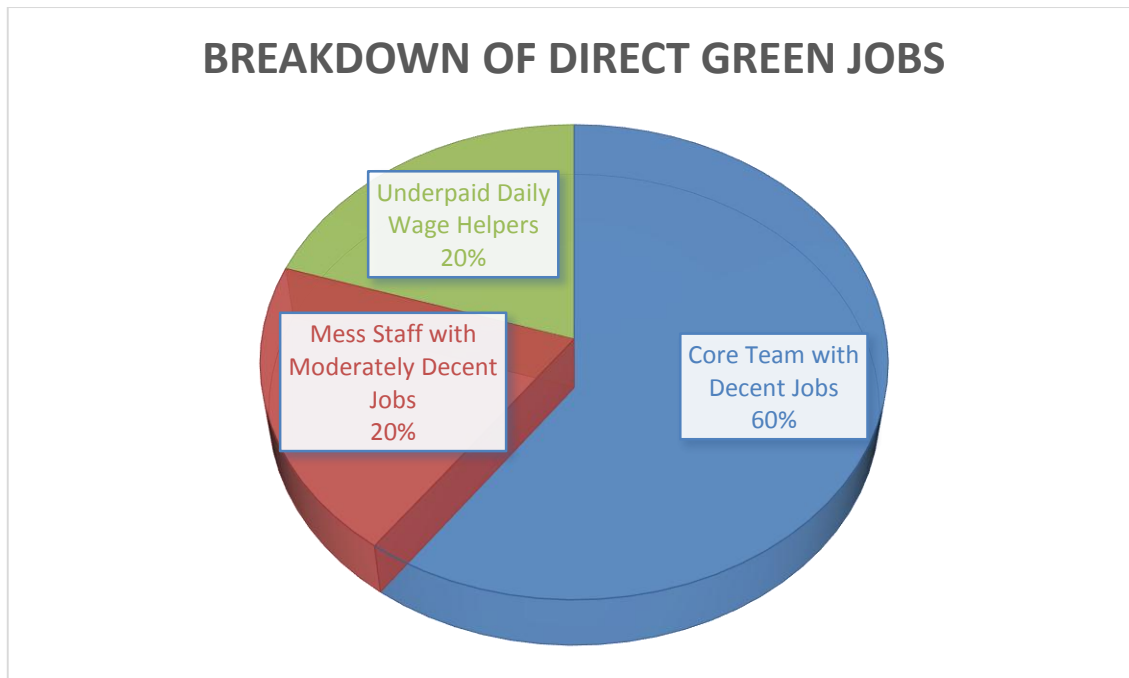


Figure 6 Breakdown of Direct Green Jobs

Indirect Jobs:

On average, a total of 70 indirect jobs were recorded on each surveyed site. These include Food and Grocery Supplies, Transportation (including drivers), Complete security staff, General M&R on site, fumigation tenders, water tank cleaning, Water Tankers for domestic use, Mineral Water contract for drinking, Blackwater Removal contracts & were all outsourced to local and nearby contractors to generate economic activity in the surrounding area. However, the remuneration dealings for each specific contracts are kept confidential and solely between the two contracting parties. These plants require massive number of services which are secured through outsourcing to the local industry. It is mandatory and only ethical to do so in order to promote economic activity and development in the nearby geographical area.

Induced Jobs:

As per the survey and interviews conducted a total of 150 induced jobs were identified per plant. Specific details were again hard to gather but one can be absolutely sure these industries serve as a major driver for both the Blue and the White-collar economy of the country. These jobs were mostly pertinent to local supply chains, and economic activities around the operations of the RE plant.

The results conclude that not all seemingly green jobs created in the renewable energy sector are decent jobs. In fact, the proportion of decent jobs can be reliably estimated at 75%. on average

Features that work out in the favor of the industry include; provision of messing, lodging, transportation to and from site for core staff, timely salaries and bonuses disbursements,

financing scheme for the employees' offering loans on easy repayment terms, medical insurances and provision of provident fund. In addition to this, under the HSE regulations all employees have to go through a thorough Medical Testing Procedures from a designated Laboratory from Karachi (also facilitated and paid for by the Contractor), a state-of-the-art digital attendance mechanism is adopted to ensure proper work hours and timely change of shifts, and regular emergency drills under defined SOPs are carried out in order to train the employees. In case of accidental death of a worker on-site a package of PKR 1.5-2 Mn is paid as support to the family.

However, for said jobs to cover the 'decent' job criterion, the following areas need more attention and could be considered for 'greening' of the jobs:

- Provision of Hard Area Allowance
- Provision of Risk Allowance due to critical operation at High Voltage (132kv)
- TA/DA
- Quarterly bonus as no other earning potential for workers
- Increase in Remuneration for Mess and Daily Wage Staff
- Improved safety PPEs for personnel
- Provision of Recreational Activities for on-site stay to improve mental health
- Basic Health Facility available on-site
- CSR activities around the plant for local communities should be prioritized

An important feature of these setups is their deployment in remote areas that helps bring the very lower echelons of the societies into the mainstream economy dispersing the geo economic benefits across a large geographical area. However, more needs to be done for the employees at the bottom of the organogram as these remain most vulnerable to economic uncertainty. Since not all jobs created qualify as 'decent' jobs, site owners need to introduce more incentives for these non-officer cadre workers to promote a greener economy.

As far as the transition to green jobs within the energy sector are considered, responses gathered could be classified broadly under three categories pertinent to the following:

- Education and Capacity Building
- Industry Development and Substitution
- Community Support and Quota Systems

We've already observed how a green job transition should incorporate elements of economy, environment and human rights. The above three categorization of demands from energy workers

as well as employers and RE developers, could serve as a good blue print, to undertake a range of activities regarding green job propagation.

Policy makers will need to ensure that any green economy transition should include well-paying and respectable green and decent jobs with provided benefits. For a transition from dirty to clean, not only training and capacity building needs to be provided, it also requires backing and support through financial incentives and quotas for jobs. Global examples explored above through our case studies, also highlight possible pathways for Pakistan to explore in ensuring a just energy transition.

5 RECOMMENDATIONS

The path to decarbonization should be just and inclusive. The recent green developments in Pakistan have seen a massive increase in employment opportunities across the country, particularly in green economic sectors.

Despite breaking the glass ceiling in a lot of walks of life, women have been unable to make inroads on renewable energy industry or forestry based jobs. It is not just the remote locality of the sites, harsh weather and tougher physical conditions but in fact the female social security environment in these locations that serve as the greatest barrier in female recruitment. Plant sites and forestry sectors need to adopt better and more strict security measures to provide a safe and reliable work environment for their female employees.

Dedicated support, quotas and jobs need to be created and sustained for female incorporation in the nascent green industry. The RE Industry, despite being in its early stages has begun to spur a decent amount of economic activity nationwide. As the industry plus the markets mature a much better picture shall be painted. The Government must put in all its effort to expand RE setups and encourage RE portfolio through Public Private Partnerships, ensuring ease of doing business, take stringent measures for economic and political stability to improve investor confidence, while being mindful of ensuring and legislating decent jobs with dedicated frameworks to incorporate local and vulnerable communities within this ambit.

Green Industry growth can serve as a clinical remedy for dealing with the rising unemployment and provision of multi role & decent jobs catering to the majority population. Another important feature of these RE setups is their deployment in remote areas which helps bring the very lower echelons of the societies into the mainstream economy dispersing the geo economic benefits across a large geographical area.

However more needs to be done for the employees lurking at the bottom of the organogram as these remain most vulnerable to economic uncertainty. Since not all jobs created qualify as 'Decent' jobs, Site Owners need to introduce more incentives for these non-officer cadre workers shielding them from the increasing costs of inflation.

Pakistan needs to work on dedicated policy environment around sectoral green jobs. This would mean that sectoral roadmaps for transitioning to clean and green need to be developed, where legislation and regulatory framework should provide the impetus to make the shift from brown to green jobs. It could also serve as a blue print for Pakistan to develop and utilize its youth bulge and provide employment opportunities in Sustainable development, at a time where economic and environmental crises have hampered national growth and stability.

Based on the literature review and the findings explored in the previous chapter, the table below also highlights the future focus areas that need to be worked on and puts forward recommendations for course of actions, that can aid in setting a path for further research on this topic and eventually prove beneficial for inculcating sustainability agenda in policies. It also provides recommendations garnered through current work by highlighting different focus areas that need priority attention

and suggest possible next steps to develop further literature around the nascent green job industry in Pakistan.

Focus Areas	Classification	Recommendation
Data Collection	Monitoring and Evaluation/ Research and Development	<p>Pakistan does not have enough sophisticated data to conduct a primary research component and analyze the causal relationships as well as they could be. As such, a major recommendation of this paper is to conduct a study similar to the one by Bangladesh (Rahman, 2011) that can aid tremendously in green sector related decisions. While this paper has made an attempt to use a smaller pool of participants in its survey, this can be done on a much bigger scale. Thus, this research is important and provides a smaller scale solution that can be built up. This could be undertaken by a new section/wing/unit set up for a specific Research and Development on green jobs within the Ministry of Climate Change. The basic idea would be to identify all tasks that are part of a job and categorize how many or if all of them fall under the criteria of green jobs. With such data available, it would also be possible to create a <i>goji</i> index as mentioned above in the Janser study (2018). This would elaborate on the extent of increase in green jobs in terms of nature as well as number.</p>
Absence of Data	Research and Development	<p>It is important to possess reliable and relevant data on all activities in the agriculture and forestry industries (to begin with, later more industries can be added), to assess the level of greenness of an activity, investigate how it could be made greener, and work on how more of these jobs could be created. Such research could potentially act as a major stimulant for the green sector. As mentioned in the study, the social dimension plays a huge role in the jobs that people enter, the perception they have about it and how accepted it is. Thus, spreading the importance of green jobs through more research and development will help to factor into this dimension and improve it.</p>

Concentration on eliminating brown jobs	Research and Development	Wherever possible, rather than try to eliminate brown jobs, the brown jobs be turned into green ones. It is likely that by only changing a few tasks related to the job or by only changing the nature of the job, it could be transformed. This way there would be lesser unemployment issues to deal with. For example, in case a particular job description does not fall into decent work category, the solution should be to introduce aspects that would make it decent.
Lack of Government Initiative regarding green jobs	Political Will and Champions	The government should put in effort to expand such setups and encourage green jobs portfolio through Public Private Partnerships, ensure ease of doing business, and take stringent measures for economic and political stability to improve investor confidence. It is also important to encourage the key players in the green economy to transform the current brown jobs into green by improving aspects such as risk allowance, hard area allowance, better safety equipment, better pay for lower grades, recreational activities on site, and provision of basic health facilities.
International Best Practices are not used as examples	Research and Development	There are multiple examples of how other countries have invested in the green sector. There has also been strong monitoring and evaluation mechanisms set up that show flaws in initiatives. There needs to be in-depth research into this countries, how Pakistan can replicate these systems, and make sure that a comprehensive system be established to improve the green economy. This is particularly true in the post Covid-19 world, where it is critical that an approach be adopted that is in line with green recovery practices.
Lack of investment in green jobs	Financing	Given the lack of investment in green jobs, it is also recommended that infrastructure gaps in the development of green jobs be identified, and more targeted interventions take place, e.g., mapping of the challenges and obstacles hindering the growth of green jobs to overcome them. There needs to be more information available on gaps and how these can be overcome and where finances should be devoted

Lack of policies regarding green jobs	Law and Policy	There needs to be an effort to ensure the introduction of climate change related policies, and how the green economy is the solution to the multiple issues that the country will face if these are not introduced.
Lack of gender sensitivity in the green economy	Law and Policy	More women and gender minorities need to be included in the decision making around green jobs. A more gender sensitive lens needs to be used to ensure that policies that are introduced are inclusive and consider the multiple obstacles that gender minorities face in entering the green economy. This is especially true when we think about ‘decent jobs’ specifically.
Lack of skills to enter the green economy	Capacity Building	Technical training programs, toolkits, and educational content related to green jobs need to be introduced to enhance the workforce’s skillset and capacity development. Moreover, gender inclusivity in training for green jobs training with a special focus on rural women should be ensured.
Lack of focus in research around the green economy	Research and Development	Given the research that has been done, it is important to focus on specific variables to ensure that there are better employment rates and increased green loan growth rate for the economic dimension, poverty, education, and health trends based on geography for the social dimension, and forest cover along with air quality data for the environmental dimension.
A comprehensive Green Deal	Law and Policy	There needs to be comprehensive economic policy which has a growth strategy, covering all sectors of the economy. This will ensure that there is a just green transition and a well-researched plan on how green targets will be reached. The case study methodology proves to be useful because similar tactics can be used and improve existing legislation and help to conceptualize newer and more improved Acts.
Lack of information on green jobs	Research and Development	There needs to be a platform that has information about green jobs, what skills are required. There can also be a mechanism to report what skills candidates lack in order to pinpoint what type of capacity development is required
Lack of incentives by	Finance	There is a lack of incentive to transition to a green economy. There needs to be a sector-by-sector

the government		evaluation of how green transition can happen and what incentives are required, especially when it comes to financing
Lack of green technologies	Finance	There needs to be more regional cooperation to help to ensure that green technologies are procured. There can be regional agreements that can be reached, and finances procured to bring green technologies to the country

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APPENDICES
APPENDIX A – SURVEY AND QUESTIONNAIRE

GENERAL INFORMATION

- 1) Name of the enterprise:
- 3) Location:
- 4) Main activity of the enterprise which has the plant:
- 5) Type of energy produced:
 - 1) What type of source is used for making energy?
 - 2) Where is it obtained from?

THE PLANT

- 1) What does your plant produce (gas, electricity, etc.)?
- 2) Level of activity in the last year (as a percentage of installed capacity).
- 13) For recruiting personnel for your plant, do you liaise with universities or technological centres?
- 14) And for training personnel?
- 15) How many employees have been employed?

Direct jobs:

Indirect jobs:

Induced jobs:

Direct jobs: These are the result of energy production activities (operation, maintenance, management, among others)

Indirect jobs: These are jobs created along the value chain, in other words, in those sectors that supply goods or services to the energy chain (production of agricultural inputs, construction of parts necessary for plant operation, outsourced activities, among others).

Induced jobs: These are jobs created by purchases made by direct and indirect employees of the activity in question with the income received for their work.

- 16) How many women employed out of total in direct jobs, indirect jobs, induced jobs and total work.
- 17) How many work shifts per day does the operation of the plant require?

DECENT WORK

Ask whether any of the following exist in organization if yes then for how many employees.

- 1) Working hours exceeding 48 per week _____
- 2) Number of employees with insecure jobs _____
- 3) Involuntary underemployment _____ Yes/No _____
- 4) Work income below the minimum labor wage _____ Yes/No _____
- 5) Ask if any of the following exist in the organization. Answer all of the questions below with Yes/No
 - leave for family reasons _____ Yes/No _____
 - official holidays _____ Yes/No _____
 - maternity/paternity leave _____ Yes/No _____
 - official holidays _____ Yes/No _____
 - Extra hours unpaid _____ Yes/No _____
 - paid sick leave _____ Yes/No _____
 - paid holidays _____ Yes/No _____

Answer with Yes if any of the following is faced during your employment.

- bonuses.
- retirement contributions.
- In contact with toxic substances.
- In an environment with unpleasant smells.
- Serious accidents.
- In uncomfortable temperatures.
- With loud noises.
- Without good ventilation.
- Without good lighting.
- With situations of stress, aggression or abuse.
- With night work.
- With occupational damage to health.
- Without equipment or tools with safety devices.
- Without sufficient space.
- Without breaks at work.
- Without emergency devices or alarms.
- Without protective equipment, clothing or tools.

Just Energy Transition for Energy Sector Employees in Pakistan

1. What, according to you, is a green job?
2. What are key skills required for professionals to classify as a green worker in the energy sector?
3. How is our existing workforce in fossil energy, better suited to transition towards jobs in the clean energy sector?
4. What are the capacity and skill gaps between our existing workforce and the requirement of the green energy sector? Who can provide these skills? Are there any current opportunities of skills attainment? How could this be improved in the future?
5. What are some interventions at policy and programme level that could be undertaken by the government to ensure that the energy transition is just, for existing energy sector workers as well as communities depending on fossil-based fuels and its associated economy?