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The Interplay of Environmental Regulations and Corporate Sustainability Commitment in Driving Renewable Energy Investments in Pakistan: The Path of Analysis and Proposed Framework

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Abstract

The proposed investigation will address the interaction between environmental laws, corporate investment in sustainable energy, and the mediating role of corporate sustainability commitment in the case of Pakistan. The country has initiated a move from fossil fuels to renewable sources of energy, so an understanding of the factors influencing corporate investment decisions becomes imperative. The study proposes that hard environmental regulations are said to encourage corporate investment in sustainable energy to the extent that firms are pressured to adopt greener technologies to avoid penalties and cost limitations and to gain a competitive advantage. The financial incentives are expected to aid corporate participation in renewable energy projects and offset barriers to investment. The study identifies public awareness and social pressure as composite variables that can ultimately guide corporate behaviors toward sustainability. Corporations subject to more scrutiny by consumers and other stakeholders are freer to comply with public expectations, which in turn shall further induce their investments into sustainable energy initiatives. Corporate sustainability commitment is said to mediate and enhance the ability of firms to respond effectively to regulatory pressures and maximize the benefits from financial incentives. This research work bears implications for policymakers, corporate leaders, financial institutions, and public advocacy groups. Robust regulatory frameworks and well-targeted financial incentives are thus important for policymakers. Aligning their strategies with sustainability goals is highly recommended for corporate leaders, while financial institutions are strongly urged to design appropriate financial products to support renewable energy initiatives. Public advocacy groups are essential in engaging for transparency and accountability in corporate practice. By capturing the gap in the literature pertaining to environmental laws and corporate investment concerning developing nations, the present study endeavors to fill some void in the understanding of the dynamics so pertinent to the renewable energy sector of Pakistan. The study results will finally serve as important pointers for energy sustainability investments that will be crucial for economic development and environmental sustainability.

Key words: Environmental regulations, corporate investment, sustainable energy, corporate sustainability commitment, financial incentives, renewable energy.

Introduction

It has been discussed in this chapter that the developed nations have progressed in utilizing environmental regulations towards corporate investment in sustainable energy, although challenges remain in countries like Pakistan, which fall under developing economies. These gaps will have to be addressed if the ambitious climate targets by different nations must be achieved and if a sustainable energy future is to be charted. Learning and experiences from developed nations can give important lessons to Pakistan in strengthening its regulatory framework and encouraging investments in sustainable energy.

Background information

Corporate investments in sustainable energy have been stimulated by environmental regulations globally, focusing more on developed regions like the United States, Europe, and parts of Asia. In the USA, these wide-ranging policies on the environment have had a bearing on the attitude of companies towards sustainable energy investment. For instance, the Inflation Reduction Act of 2022 allocated about $369 billion for new initiatives in climate and energy, expected to spur a veritable upsurge in clean energy investments (U.S. Department of Energy 2024). It incentivizes renewable energy and further strengthens jobs in opening up markets for green employment-with projections that jobs provide by this renewable energy sector will amount to over 1.3 million by 2030 (U.S. Department of Energy, 2024). The European Union sets itself up as the highest regional market for sustainable energy investment-in this case brought about by harsh environmental laws and ambitious climate objectives. Europe becomes the first climate-neutral continent by 2050 through the European Green Deal, which has generated thousands of investments in renewable energy infrastructure (European Commission, 2024). The Fit for 55 policy introduced in 2021 further facilitates corporate investment in sustainable energy technologies since it envisages greenhouse gas emissions" decreasing by at least 55% by 2030, compared with 1990 levels (European Commission, 2024). As a result, in 2023, renewable energies would have represented about 38% of electricity generated in the EU, showing a clear trend towards sustainable practices in energy generation (European Commission, 2024). Keys among the Asian countries are China and India as far as the investments in clean energy are concerned. The primary country that invests heavily in renewable energies across the globe is China, the country where the authorities have initiated regulations and guidelines that fast-track solar and wind energy projects towards attaining 20% boost in renewable energy capacities in 2023 (National Energy Administration of China, 2024). In like manner, India aims to achieve an ambitious target of setting renewable energy capacities to about 500 GW by 2030 in reaching which the government has instituted initiatives such as the Solar Park Scheme and the National Wind-Solar Hybrid Policy (Ministry of New and Renewable Energy, 2024). These efforts therefore position both countries as giants on the global landscape on the road toward sustainable energy. It is true that despite all these developments, the gap between the theory of the environmental regulation and the practice of it on the field can still be vast. Cases for many developing countries evince regulatory frameworks that are inferior, poorly implemented, or just non-existent which greatly lessen the phenomenon of corporate investment in sustainable energy. Though all countries within Southeast Asia claim to reduce their carbon emissions quite frankly, there is actually no notable poll utility and financial incentives that could push renewable investments to flourish (Asian Development Bank, 2024). Furthermore, varying levels are present concerning the awareness and pressure on public environmental issues; these count against the sustainability commitments being made by companies and decisions on investments in those regions. Pakistan now has various challenges and opportunities. Primarily, the country has been experiencing high energy shortages and environmental degradation, as its energy generation is dependent on fossil resources primarily, which is a huge part of greenhouse gas emissions (World Bank, 2024). This has led to the government realizing that it needs to move to sustainable energy sources and has formulated several policies for promoting investment in renewable energy. The National Electric Power Regulatory Authority (NEPRA) has provided feed-in tariffs for projects on solar and wind energy, which have encouraged the participation of the private sector in the renewable energy market (NEPRA, 2024). However, these efforts are not effective in solving the prominent problems of environmental regulations in Pakistan. This regulatory framework is usually said to be inconsistent and without enforcement, which is lower than investor confidence in the renewable energy sector (Khan et al., 2024). In addition, corporate investment has not been enhanced since incentives in monetary provision are inadequate for sustainable energy projects. Although the government has approved some grants and benefits such as exemptions from taxes and subsidies for projects in renewable energy, there have been bureaucratic slogs in the implementation of such initiatives (Khan et al., 2024). Compared with developed countries, public awareness and pressure regarding environmental issues are relatively low in Pakistan. The public lack of awareness has led to insufficient demand for sustainable energy solutions, which impacts corporate investment decisions. It is noticed that many corporations give priority to short-term profits rather than long-term sustainability goals in such an unregulated environment (Ali et al., 2024). In today's context, thus, there is an urgent requirement for improved environmental regulation, better financial incentives, and increased public awareness, which would ultimately facilitate the transition to sustainable energy in Pakistan. The enforcement of existing regulations needs to be strengthened and there needs to be consistency in policy implementation in order to develop confidence among investors in the renewable energy sector. Also, there is a need for enhancing public awareness campaigns for the benefits of sustainable energy in order to create a more enabling environment for corporate investment in this area.

Problem Statement

Many challenges have been involved in shifting to sustainable energy in Pakistan, especially regarding environmental regulations directed towards corporate investment. Although the government has employed several policy avenues to promote renewable energy, the impact of regulations has been modest. Available literature reveals a gap on how these regulations affect the behavior and investment decisions of private firms in the renewable energy sector. For instance, while a result of studies about the positive effects of environmental regulations on corporate investments in developed countries, including the United States and European nations, is available, such a comprehensive analysis in the context of Pakistan is not available (Khan et al., 2024).

It didn't analyze the barriers specific to the Pakistani corporate world in negotiating the regulatory ambit. The divergent implementation of policies, lack of significant financial benefits, and absence of public awareness towards the advantage of sustainable energy are some of the things that contribute to such factors (Ali et al., 2024). These lead to that theoretical gap in the understanding of environmental regulations and corporate investment in sustainable energy in developing countries, especially in South Asia. Meanwhile, amidst a spate of studies on renewable energy policy on a global scale, inadequate empirical evidence exists directly linking environmental regulation with corporate investment outcomes in Pakistan. Such a gap is fundamentally critical because it focuses on understanding these dynamics, thus crafting effective policies which could boost investment in sustainable energy use. The existing bodies of studies, in general focus, on the technical or economic dimensions of renewable energy, ignoring the social and political factored environment of corporate investment decisions (Asian Development Bank, 2024).

Gap Analysis

Still, while there is a multiplicity of works on renewable energy policy around the world, there is a section that does not have enough empirical evidence to link environmental regulation with effects on corporate investment outcomes in Pakistan, thus making that gap crucial because it bears on understanding these dynamics for formulating proper policy measures for stimulating investment into sustainable energy. Most of the previous studies include, in general, major on technical and economic aspects of renewable energy while excluding the consideration of social-political context affecting the investment decision of the corporate forums (Asian Development Bank, 2024). The impact of environmental regulations on corporate investment in sustainable energy in Pakistan is gap analysis, with several critical areas being uncovered for further exploration. This analysis provides literature gaps, theoretical gaps, methodological gaps, and empirical gaps that currently exist in the research landscape.

Literature Gap

Substantial literature exists examining the effects of environmental regulations on investment by corporations in developed countries - particularly United States and European others - but limited studies have gone into the same direction for the developing countries in general and Pakistan in particular. The research largely tends to find positive correlates between stringent environmental regulations and corporate investment in renewable energy in a developed context (Khan et al., 2024). However, it lacks any thorough analysis exploring these dynamics in a Pakistani context, thus leaving a huge gap in understanding how local regulations influence corporate behavior and investment decisions in sustainable energy (Ali et al., 2024).

Theoretical-Gap

Despite analyzing the theoretical frameworks about the existing relationship between environment regulation and corporate investment, these are largely majorly derived from studies conducted in developed countries, thus often non-profitability applicable to the socio-economic and political context of Pakistan. These theories do not adequately address the specific challenges that corporations face in developing regions, often characterized by inconsistent policy enforcement, limited financial incentives, and variable levels of public awareness over sustainability (Asian Development Bank, 2024). Such an oversight results in a theoretical gap that needed to fill by context-specific model development, which would effectively explain the relationship between regulatory frameworks and corporate investment for sustainable energy in Pakistan.

Methodological Gap

Most of the research conducted regarding the above has had a methodological slant towards quantitative approaches that speak broadly about the relationship between the environmental regulation and investment levels, providing little indication of the other aspects that internally affect corporate decision-making (Khan et al., 2024). There appear to be no qualitative studies examining the perceptions and experiences of corporate stakeholders with regard to environmental regulations in Pakistan. This methodological gap limits understanding about how by various factors such as regulatory consistency, financial incentives impact corporate investment decisions in renewable energy.

Empirical-Gap

Researcher has collected firsthand information that environmental regulations do not link directly to corporate investment outcomes in Pakistan. Several studies have explored the effect of international renewable energy policies; however, none of them seem to indicate specific data or case studies over time on how such policies affected corporate behavior in Pakistan with respect to the renewable energy sector (Ali et al., 2024). The empirical gap is significant because it limits the ability to formulate appropriate policies that can spur investment in sustainable energy. There only exists evidence and not local research, meaning that policymakers cannot be informed with possible data to take any decisions that relate to the peculiar challenges and opportunities in Pakistan's renewable energy landscape.

Research Objectives

Based on above discussions, following are the objectives of the current research study.

1. Assessing the influence of the environmental regulatory stringency on corporate investment in sustainable energy in Pakistan.
2. Evaluation of financial incentives and corporate investment decisions in renewable projects.
3. Investigating the role of public awareness and pressure into investment by the corporates into sustainable energy initiatives.
4. Examine the mediating role of corporate sustainability commitment into the linkage of environmental regulations, financial incentives, public awareness, and corporate investments in sustainable energy.

Research Question

Based on research objectives, following are the aligned research questions of the study.

1. What does stringency of environmental regulations mean for corporate investment towards sustainable energy in Pakistan?
(Dependent Variable: Corporate investment towards sustainable energy)
2. What does availability of financial incentives does to influence decisions in corporate investment in renewable energy projects?
(Independent Variable: Availability of financial incentives)
3. In what way do public awareness and pressure influence corporate investment in sustainable energy initiatives?
(Independent Variable: Public awareness and pressure.)
4. How far does corporate sustainability commitment mediate between environmental regulations and corporate investment in clean energy?
(Mediator: Corporate sustainability commitment).
5. How does corporate sustainability commitment mediate between financial incentives and corporate investment in sustainable energy?
(Mediator: Corporate sustainability commitment).

Significance of the study

The study is indeed a multi-dimensional value addition concerning the impact of environmental regulation on corporate investment in sustainable energy in Pakistan for various key players and stakeholders. This research collection is an important one for policymakers as it identifies how the extant environmental laws operate or influence corporate investments. This also detects gaps in the extant regulatory framework, thereby providing opportunities for policy changes that make incentives for investments in renewable energy more effective. Improved regulations enable increased participation of corporates in renewable energy sources, which is significantly important in terms of the energy needs and climate targets of Pakistan. Comprehending the nexus between regulation and corporate behavior will help policymakers further create an enabling environment for sustainable development. This research has certain and very important benefits for corporate stakeholders such as businesses and investors, in terms of all the findings providing a clearer understanding of how environmental regulations go into the decision-making about investments in renewable energy. Challenges and opportunities within the regulatory environment will then be highlighted for making decisions on investment in sustainable energy clearer for companies. Knowing this will align corporate strategies with regulatory expectations so that return on investments could be maximized and so that gross corporate social responsibility profiles become better. Even this research study has addressed the needs of environmentalists and NGOs that advocate for sustainability. It is going to provide empirical evidence regarding the effectiveness of environmental regulations in persuading companies to invest in renewable resources and therefore promotes advocacy toward strengthening environmental laws, thereby leading to greater public awareness and engagement toward such initiatives, creating a culture of environmental responsibility throughout society.

In addition, it will fill a void for academia and existing literature about environmental regulations affecting the corporate investment in sustainable practices, especially in developing countries like Pakistan. It fosters context-specific theories and methodologies, contributing much to the holistic understanding of the regulatory environment versus an investment into sustainable energy linkages. The findings can lay a basis for further exploration by scholars on related topics in other developing regions. In the end, the society in the large context, including the local community affected by energy policies, will gain from this study. More investment in sustainable energy increases access to clean energy, creates jobs in the renewable sector, and reduces environmental degradation. Such arguments informed to stakeholders add toward a collective effort to improve sustainability for future generations concerning strong environmental regulations.

Literature Review

The investments made by corporations in renewable energies are largely driven by specific factors with regard to their corporate investment decisions. However, as the world gradually turns from its dependence on fossil fuels to renewable energy sources, understanding the forces shaping corporate action becomes important for both the government and the corporate leaders. This review focuses on some of the crucial key parameters like strictness of environmental regulations, financial incentives available, and the pressure formed from the public awareness and activism. The mediating role of corporate sustainability commitment will assess how a company's commitment to sustainability can affect its responsiveness towards regulatory and market demands. Synthesizing the current research, this literature review is an attempt to offer a solid frame of driving factors into corporate investment in sustainable practices as pertained to developing regions like Khyber Pakhtunkhwa, Pakistan.

Corporate Investment in Sustainable Energy

Corporate investment in sustainable energy is investments by businesses into renewable energy projects and into green business practices. Quantitative indices to measure this investment primarily include measures such as total capital amounts deployed, number of sustainable actions taken, and ratio of total investment directed to those actions (Lee et al., 2024). Investments in sustainable energy are very important in relation to fighting the climate crisis and the transition towards low-carbon economies, and it would be very useful to policymakers and top corporate managers alike to learn what drives these investments.

Key factors effecting corporate investment in sustainable energy

Stringency of Environmental Regulations

Environmental regulations (ERs) are significant means of dropping environmental pollution (Ying & Jin, 2024). Similarly, stringency in environmental regulations could lead to a significant alteration in the investment decisions of corporations. Empirical research found that strict regulations made firms invest in green technologies to meet the regulatory standards and avert penalties. This research study is further supported by Kumar et al. (2023), which shows a positive relationship between the companies' environmental stringency and corporate investments in renewable energy projects. The prior study of Ying &bJin, (2024) highlighted three classes of environmental regulation such that command control of ER, which can be possible through governmental penalties imposed on these who involved in such practices. The next is about market incentive program of ER, which can reduces pollution and smog principally with the help of subsidies in taxes with the aim of inspiration the total cost and value of products. Finally, the act of voluntary-participation in ER activities, depend on primarily on the individual regulations of firms mitigate the negative impact on environmental. The current study infers that companies operating in areas of stricter regulation may invest heavily in sustainable initiatives, thus backing the hypothesis that stringent regulations inspire investments in sustainable energy by the firm (H1).

Availability of Financial Incentives

According to the perspective of Kumar et al. (2023), that financing for the corporation regarding investments into sustainable energy: tax credits, grants, or some subsidies play a vital role in influential corporate investment in sustainable energy. There have also been indications that incentives would lower the cost of investment while, at the same time, increasing the attractiveness of the renewable energy (Smith & Thompson, 2024). For Instance, John-son et al. (2023) proved that firms would invest more in sustainable energy initiatives in jurisdictions where financial incentives were stronger. As a result, this supports the hypothesized proposition that financial incentives create a positive impact on corporate investment in sustainable energy (H2).

Aspects of Public Awareness and Pressure

Public awareness and social pressure concerning sustainability have been important influences on corporate behavior with respect to their investment decisions. Public perception of the environment can learn more investment returns in sustainability practices as companies try to build their reputation or bring their practices in line with consumer expectations when it builds consumer concern about environmental issues (Williams & Garcia, 2023). For example, according to a survey by Martinez et al. (2024), companies faced with significant public pressure to adopt sustainable practices were more likely to increase their investment in renewable energy, indicating that public awareness and pressure positively influence corporate investment in sustainable energy (H3).

Mediating Role of Corporate Sustainability Commitment

Corporate Sustainability Commitment

The corporate commitment to environmental sustainability mediates the relationship between key factors of the study and corporate investment in sustainable energy. It incorporates how deeply sustainability is embedded within the organization: in its mission, in values, and in operational strategies. Most recently, Chen and Lee (2024) found that sustainable companies tended to develop better responses to strict regulations as well as to financial incentives. For example, Patel et al. (2023) stated that corporate commitment to sustainability enters as mediation in the relationship between financial incentives and investment decisions, thus revealing that companies that are more sustainable-focused are likely to take up financial incentives for their enhanced investments in sustainable energy (H4). Furthermore, public awareness can also enhance corporate sustainability commitment that increasingly encourages investments in sustainable energy sources. Surveyed by Nguyen et al. (2024), it was noted that companies with high public scrutiny were more open to taking their sustainability commitments a notch higher and thus afloat be heightened levels of investments in renewable energy projects.

Supportive theories

Some theoretical underpinning can be employed to analyze the relationships between all study variables: corporate investment in sustainable energy, stringent environmental regulations, unavailability of financing incentives, public awareness and pressure, and corporate sustainability commitment. The following theories will support the study:

Stakeholder Theory

Stakeholder Theory implies that organizations should take into account the interests and influences of all stakeholders in the course of decision making such as customers, employees, investors and the community (Freeman, 1984). In this particular study, stakeholders are putting pressure on corporations for sustainable practices and investments in renewable energy. Stringent environmental regulations coupled with increased public awareness often serve as driving forces for corporate investment as companies choose to align their operations with stakeholder expectations. This theory supports the hypotheses that public awareness and regulatory frameworks influence corporate investments in sustainable energy.

Institutional Theory

Scott (2001), cites, that institutional theory focuses on the institutional environment and its influence on organizational behavior. This is to say that organizations were bound by rules, norms, and expectations dictated by the conditions of the institutional environment: regulatory frameworks and societal pressures. This is useful when learning how implicit or explicit environmental regulations shape corporate financial incentives determined by investment decisions. Thus, firms that operate in an environment with a strict regulatory framework will probably invest in sustainable practices for legitimacy and competitive advantage.

Resource-Based View (RBV)

The resource-based view states that resources and capabilities of a firm are fundamental in achieving a competitive advantage and above-average performance (Barney, 1991). In the current study, corporate sustainability commitment is viewed as an important and valuable resource for better leveraging financial incentives and environment regulation compliance. This RBV put forth the argument that firms with a strong commitment to sustainability could patent medals, making investments in renewable energy initiatives to transfer outcomes on mediating independent - dependent variable relationships.

Social Exchange Theory

As per social Exchange Theory, social behavior occurs through exchange processes, and individuals seek to maximize benefits with minimized costs (Homans, 1931). The theory could also be applied to society with respect to organizations and stakeholders, such as the public and regulatory bodies. Given the increased awareness and pressure, companies develop that perception to invest more in renewable energy to reciprocate in order to gain reputation and stakeholder relation enhancement. Additionally, this theory supports the role of corporate sustainability commitment as the mediator: companies exhibiting that corporate sustainability orientation will likely ensure positive exchange outcomes with their stakeholders.

Theory in practice

Social Exchange Theory indicates that social behavior is indeed the result of a process of exchange in which individuals seek maximum benefits and, at the same time, lower costs (Homans, 1958). It could, therefore, help one understand the kind of relationship that exists between firms and their stakeholders, including the public and regulatory bodies. An increase in public awareness and activism motivates firms to perceive it as a need for them such that they would invest in renewable energy for having their image improved through stakeholder engagement. The same is said by this theory with regard to the mediatory role of commitment to the sustainability of the corporation, as firms advocating sustainability tend to engage in frequent positive exchanges with stakeholders.

Application of Stakeholder Theory in Corporate Investment in Sustainable Energy

The Stakeholder Theory establishes a reliable basis on which corporations comprehend the complete market scenario of sustainable energy investments. This implies that organizations, rather than being like those static things, indeed attached to that network of lifelong relationships with stakeholders of all types, including customers, employees, investors, regulators, and even the public at large. This dependence of stakeholders relates to the investment decisions of a company in sustainable practice.

Dependent Variable (DV)

Corporate Investment in Sustainable Energy:

A set of independent variables determines the situation of this dependent variable, which is corporate investment in sustainable energy. Companies that perceive stakeholder pressure from strong restrictions, financial incentives, and public awareness tend to invest more toward achieving renewable energy strategies. This serves as compliance with societal and legal obligations and adds a competitive advantage to the reputation of the firm in front of its stakeholders.

Independent Variable (IVs)

1. Stringency of Environmental Regulation:

Corporations operate under a regime of environmental regulation whereby compliance with the environmental laws is necessary in order to be accredited by the stakeholder, regulating bodies, and the environmental advocacy groups. As a result, corporations are motivated to invest in sustainable energy for the legal and stakeholder legitimization and reputation.

2. Availability of Financial Incentives:

Financial incentives like tax credits, grants, and subsidies constitute a very important part in determining corporate investments. These are offered by stakeholders like government institutions or financial institutions to promote sustainable actions by the companies. Such companies can, therefore, assure their stakeholder commitments towards environmental sustainability by accessing these financial incentives.

3. Public Awareness and Pressure*:*

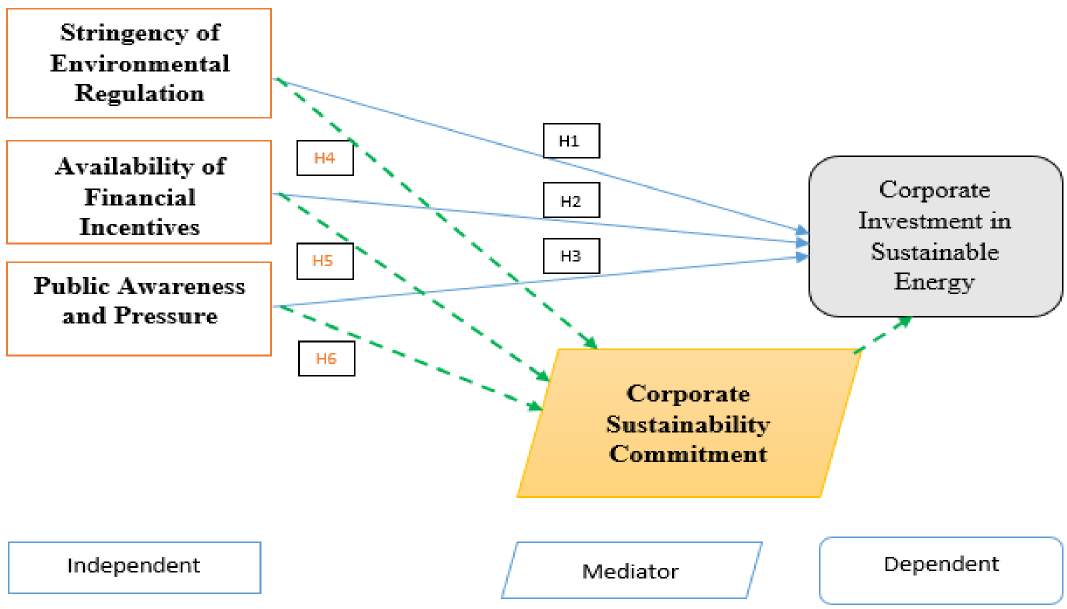
Public awareness regarding environmental issues induces pressure on organizations which they require to adopt sustainable practices. There are stakeholders like consumers and communities that demand accountability and sustainable investments from these organizations. Such pressures spur the organization into alignment with various stakeholder values leading to increased investment in renewable energy initiatives to respond to societal opportunities.

Mediator

Corporate Sustainability Commitment*:*

Measuring sustainability within the organization mediates this whole framework. When they embedded it into their mission and values, organizations are better equipped to respond to stakeholder pressures and views. Strong commitment to sustainability would enable the firm to handle regulatory conditions and also avail them of financial incentives eventually leading to increased investment in sustainable energy resources. Thus, the better they commit to sustainability, the more likely successful stakeholders and investments will motivate initiatives in renewable energy.

Conceptual framework based on The Stakeholder Theory



Research Hypotheses

H1. Stringent Environment Regulations Have Encouraged Corporate Investments in Sustainable Energy.
H2. Availability of Financial Incentives Have Allowed Corporations to Introduce Sustainable Energy Programs in Their Enterprises.
H3. Public Awareness and Pressure Have Motivated Corporations to Invest in Sustainable Energy.
H4. Corporate sustainability commitment mediates the relationship between stringently enforced environmental regulations and corporate investment in sustainable energy.
H5. Corporate sustainability commitment mediates the impact of financial incentives on corporate investments in sustainable energy.
H6. Corporate sustainability commitment mediates public awareness and pressure and corporate investment in sustainable energy.

Proposed Methodology

Research Design

It certainly preferred collecting quantitative research data under the positivistic approach whereby measurement was done objectively and relationships were statistically analyzed among variables (Saunders, Lewis, and Thornhill, 2009) in the positivist paradigm. This method fits this study well since it is going to investigate into causal relationships between corporate investment in sustainable energy (the dependent variable) and stringency of environmental regulations, availability of financial incentives, and public awareness and pressure (the independent variables), while corporate sustainability commitment is assumed as the mediating variable.

Research Type

A mono-method approach is going to be employed which is to deal with the collection and analysis of quantitative data exclusively. It allows a very streamlined system of data collection and analysis that ensures the consistency and reliability of the findings (Creswell, 2014). A cross-sectional design was adopted as this study intended to collect data at a specific period to measure and determine the relationships of the variables.

Population and Sample

This research will focus on, consisting of corporate decision-makers and sustainability officers within operating organizations in Pakistan. Random stratified sampling technique will be employed to facilitate its representation across industries and sizes of companies. For the study sample size, the guideline from Cohen's which provides an effective statistical power to meet a hire number of respondents to ensure about 200 respondents for its analysis (Cohen, 1988).

Following the key players and financial institutions cited earlier, selected organizations/departments which will become respondents in the target population for data collection from top-knot organizations in these sectors are given below. Each of these will be of use to get very much into the concerns of the study in terms of corporate investment in sustainable energy in Khyber Pakhtunkhwa (KPK).

Target Population for Data Collection

The population under consideration in the present study is specific organizations and departments. The researcher will collect relevant data from knowledgeable individuals who will provide accurate information regarding research aims and objectives. This method would test the degree and enhance the reliability of the findings, building a necessary preamble to a better understanding of the factors determining corporate investment in sustainable energy in Khyber Pakhtunkhwa.

Khyber Pakhtunkhwa Environment Protection Agency (KPEPA)

Target Individuals: Environmental policy analysts and regulatory officials.

Relevance: They can spell out the stretch and rigour around environmental policies and the way they impact firms when it comes to investing in sustainable energy.

KPK Ministry of Energy

Target Individuals: Energy policy makers and project managers.

Relevance: They can provide information on the government schemes, monetary incentives for green projects, as well as overall energy policy direction at the provincial level.

Pak Oman Investment Company

Target Individuals: Loan officers and investment analysts.

Relevance: They can describe what financial products they have on offer for renewable energy projects and the eligibility for investment.

Pakistan Renewable Energy Association PREA

Target Audience: Executive members and project coordinators.

Relevance: They can share insights regarding industry trends, public awareness, and collective stance of renewable energy sector in KPK.

U Microfinance Bank

Target Audience: Microfinance Managers and Sustainability Program Directors.

Relevance: They can give perspective on funding available for small-scale renewable energy projects and how microfinance can support sustainable efforts.

Khyber Pakhtunkhwa Financial Institution KP-FI

Target Audience: Financial analysts and development project managers.

Relevance: They can provide insights on local financial support mechanisms for development and sustainability projects.

Data Collection

For the purpose of this research primary data are to be collected by an adopted survey questionnaire designed to measure independent variables, dependent variable, and mediator. The questionnaire will contain structured items using a Likert scale for the assessment of respondents' perceptions of:

• *Corporate Investment in Sustainable Energy (DV*): This is the extent of financial resources allocated to such sustainable energy initiatives.

• *Stringency of Environmental Regulations (IV):* The regulations' extent to which they impact behavior of organizations.

• *Availability of Financial Incentives (IV):* Financial support for sustainable practices;

• *Public Awareness and Pressure (IV*): societal demand for corporate sustainability;

• *Corporate Sustainability Commitment (ME):* prioritizing sustainability by organization in its operations.

Proposed Data Analysis

Statistical Package for the Social Sciences, SPSS, will be used for data analysis, besides SEM-PLS (structural equation modeling - partial least squares). The steps for analysis are:

1. Descriptive Statistics: The first descriptive analysis will give a summary of the demographics of the respondents as well as the major variables.

2. Reliability and Validity Testing: The reliability of the survey instrument will be determined using Cronbach's alpha, while construct validity will be evaluated through exploratory factor analysis (EFA) (Field, 2013).

3. Hypothesis Testing: Structural equation modeling-partial least squares (SEM-PLS) was used to achieve the intended hypotheses testing. The model would be appropriate for analyzing complicated relationships between variables and observing the mediating effect of commitment to corporate sustainability in the independent-dependent variables (Hair et al., 2017).

4. Interpretation of Results: The results will be interpreted in the context of the research questions concerning corporate investment and its implications on sustainable energy in Pakistan.

Conclusion

The focus is on investigating environmental regulations, corporate investments in sustainable energy, and the mediating role of corporate sustainability commitment in Pakistan. Understanding how stringent environmental regulations affect corporate decisions regarding investments in renewable energy is central to this study. Public awareness and pressure on corporate investment behavior shall be studied, thus providing a comprehensive institutional framework for different corporate investment behaviors in a developing country situation. The proposed model asserts that stringent environmental regulations could elicit corporate investment in sustainable energy. With this assumption, the model maintains that the enforcement of regulations will require firms to adopt greener technologies or renewables to avoid penalties and thus gain an edge over rival firms. These financial incentives are also supposed to lure companies to wind and solar projects, as they cut investment costs and increase the attractiveness of sustainable initiatives. Public pressure and awareness are deemed another essential push for corporate engagement in sustainable practices. The model contends that higher consumer and stakeholder scrutiny will push companies to invest heavily in sustainable energy to align with public expectations. Corporate sustainability commitment as a mediator is thus paramount in this context: companies with sustainability driving their business strategies will be in a better position to comply with regulatory pressure and take advantage of financial incentives. Altogether, the study casts some light on corporate investments in sustainable energy specifically in Pakistan and adds to previously conducted studies in this area. A need is created to synergize all policy avenues into a coherent framework incorporating laws, financial incentives, and engagement of society for increasing corporate investments in renewable energy projects.

Implications of the Study

The implications of this proposed study are numerous with respect to the various stakeholders involved in promoting sustainable energy in Pakistan. For policymakers, the study informs that establishment and enforcement of environmental laws geared towards sustainable development is paramount. By knowing the ability of stringent environmental regulations to-enhance corporate investment, regulators can frame incentives in favor of renewable energy projects. For leaders in corporate companies, the model explains how sustainability intentions should be embedded in all their business strategies. With an understanding of these relationships, companies will make strategic decisions both to enhance their future competitiveness and to meet their current stakeholders' expectations. In light of the above, it can be said that further research on the environmental regulations versus the behavior of firms in developing countries may elucidate context-specific theories and methodologies, thereby offering a sound contribution to the sustainability studies domain?

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