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Green Energy, Economic Growth, and Environmental Quality Liaison in Pakistan

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Abstract: *There is a positive relationship between green energy and environmental quality parameters that have roots in sustainable development. The study aims to explore the lies between green energy, green growth, and environmental context to recommend better strategies for sustainable financial and ecological outcomes in Pakistan. The data has been collected from a set of 100 samples and later it has been reviewed for the statistical analysis under smart PLS. It has been outlined that the theoretical foundations have been applied to justify green energy, economic growth, and environmental quality parameters, and their link is based on innovation and sustainability. The study is based on eight hypotheses, and all of them have been proven positive because there is a direct relationship between environmental quality parameters and positivity, which supports the economy and justifies sustainability in collaboration with innovation in the long run. The study recommends to policymakers and project managers in the context of renewable projects and other projects in Pakistan the use of renewable energy resources and the need to make sure that sustainability is a priority throughout. The study has a future implication in high school for the policymakers and stakeholders in addition to investors and project managers to support evidence-based information for the implication of Environmental Quality parameters.*

Key Words: Green Energy, Economic Growth, Innovation, Sustainability, Environmental Quality, Pakistan

Introduction

Background

Environmental degradation has increased in the last century due to technological growth showing a demand for sustainable economic growth. Green energy is essential because it is a crucial driving agent in sustainable economic and ecological growth by fostering innovation and reducing emissions (Kahia et al., 2021). It has been found that policymakers and businesses can collaborate to overcome the challenges and harness the green energy application sustainably (Zafar et al., 2021). The connection between three categories including green technology, green growth and environment can help collaborate economic growth and societal support. This is possible if a circular economy minimizes environmental degradation and works on the green growth focus with the help of cost-efficiency practices and affordable energy solutions. This needs to be emphasized with the idea of green growth in various industries, including manufacturing and automobiles.

Research Problem

There is a direct relationship between green energy and environmental quality parameters that have roots in sustainable development. The three pillars of sustainable development include environment, economy, and society (Usman et al., 2022). The environment, economy, and society are collaborating to support the concept of ecological preservation and the economic presence of progress by valuing social support. There is a need to review green energy concepts like renewable energy support and decarbonization, for instance (Khan & Hiu, 2021). This promotes the idea that how economic growth is possible under the privilege of energy security concepts and technological innovations. The investigation will be helpful in emphasizing the improvement of environmental quality parameters by exploring circular economies to minimize

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environmental degradation and encourage the use of economic growth under green growth models. The research also focuses on energy support ideas under the privilege of synergies, such as the benefit of society and the economy by reducing energy poverty and ensuring conservation practices.

Aim and Objectives

The study aims to explore the lies between green energy, green growth and environmental context to recommend better strategies for sustainable financial and ecological outcomes in Pakistan.
The main objectives are:

1. To review the renewable resources for reducing negative impacts on Environmental Quality in Pakistan
2. To promote green growth projects under policy context to support economic growth models for sustainable development in Pakistan
3. To assess the use of Environmental Quality assessment and policy frameworks for encouraging green energy and green growth concepts in Pakistan
4. To recommend actionable guidelines for financial applications and innovative technology support in the context of stakeholder engagement and sustainable future applications in Pakistan

Research Questions

The main study questions are:

1. What are the renewable resources for reducing negative impacts on Environmental Quality in Pakistan?
2. How to promote green growth projects under a policy context to support economic growth models for sustainable development in Pakistan?
3. What are the uses of Environmental Quality assessment and policy frameworks for encouraging green energy and green growth concepts in Pakistan?
4. What recommended actionable guidelines can be used for financial applications and innovative technology support in the context of stakeholder engagement and sustainable future applications in Pakistan?

Research Needs

The study needs to emphasize the use of green energy as a driving agent to encourage renewable resource users to reduce their dependency on fuels by facilitating economic resilience. The research also utilizes technologically innovative ideas for cost-efficient applications of pollution control models in the utilization of connectivity for generating powerhouses and geothermal units. The study also utilizes the idea of green resources, where green technology is a positive agent in understanding the needs of the industry. This has increased the need for this study because it will provide an outline for planners and policymakers (Zafar et al., 2021). The forecasted recommendations of the study will also offer applied and scientific contributions to understand the need of this study and explore how it can be helpful to the management and teams in dealing with environmental challenges and understanding the need for sustainable development concepts. It will help organizations deal with the challenges of sustainable development applications in the context of a growing timeline of industries. It will enable the management and planners to understand the three pillars of sustainable development for supporting green technology and make sure that they can benefit the economy and environmental quality parameters with no compromise.

Literature Review

Theoretical Foundations

Various theories apply in the context of green energy and economic growth to emphasize the application of routine practices to meet environmental quality standards. Some popular theories that are relevant for understanding the current study and its implementation in the collaboration of green energy and economic growth to support the Environmental Quality standards in Pakistan are discussed here (Usman et al., 2022). The popular theory of the Kuznet curve is applicable in this context, and its environmental version has been supported to understand economic growth and its application to environmental degradation (Ullah et al., 2021). The theory reveals how green energy and renewable resources are helpful in energy adoption as a turning point to reduce environmental degradation at a rapid speed. Keeping in view the role of

sustainability and the adoption of green technologies, it reveals how sustainability is a priority and that there should be no compromise on the adoption of green technologies. The positive role of sustainability helps hold through the control of degradation, which has been reviewed, and the theory is tested in the current analysis to understand the growing trends and degradation control.

Sustainable development theory is another popular theory that is applicable in the present study to support the evidence of how the analysis can help facilitate the idea for supporting evidence and meeting the environmental quality standards (Usman et al., 2020). The approachable role of the three pillars of sustainability has been emphasized to support the evidence that society and ecologies are applied for economic growth. The theory has been further supported by the United nation (UN) under the privilege of SDG developmental projects by outlining 17 goals and making sure that how they are enhancing the green technology application enhancing the green technology application to overcome the climate and other issues at the international level (Kahia et al., 2021). The theory has been tested in the current study to support the evidence of how the green technology application can be helpful in the paradigm of no compromise for the Environmental Quality parameters and their facilitation in the long run to meet the ecological challenges.

Green growth theory is another popular theory for renewable energy adoption and support of economic growth and sustainability concepts in low-carbon economies. It enhances the use of renewable energy resources by creating green jobs and reducing fossil fuel dependency. Further, it encourages the idea of renewable resources like solar and wind energy to avoid environmental degradation and loss of cost from economic and social perspectives (Usman et al., 2020). Various international organizations have adopted the idea of fostering economic growth and sustainable energy to interplay the practices for the facilitation of Environmental Quality parameters. The theory has been tested in the present study to understand how the connection between Environmental Quality and green technology exists to enhance economic growth at the international level based on the issues in a developing country like Pakistan.

Green Energy

Khatri et al. (2022) reviewed the demand for green technology and revealed that in the late 1960s, the demand had been growing. It has been found that power planning and energy saving started in Pakistan in 1967, but the concept of environmental support has been missing. The planning division focused on the category of green energy in 1994 to introduce electricity-focused power supply plants in the country. It has been found that industrial growth was rapid in the twentieth century, which was the driving agent for fossil fuel exploitation. The green energy concept was not new to the country, but its application was challenging because people were not able to understand it, and lack of awareness was another concern that weakened the Nexus between the environment and economy based on the social gaps.

Naqvi et al. (2022) claim that there is a need for green tech use under sustainable cities and communities (SDG11), life below water (SDG14), and life on land (SDG15) in the country. However, Pakistan had operated its first renewable energy policy, which was focused on fuel support, in 2006 (Khatri et al., 2022). This shows an intention toward the use of renewable energy resources for the sake of environmental support, which has been a global phenomenon that is concerned with encouraging sustainability at the international level. As a developing country, it was challenging for Pakistan to understand the financial issues that are leading to the use of non-renewable energy resources as a trouble for ecologies. It shows that the country was not able to understand the policy support value for long-term sustainability based on the financial investments in the present age.

Economic Growth

Economic growth is the direct gross domestic product GDP growth, which determines how the country estimates its growth timeline on an annual basis. It has been found that the GDP growth was slow in the country because the challenges at a local and international level were quite enough to meet the GDP growth timeline. In this critical time, economic growth was mainly focused on meeting the challenges of increasing the financial timelines and economic success to meet the social challenges. Bhutta et al. (2022) reveal that green innovation has a significant role in the energy production units in the country. India has been found to lower its carbon emissions from 1980 to 2018. However, Pakistan seems less successful in this connection to collaborating on a balance for the financial and environmental context based on sustainability.

Ullah et al. (2021) further add that Pakistan's pollution emissions have been increasing, and there is a high need for asymmetric support from technological emissions. The era of 1990–2018 justifies a visible rise in economic growth but is based on unsustainable environmental practices. This needs to be addressed with knowledge-based economy support to control the carbon emissions and increase the carbon footprint issues. The negative role of technology has been outlined, showing an asymmetric effect on environmental concerns, and there is a high need to understand the concept of environmental economies (Usman et al., 2022). It is essential to realize that the short-term losses of the economy can help meet the long-term economic challenges and make sure that sustainability is a responsibility for all industries operating in the country.

Environmental Quality

Here, the quality of the environment refers to the avoidance of any undesirable content called pollutants in the biosphere. The Environmental Quality parameters include the correct ratio of guesses liquids and solids in the biospheres, including atmosphere, hydrosphere, and lithosphere (Khan & Hou, 2021). Naqvi et al. (2023) investigated air quality specifically to understand how ambient air has not been meeting the requirements for quality parameters in the country. It has been found that the ambient air has been moderately polluted, and it poses a risk to public health.

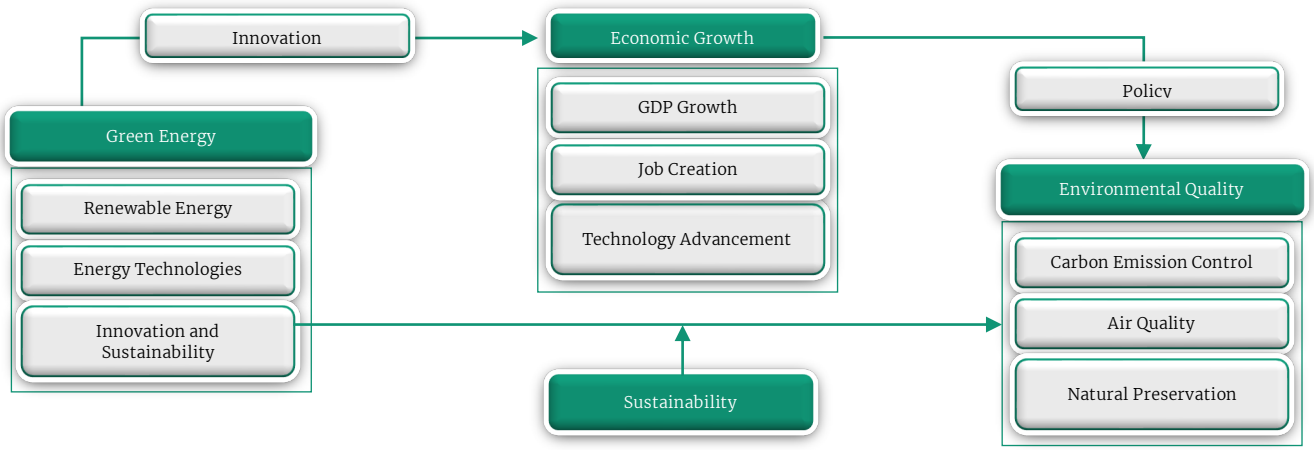
There is no compromise on environmental quality because if there is a compromise, then the output will be traced to issues like critical smog in cities like Lahore and Multan during winter. Various studies show that environmental quality parameters need to be reviewed by Environmental Protection agencies (EPA) both on the provincial and federal levels (Usman et al., 2022). This will enable the people to understand the needs of ecologies and meet the challenges so the country will be able to support the idea of sustainability and meet the needs of SDG targets. Further, Naqvi et al. (2023) claim that ambient noise is also high in various areas is crossing the percentage of variable year limit and needs to be addressed; otherwise, an environmental management plan (EMP) will not be able to handle the issue in the long run and meet the sustainability challenges in the country.

Conceptual Model

The conceptual framework has been derived based on the three main parameters: green energy, economic growth, and Environmental Quality. Green energy is further divided into three variables, including renewable energy, energy technologies, and innovation with sustainability. The economic growth has been divided into three further variables, including GDP growth, job creation, and technological advancements (Naqvi et al., 2022). The third variable is Environmental Quality, which has been further divided into understanding the control for carbon emissions, understanding air quality, and natural preservation to meet the environmental capability parameters. Sustainability has been found a major agent in supporting the three variables at grand while green energy will be leading the innovation to promote the concept of economic growth. Further, the policy will be helpful in the context of economic growth in applying environmental quality parameters.

Figure 1

Conceptual framework



Hypotheses

- H1: higher use of renewable energy has a positive impact on GTP growth
- H2: adoption of green energy has a positive impact on controlling environmental degradation
- H3: economic growth increases with investment in green technology
- H4: green energy has a positive impact on Environmental Quality for sustainability
- H5: transition to green energy has a negative impact on green economic growth in the initial stages
- H6: economic growth at a fast pace hurts the environment
- H7: policy parameters for renewable energy and technology innovation have a positive impact on economic growth
- H8: policy parameters for renewable energy and technology innovation have a positive impact on environmental growth

Scope of Study

The present study has a high scope for revealing the idea of how innovative solutions can be helpful in the practices of sustainability and revealing facilitation for organizations. The approachable role of sustainability can help encourage organizations and management teams to explore environmentally friendly practices and enhance the use of green technologies (Usman et al., 2022; Naqvi et al., 2022). The study has a huge scope in a developing country like Pakistan because, due to a lack of resources and finances, the country is already involved in environmentally non-friendly practices that exceed the limit of environmental quality standards. The lack of environmental practices and sustainability support has been a driving agent for the increasing pollution levels in the country, which has been justified by the rise of primary and secondary pollutants in the atmosphere that lead to smog. If industries and manufacturers are exploring sustainability practices and focusing on the idea of green job creation and innovative practices, then it is better to explore eco-friendly programs so the country will be able to control its carbon footprint.

Research Methodology

Research Design

The study adopted a primary research design to derive the connection between green energy, economic growth, and environmental quality review. The design aims to investigate the quantitative relationship between the three by specifying how it is supporting GDP growth and outlining the role of carbon emissions in reviewing the air quality parameters. The design helps investigate the independent and dependent variables. The independent variables of green energy adoption and investment in green energy are reliable on the dependent variables like economic growth and quality parameters. The quantitative analysis helps support the correlational support understanding of the three parameters of Nexus. It has been supported by positivism. Pandey and Pandey (2021) narrate that the positivism philosophy is helpful for the quantitative paradigm because it supports the data collection method by avoiding biases.

The design is operating a primary quantitative analysis plan based on the survey tool application. A questionnaire was outlined based on the conceptual framework and hypothesis testing. It is comprised of a set of closed-ended questionnaires supported by a liquid scale in some cases. The researcher feels comfortable collecting the data in this manner, where respondents have to mark the relevant answer and submit the form. Further, a deductive approach has been adopted to facilitate the analysis process and make sure that the primary quantitative research design has been explored for reliability and validity parameters. The deductive approach is also helpful in handling the variables both dependent and independent to avoid biases and make sure that the relationships and causal links are also handled with the help of a deductible approach application under the privilege of offer positivism philosophy. It helps the researcher avoid biases and ensure that the validity content has been increased in the results to encourage the scope of the results and make sure that it is authentic for future exploration.

Sample

The study has taken some of the respondents from the whole population because it is not easy for the researcher to explore the whole population and collect data from every member of the chosen population

(Verma et al., 2024). The population is comprised of managers and working teams operating in the context of the country's economic growth sector, where green technology has been introduced, and it's supposed to be a parameter for dealing with environmental quality standards. Purposive sampling was done based on the non-probability category of the sampling plan, which is helpful in choosing the relevant people from the whole population so they will be able to provide content according to the needs of the study and the demands of the researcher. The sample size is 100, which is an ideal size for collecting data from the whole population and managing a small sample where limited time and resources are at hand.

Measurement

The data will be sent back to the researcher in the form of an Excel sheet, which shows the collaborative data of the whole study and makes sure that it explores relevant content in the tabular as well as graphical output. This encourages the researcher to display the comparison of the percentages and discuss the data. Further, Smart PLS has been explored to analyze the data and measure the validity and reliability parameters. The validity of the current data output has been supported by confounding the factors of global energy parameters and political context. On the other hand, reliability has been supported by the consistency of the sources and by making sure that the metrics are standardized.

Analysis

Smart PLS software has analyzed the data with the help of a software expert and using an Excel file. Please find it helpful for application as a robust tool to support the comparison and avoid biases. The research model is specific for exploring the mediating variables in addition to the dependent and independent ones, which is helpful to the researcher in measuring the constructs and supporting the reflective and formative indicators. Data sources were the respondents who provided the data from the sample of 100 respondents. It has been further analyzed by importing the data set in the smart PLS and generating the construction of a structural model to explore the latent constructs and hypothesized relationships. The researcher has assessed the measure of the data by using the values of the variables and exploring them as the final value of Cronbach's alpha. The data has been further supported for path coefficients and interpretation. The results are discussed and summed up to test the hypothesis and theoretical context for the three theories mentioned in the theoretical foundations. The research questions are answered to end the results and sum up the study plan.

Validity

The validity of the results has been checked as a structural model has been explored to find the output. Internal and external support has been added to ensure content validity based on the indicators chosen and the responses for the constructor to finalize the theoretical applications (Verma et al., 2024). Construct validity has been applied to check the accuracy of the convergent and discriminate validity features for HTMT value and variance extract value. The criterion validity has been reviewed to analyze the expected outcomes and determine how the external benchmarks are developing a collaboration with the internal ones. The validity has also been tested for the internal context, where policy frameworks and population size have been supported to confirm the approval of the hypothesis. Smart BLS has been supporting the use of evaluation under the matrix for Cronbach alpha and composite reliability by checking its value and ensuring the threshold.

Assumptions

The assumptions of the study claim that a causal relationship exists for theoretical applications where environmental quality has been influenced by economy review parameters and GDP growth content to ensure the validity is constructive and realize how the indicators are adequately interconnected. Another assumption is to review the quantitative data and understand the relationship of variables by supporting statistical techniques for checking the linearity of the additive-modeled application and the impact of the economy on the environment. The assumptions are supported by data assumptions for population size and temporal consistency in the context of a policy and economic output and time lag effects in a developing country.

Results And Findings

Brief Overview

The chapter has discussed the findings of the study based on the data collected from the smart PLS after retrieving the respondents' opinions in statistical conversions. It has outlined the descriptive analysis with justification support of results of applications of the method. The data has been added to provide the hypothesis testing based on the different tests conducted.

Results of Application of the Method

Table 1

Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG -> PO	0.809	0.811	0.037	21.903	0.000
GE -> EQ	0.470	0.473	0.075	6.297	0.000
GE -> IN	0.738	0.747	0.057	13.030	0.000
IN -> EG	0.711	0.718	0.054	13.056	0.000
PO -> EQ	-0.417	-0.402	0.084	4.956	0.000
SUS -> EQ	0.751	0.741	0.122	6.177	0.000

Notes: EG: Economic Growth, GE: Green energy, EQ: Environmental Quality, IN: Innovation, SUS: Sustainability, PO: Policy

It has been found that the path coefficient value is revealing the highest value of 0.809 for EG -> PO. This narrates that the link of the two variables for policy and economic growth is high as compared to others.

Table 2

Outer Loadings

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG 1 <- EG	0.769	0.770	0.056	13.696	0.000
EG 2 <- EG	0.646	0.647	0.098	6.595	0.000
EG 3 <- EG	0.774	0.767	0.063	12.314	0.000
EG 4 <- EG	0.589	0.577	0.113	5.206	0.000
EG 5 <- EG	0.726	0.728	0.054	13.508	0.000
EQ 1 <- EQ	0.734	0.728	0.069	10.705	0.000
EQ 2 <- EQ	0.884	0.883	0.021	41.594	0.000
EQ 3 <- EQ	0.785	0.777	0.066	11.945	0.000
EQ 4 <- EQ	0.878	0.878	0.022	39.533	0.000
EQ 5 <- EQ	0.232	0.224	0.154	1.505	0.132
EQ 6 <- EQ	0.429	0.420	0.139	3.076	0.002
GE 1 <- GE	0.804	0.801	0.055	14.601	0.000
GE 2 <- GE	0.887	0.885	0.031	28.342	0.000
GE 3 <- GE	0.837	0.840	0.039	21.236	0.000
GE 4 <- GE	0.453	0.444	0.125	3.615	0.000
GE 5 <- GE	0.623	0.616	0.105	5.921	0.000
IN 1 <- IN	0.865	0.864	0.031	27.963	0.000
IN 2 <- IN	0.845	0.842	0.039	21.918	0.000
IN 3 <- IN	0.854	0.852	0.040	21.614	0.000
IN 4 <- IN	0.776	0.774	0.056	13.776	0.000
IN 5 <- IN	0.734	0.733	0.059	12.353	0.000

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
PO 1 <- PO	0.765	0.747	0.106	7.203	0.000
PO 2 <- PO	0.869	0.874	0.038	23.079	0.000
SUS 1 <- SUS	0.857	0.859	0.036	23.787	0.000
SUS 2 <- SUS	0.676	0.649	0.134	5.045	0.000
SUS 3 <- SUS	0.689	0.678	0.090	7.692	0.000

The outer loading is showing a high value for EQ 2 <- EQ. This narrates that environmental quality has been a priority standard under the privilege of results based on the outer loading data compared to other variables.

Table 3

R square

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG	0.506	0.519	0.077	6.590	0.000
EQ	0.666	0.686	0.061	10.844	0.000
IN	0.545	0.562	0.084	6.484	0.000
PO	0.654	0.659	0.059	11.047	0.000

R square is showing a high value of 0.666 for Environmental Quality standards as compared to others which has been followed by policy for another value of 0.654.

Table 4

R square adjustment

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG	0.501	0.514	0.078	6.460	0.000
EQ	0.655	0.676	0.063	10.356	0.000
IN	0.540	0.557	0.085	6.365	0.000
PO	0.651	0.656	0.060	10.878	0.000

R square adjustment is again showing a high value for Environmental Quality for 0.655 followed by again policy for 0.651 justifying that both the variables have dominance as compared to others.

Table 5

RHO c

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG	0.830	0.828	0.026	32.167	0.000
EQ	0.836	0.832	0.029	28.566	0.000
GE	0.851	0.849	0.025	33.803	0.000
IN	0.909	0.907	0.019	47.833	0.000
EG	0.830	0.828	0.026	32.167	0.000
EQ	0.836	0.832	0.029	28.566	0.000

RHO c is showing a value of a dominance for 0.909 for innovation as compared to other variables which is justifying itself tendency of dominance however other variables are also showing a value above 0.78 which is showing that none of the variable is rejectable.

Table 6

RHO a

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG	0.755	0.761	0.041	18.481	0.000
EQ	0.858	0.858	0.025	34.606	0.000
GE	0.850	0.853	0.032	26.185	0.000
IN	0.878	0.880	0.027	32.774	0.000
PO	0.538	0.543	0.385	1.397	0.162
SUS	0.688	0.664	0.169	4.060	0.000

RHO a shows a dominant value for Environmental Quality with a significance of 0.858, followed by some other variables with the dominant value; however, policy and sustainability show the lowest values in the output.

Table 7

Cronbach Alpha

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
EG	0.745	0.741	0.044	16.922	0.000
EQ	0.757	0.753	0.045	16.828	0.000
GE	0.783	0.781	0.038	20.732	0.000
IN	0.874	0.871	0.029	30.094	0.000
PO	0.515	0.505	0.118	4.360	0.000
SUS	0.622	0.613	0.081	7.696	0.000

Cronbach alpha is showing a dominant value for innovation again as 0.874 followed by some other variables how again the policy and sustainability are recorded for the lowest values as per previous reviews.

Table 8

HTMT

	Original sample (O)	Sample mean (M)	2.5%	97.5%
EQ <-> EG	1.089	1.096	0.957	1.215
GE <-> EG	1.012	1.017	0.940	1.092
GE <-> EQ	0.893	0.901	0.788	1.008
IN <-> EG	0.889	0.890	0.772	0.984
IN <-> EQ	0.963	0.968	0.897	1.031
IN <-> GE	0.845	0.848	0.705	0.970
PO <-> EG	1.222	1.280	1.036	1.817
PO <-> EQ	0.896	0.947	0.704	1.353
PO <-> GE	0.959	1.006	0.771	1.397
PO <-> IN	0.618	0.648	0.431	0.907
SUS <-> EG	1.316	1.339	1.189	1.609
SUS <-> EQ	1.025	1.044	0.862	1.269
SUS <-> GE	0.925	0.943	0.789	1.115
SUS <-> IN	0.809	0.825	0.663	1.007
SUS <-> PO	1.621	1.728	1.309	2.714

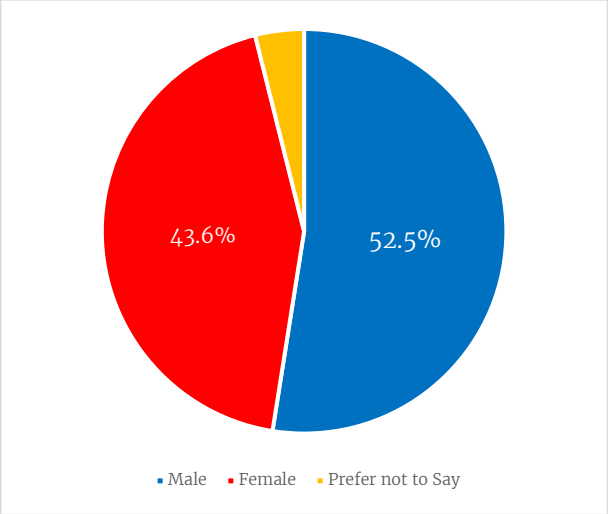
HTMT shows a dominant value for most of the variables if some of them are justified for a value above one, which shows that the significance of most of the variables is high, while the least dominant variable has been recorded for PO <-> IN only.

Descriptive Analysis

Descriptive analysis is narrating the data that has been collected from demographics and other reviews.

Figure 2

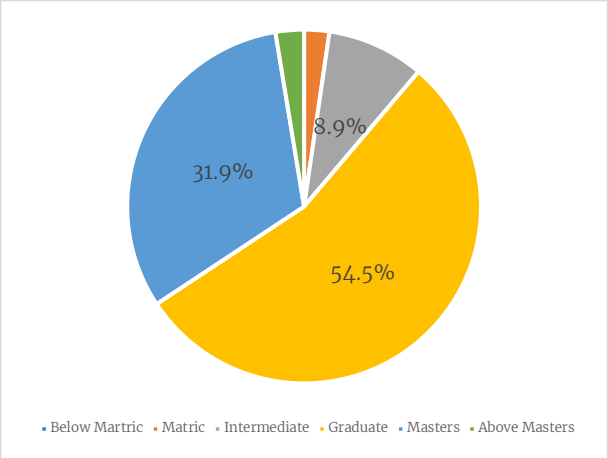
Gender data



It has been found that dominant respondents were comprised of male comprising 52.5% however remaining work e-mail for 43.6%. A little number of the respondents have not shared their gender.

Figure 3

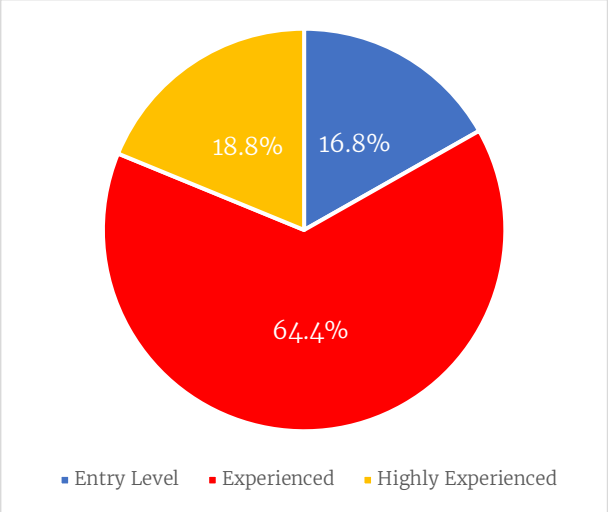
Education Level



The education level has been reviewed where it has been found that maximum number of respondents are covering graduate group for 54.5% followed by master level degree holders for about 31.7%. About 8.9% were covering the intermediate level however metric and below metric are covering a meager percentage.

Figure 4

Job Level



It has been found that the maximum respondents were experienced comprised of 64.4% followed by highly experienced for about 18.8%. Only 16.8% of the respondents were at entry level which is justifying that the maximum respondents were covering the major high groups.

Validity/Reliability Analysis

The validity and reliability have been revealed in the data where justifications are high, and it has been found that the maximum feedback has been taken from the lens of various tests, approving the dominance of results with justified opinions that it is reliable and valid for the statistical and numerical reviews. The value of the path coefficient shows the single variable review for justifying its reliability; however, Cronbach alpha and outer loading have done the comparative analysis of two or more than two variables at a time, which justifies that the reliability factor has been added in the result to see the significance of variables.

Tests of Hypotheses

The overall review shows that about eight hypotheses have been outlined in the initial stage of the result, which have been proved positive by the significance of the variables and their comparison that has been reviewed in the analysis. H1 claims that the higher use of renewable energy has a positive impact on GTP growth. Further, the H2 claims that the adoption of green energy has a positive impact on controlling environmental degradation. The outer loading is showing a high value for EQ 2 <- EQ. This narrates that environmental quality has been a priority standard under the privilege of results based on the outer loading data compared to other variables. Both hypotheses are approved as positive based on the data from the study.

H3 reviewed the economic growth increases with investment in green technology, while H4 claims that green energy has a positive impact on Environmental Quality for sustainability. R square shows a high value of 0.666 for environmental quality standards compared to others, which has been followed by policy for another value of 0.654. Hence, the two hypotheses are proven to be positive in the review parameters. H5 claims that the transition to green energy has a negative impact on green economic growth in the initial stages, while H6 reviewed that economic growth at a fast pace has a negative impact on the environment. Cronbach alpha again shows a dominant value for innovation, 0.874, followed by some other variables. However, policy and sustainability are recorded as having the lowest values as per previous reviews. Hence, again, the two hypotheses are proved to be positive.

Further, H7 reviewed the policy parameters for renewable energy and technology innovation to have a positive impact on economic growth. It has been found that the path coefficient value reveals the highest value of 0.809 for EG -> PO. It has proven positive. At the same time, H8 claims that policy parameters for renewable energy and technology innovation have a positive impact on environmental growth. This is also justified and positive for the use of new sources. RHO a shows a dominant value for Environmental Quality with a significance of 0.858, followed by some other variables with the dominant value; however, policy and sustainability show the lowest values in the output.

Discussion

Brief Overview

The discussion has provided an outline of the results and the application of the method specifically to understand that how the descriptive analysis is applicable and the previous testing of hypothesis is supportive to the future implications of the data. It is justifying the research questions to be answered based on the hypothetical review.

Discussion of Results

It has been found that most of the hypotheses are proven positive. Here, popular theories that are relevant to understanding the current study and its implementation in the collaboration of green energy and economic growth to support the Environmental Quality standards in Pakistan are discussed (Usman et al., 2022). The relevance of the popular theory of the Kuznet curve, their environmental version, has been found where the popular theory of the Kuznet curve is applicable in this context. It has been found that the use of the economy has been reviewed to have an influence on the environment. It is revealed that to understand economic growth and its application to environmental degradation, the Kuznet curve is essential (Ullah et al., 2021). Naqvi et al. (2022) claim that there is a need for green tech use under

sustainable cities and communities (SDG11), life below water (SDG14), and life on land (SDG15) in the country. It has been added here that the use of the renewable energy policy is privileged, which has been justified by the influential approaches in the hypothesis, and the tests show the significance of most of the variables. However, Pakistan had operated its first renewable energy policy, which was focused on fuel support, in 2006 (Khatri et al., 2022). The justifications are high, so it is essential to understand how the pragmatic approaches can help the organizational environmental quality standard meeting, and there should be no compromise on sustainable development.

Discussion of Descriptive Analysis

The descriptive analysis shows a positive impact of the consideration of environmental quality standards and valuation in conducting economic growth in the country. There is no compromise on environmental quality because if there is a compromise, then the output will be traced to issues like critical smog in cities like Lahore and Multan during winter. This has been reviewed from the lens of economic growth, so it is essential to consider it where respondents also agree with this opinion with the justification and approval of the significance of most of the variables from the smart PLS results. Various studies show that environmental quality parameters need to be reviewed by Environmental Protection agencies (EPA) both on the provincial and federal levels (Usman et al., 2022). There is a need to understand that the descriptive analysis also agrees with the opinion for understanding the support for the organizational and equality facilitation in environmental standard meetings and justifying the value of equalities on priority, and there should be no compromise on social and ecological parameters for economic growth.

Discussion of Tests of Hypothesis

The conceptual work has already outlined the use of various parameters and their influence on one another, and innovation and policy have been found in the intermediate perspective while collaborating with the other variables. The hypothesis is successful in proving that green energy work has had a positive impact on economic growth in the timeline of innovation as a positive approach to dealing with things. It has been also revealed that economic growth has been under the privilege of a policy-driving agent for the positive impact on Environmental Quality. Sustainability has been embedded as per conceptual framework implementation where it has been justified that the collaborative impact of sustainability can lead to the positive impact of all the variables on one another and support with the facilitation where discussion is justifying the positive influence as a priority.

Post-hoc Analysis

Post-hope analysis has already been applied where hypotheses are tested with the help of statistical smart PLS software output. It has been revealed that the literature is giving contradictory positive impacts. We reveal the opinions of various authors and show a positive impact, as analyzed by the author, for justification of most of the variables in the hypothesis context. There is a need to support the evidence based on the various resources where justifications are high for understanding how the Environmental Quality parameters are not compromised, and the significant value has been recorded in the results of various variables.

Summary

The whole dissertation has been divided into six parts. The introduction introduces the topic and adds the aim and objectives of the study in education to the problem statement and research questions. The literature chapter has outlined the theoretical foundations and hypothesis in addition to the scope of study to justify the conceptual work and support the evidence-based analysis. The next part was methodology, which supported the methodological paradigm and discussed the Google survey pattern, sample size, and other variations for understanding the application of smart PLS in the current study. The next chapter covers the findings that support the descriptive and hypothetical reviews based on the results of the statistical analysis, and some important tests are shared there. Does the discussion chapter proceed with reviewing the results from the lens of literature and theoretical review to understand how the descriptive analysis and hypothesis review support the evidence-based analysis? Further, it has also outlined the post

hoc analysis. Further, it has also outlined the post hoc analysis, and the conclusion has shared the recommendations and summary of the main opinions in addition to the future implications of the study.

Conclusion

It is concluded that most of the hypotheses are justified as positive, so the statement of the aim of the study has been proved to be positive. The first research question inquired about renewable resources reducing the negative impact on the Environmental Quality standards in Pakistan, which has been proven as positive, and the answer is agreeing with the opinion that renewable resources are truly helpful in negating the negative impact on Environmental Quality parameters in the country. The significance of the variables is justifying that the research question has been positively answered, while the next question inquires about the promotion of green growth projects in the paradigm of policy contracts to facilitate the economic growth models for sustainable development in the country. The high value of EQ has been proving this, where the hypothesis is also approved as positive for the post hoc analysis and justifies that green projects can play an important role where innovation is additional facilitation from this perspective.

The third has inquired about the use of Environmental Quality assessment support and policy framework to outline the green energy and green growth concepts in the country, which has been proved positive from the lens of the value of green energy variable in most of the results as significant. Proceeding with the last question, the recommendation has been added to use the applications in the financial and economic in addition to innovative paradigms to support the stakeholders and understand how sustainable practices can promote meeting the challenges of the EQ standards and ensuring quality parameters facilitation in the long run.

Recommendations

It is recommended that innovation in the projects and renewable energy sources like solar and wheel energy can play an essential role not only in meeting the Environmental Quality standards but also in facilitating the STG goals to reduce the climate and support the facilitation reduction of the carbon footprint of most of the industries country. It is also recommended that project managers and EIA support help the organizations understand the needs of the environment and make sure that the relevant practices have been offline to facilitate the project managers not only in facilitating the projects but also in ensuring quality parameters meeting for the green energy facilitation.

Implications

The study has high implications where it is facilitating the project managers and other dealers not only in understanding the need of the project but also in understanding how the positive and pragmatic role of the policy instrument can support the stakeholders in a variety of working areas in renewable energy. Policymakers and stakeholders, in addition to investors, can use the output of the study to understand their role and apply it accordingly to encourage sustainable development.

Limitations

The study has a limitation of using primary quantitative paradigm only which has been due to the lack of resources and time. The study has tested the theories and did not come up with summing up and generating a new theory because it has focused on the primary quantitative analysis only.

Suggestions for future research

It is recommended that future researchers should take these variables in addition to some more variables that can help them to understand the role of financial and policy parameters to apply the innovation and role of the major stakeholders to encourage SDG applications in the country.

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