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The Effect Of Green Finance On Environmental Sustainability, International Evidences

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<p>Mian Ijaz Muhammad PhD Scholar, Department of Business Administration and Social Sciences, Iqra National University Peshawar. ijaz0122@gmail.com</p> <p>Dr. Asad Ullah* Assistant Professor, Department of Business Administration and Social Sciences, Iqra National University Peshawar. Corresponding Author Email: asad.wazir@inu.edu.pk</p> <p>Dr. Shah Hassan Assistant Professor, Department of Business Administration and Social Sciences, Iqra National University Peshawar, shah.hassan@inu.edu.pk</p>	<p>Abstract</p> <p>The present study was conducted by checking the effect of green finance on the environmental sustainability. India, Pakistan and Bangladesh were the sample of the study. Due to the limitation in the authorized data sources, by purposive sampling technique, the study is conducted in India, Pakistan and Bangladesh. All the data of the sample variables were collected from International authentic sources i.e. World Bank and IRENA (International Renewable Energy Agency). The data of the variables for Pakistan, India and Bangladesh were collected from 2000 to 2023. The findings of Hausman test for overall results show that fixed effect model is appropriate. The results of fixed effect model show that green finance, green technology and energy consumption has significant effect on environmental sustainability, Governments must also promote green finance as an investment and financing option to help decrease the pollution. The policies and their efficient implementation at country level by respective governments could be the first step that can bring change towards the global cause of environmental degradation.</p>
<p>Keywords:</p>	<p><i>Green Finance, Environmental Sustainability, Finance, Policies</i></p>



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Introduction

Green finance is a crucial component of the broader concept of "green banking," which includes many policies and practices that facilitate the economic, ecological, and social sustainability of banks (Chen *et al.*, 2019). Environmental sustainability is defined as a condition of interconnectedness, resilience, and equilibrium that enables human civilization to fulfill its objectives while preserving ecosystems and biodiversity. Green technology, sometimes referred to as "eco" technology, encompasses an ever-growing array of methods, processes, and materials, including non-toxic cleaning agents and energy-generating devices. It considers both the short-term and long-term environmental impacts (Doghan *et al.*, 2022). Green innovation refers to inventions that provide vital commodities, services, or processes aimed at reducing environmental harm and degradation while optimizing the use of natural resources (Afzal *et al.*, 2021).

The advancement of green finance is pivotal in the transformation of environmental development via two distinct mechanisms. Firstly, it assists and motivates enterprises to participate in environmentally sustainable practices and goods; secondly, it facilitates the replacement of high-energy equipment with energy-efficient alternatives, therefore regulating and reducing pollution levels. The advancement of green financing contributes to poverty reduction when farmers are educated about green products. The policy must be implemented to promote farmers in cultivating organic and sustainable goods while prohibiting substances that contribute to environmental deterioration (Wang *et al.*, 2021). Green finance is defined as the provision of financial services aimed at supporting environmental protection projects, including economic activities designed to optimize resource utilization and rejuvenate the environment (Bashir *et al.*, 2020). This encompasses clean and safe energy initiatives, sustainable energy enhancement, green building projects, and environmentally friendly transportation. The word "green" pertains to initiatives aimed at conserving the nation's natural resources, mitigating pollution, and achieving sustainable development (Ahmad *et al.*, 2020). The advancement of green finance pertains to the accessibility of credit designated for environmental sustainability (Ferrari *et al.*, 2022). The notion of green encompasses carbon finance, green investment, green securities, and green credit.

Environmental quality is subject to two distinct interpretations, since it is considered a basic economic good. The first pertains to the fact that, notwithstanding possible price reductions, financial institutions are prepared to invest in a pristine environment as a public benefit. It is plausible to assert that inhabitants of affluent nations possess access to technical advancements that markedly lower the expenses associated with improving local air quality, given the concurrent presence of economic expansion and technological progress in such regions (Karim *et al.*, 2022). Green technology offers several advantages for the world, humanity, and our lifestyle. Green technology may mitigate environmental damage and provide superior energy sources. Reduce the expenditures for utilities incurred by residential and commercial entities. Ensure the water is potable and the air is breathable (Wang *et al.*, 2022). Green innovation, or green technology innovation, refers to technological advancements that include environmental concerns, often merging energy efficiency with emission reduction and economic growth. In contrast to conventional innovation, green innovation considers the decrease of environmental degradation with economic advancement (Guo *et al.*, 2022). Environmental sustainability and green finance are anticipated to have a positive correlation. Green finance pertains to the conservation of the environment. The green transition is inherently linked to environmental sustainability; hence, it is inadequate and incomplete without both elements. Cross-border trade in renewable energy is essential for mitigating climate change and ensuring long-term environmental sustainability (Xie *et al.*, 2020).

Recent research underscores particular stakeholder pressures influencing ESG adoption (Zhang *et al.*, 2022) and the significance of stakeholder integration in corporate sustainability. However, it does not analyze how conflicting stakeholder demands (e.g., short-term investor returns versus long-term community environmental requirements) specifically mediate the conversion of green finance and technology inputs into effective green innovation and, ultimately, environmental sustainability outcomes. The varying impact of influential stakeholders (e.g., large institutional investors, significant regulators) compared to marginalized groups (e.g., local communities, future generations) on determining which environmental issues are prioritized for innovation is still inadequately examined (Shahbaz *et al.*, 2020). Internal stakeholders, especially workers and middle management, whose support and competencies are essential for the effective implementation of green innovation, are often neglected in the mediation paradigm (Naqvi *et al.*, 2021). Furthermore, there is a deficiency in empirical research regarding the impact of proactive stakeholder engagement strategies during financial allocation or technology selection on the trajectory (e.g., incremental versus radical) and efficacy of green innovation as a mediator (Bhattacharyya, 2022). Thus, a considerable gap exists in comprehending the moderating and mediating functions of stakeholder salience, conflicts, power disparities, and engagement quality within the established framework connecting green finance, green technology, green innovation, and environmental sustainability. Addressing this gap is crucial for cultivating a more sophisticated, accurate, and pragmatic understanding of how stakeholder interactions facilitate or hinder the trajectory toward sustainability.



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Literature Review

Akbar *et al.*, (2020) examined the influence of green innovation and foreign direct investment on the environmental and ecological quality of the BRICS nations from 1990 to 2014. The findings indicate a reciprocal relationship between CO2 emissions and energy consumption, CO2 emissions and urbanization, CO2 emissions and trade openness, as well as CO2 emissions and green innovation. The data indicate a unidirectional relationship among urbanization, CO2 emissions, and Gross Domestic Product. Recognizing the significance of financial stability in promoting green development, Huang (2024) examined the interplay of mineral resources, creativity and innovation, globalization, and green development in the BRICS countries from 1990 to 2021. The findings have shown that globalization and the sustainable development of the BRICS countries are negatively correlated. The primary proposal was that to mitigate the negative impacts of globalization and internationalization on sustainable development, the BRICS nations should tighten their environmental legislation.

Nasim *et al.*, (2022) indicated that organizations prioritizing stakeholders likely to attract more investors. Akbar *et al.*, (2020) similarly discovered that investors are inclined to invest in businesses with robust stakeholder orientation, since these firms are viewed as socially responsible. Companies with a greater focus on stakeholders have superior return on assets and return on equity. Wasti *et al.*, (2020) discovered that urbanization and financial growth influence CO2 emissions. Muhammad (2019) examined the MENA (Middle East and North Africa) nations and identified a beneficial effect of financial growth and energy usage. Zhang *et al.*, (2022) examined the impact of financial development and energy use on CO2 emissions. Green financing has been thoroughly examined with several other aspects. Wang *et al.*, (2020) analyze the stock market's response to green bond issuance. The research emphasizes the contributions of bond investors, issuers, and underwriters in establishing the green bond premium. The research concludes that the market reacts favorably to the issue of green bonds.

Zhang *et al.*, (2019) for their analysis of current green finance literature. They used a bibliometric analysis method and demonstrated that a universally accepted definition of green finance is lacking. They advocate for further study on green financing in poor nations. This article consolidates the latest advancements in green finance research, complementing the work of Zhang *et al.*, (2019). The objective is to provide a thorough comprehension of green finance to scholars, policymakers, and practitioners. I examine the policy, practitioner, and academic literature on green finance to pinpoint the most significant trends and concerns, subsequently proposing avenues for additional study.

Wang *et al.*, (2019) similarly identified that green finance encompasses two domains: environmental benefits and financial advantages, and suggested that possible environmental implications should be addressed in financing and investment choices. In 2015, 178 nations ratified the Paris Agreement to collaboratively tackle the global issue of climate change. The gravity of climate change is concerning, with a projected temperature increase of around 2.8°C by 2030 (UNEP, 2022). The International Energy Agency's research (2014) indicates that \$53 trillion would be necessary by 2035 to restrict the temperature increase to 2°C. Recent advances in financial instruments and the introduction of eco-friendly financial products significantly influence all aspects of society, hence advancing environmental sustainability via the allocation of financial resources.

Xie *et al.*, (2020) examine the influence of clean and green investments on environmental protection by assessing the causal link between green financing, clean energy investments, green technologies, and environmental sustainability. They utilize data from 2014 to 2021 and implement the Granger causality test. The findings indicated the presence of bidirectional causalities among variables, with some exceptions during the Covid-19 epidemic. Thus, affirming the need of advancing green financing to save the environment. Khan *et al.*, (2022a) investigates whether green finance effectively reduces the ecological footprint in 26 Asian nations and concludes that green finance significantly influences economic development and diminishes the ecological footprint of the sampled countries.

Likewise, Ahmad *et al.*, (2020) examine the impact of green financing and green innovation on fostering a sustainable ecosystem. The research utilizes actual data from G7 nations spanning 1995 to 2019 and applies ARDL for analysis. The results indicate that to achieve the United Nations' sustainable development objectives, the G7 must use green investment strategies, since they contribute to the decrease of harmful gas emissions. Ma *et al.*, (2023) investigates the relationship among green finance, environmental sustainability, renewable investments, and green economic activities.

H₀₁: Green finance significantly affects environmental sustainability.

Research Methodology

The nature of the study is quantitative. This study was intended to explore the effect of green finance, green technology on the environmental sustainability. Published audited reports were used for the data collection and carrying all the research process. The secondary sources have been utilized in the current study for the data collection. Therefore, the nature of study was quantitative. The present study is conducted in the South Asian Association for Regional Cooperation (SAARC). All the countries of South Asia (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) were considered as the population of the study. The International Panel on Climate Change



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(IPCC) shows that Pakistan, India and Bangladesh are affected from the global warming more as compared to other countries. According to Climate Risk Index, Pakistan ranked 5th, Bangladesh ranked 7th and India ranked on 8th (Abid, 2023). Therefore, the study included India, Pakistan and Bangladesh as the sample of the study. Due to the limitation in the authorized data sources, by purposive sampling technique, the study is conducted in India, Pakistan and Bangladesh. The data of the present study is secondary in nature. All the data of the sample variables were collected from International authentic sources i.e. World Bank and IRENA (International Renewable Energy Agency). The data of the variables for Pakistan, India and Bangladesh were collected from 2000 to 2023.

Results & Discussions

Hausman Specification Test

S#	chi-square	P-value	Results
1	306.052	0.000	Fixed Effect

The table shows the findings of Hausman specification test which has the objective of selecting the analysis model between fixed effect and random effect model. For the data analysis having multiple time series and cross-sectional units then it is important that the diagnostic test should be used to select the model of analysis. The Hausman specification test is the type of diagnostic test which has been used by this study to select between fixed effect and random effect. The assumptions of the Hausman specification test are:

H₀: Random effect

H₁: Fixed Effect

The findings show that the test statistics of the model are found significant as the p-values were found smaller than 0.05. This is concluded that fixed effect model is recommended for data analysis of the concerned model.

Fixed Effect Model

Variables	Env Sus
Green Finance	0.7656** (.000)
Green Tech	0.0588** (.000)
GDP	0.513616 (.689)
Engy Cons	0.937473** (.000)
Green Innovation	
F-value	16.12
R-square	0.681

The table shows the finding of fixed effect model for green finance, green technology, GDP, energy consumption on environmental sustainability. The findings of model 1 showed the effect of green finance, green technology, GDP, energy consumption on environmental sustainability which has showed the variance of 68%. The value of R-square in the model 1 result exhibits that green finance, green technology, GDP, energy consumption has combined effect of 68% on environmental sustainability. The findings in the table showed that the all the models showed great percentage of variance explanation in R-square. The f-values in the table showed statistical significance of the model in all four levels. The results support the argument that the green finance has positive relationship with environmental sustainability. The value of coefficient in the table shows that the green finance can make 0.76 units change in the environmental sustainability and this change will be in positive direction. The p-value of green finance is .000 which has concluded that the green finance shows significant and positive effect on environmental sustainability. The results showed that the green have significant effect on green innovation while significant effect in mediation analysis on environment sustainability. The findings showed that the green technology has significant effect on environmental sustainability and significant on green innovation and significant when green innovation sued as mediating variable. Green finance refers to the financial resources, assistance, or



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investments directed towards projects that mitigate carbon emissions, hence promoting sustainable development and fostering a more resilient future (UNEP, 2020). Consequently, green finance represents a superior financial strategy for addressing environmental deterioration by curtailing carbon emissions (Meo & Karim, 2022). Buh-ringer *et al.*, (2015) discovered that financial investment in promoting renewable energy use and innovation within the energy industry is essential for ensuring environmental sustainability. Green technology innovation refers to strategies aimed at minimizing waste and pollution while alleviating the adverse effects of carbon emissions on the environment (Qamar *et al.*, 2021). Technological innovation enables the adoption of clean and green technology, hence mitigating environmental deterioration (Fang, 2023). Numerous studies indicate that green technology innovation has a substantial role in reducing CO₂ emissions (Kuang *et al.*, 2022; Shan *et al.*, 2021).

The study indicates that green finance, green technology, GDP, and energy consumption all have substantial impacts on environmental sustainability, with green finance and green technology exhibiting notably strong positive benefits. The research indicates that whereas elevated GDP initially corresponds with increasing environmental degradation from heightened resource consumption, this impact lessens when significant expenditures in green finance and the adoption of clean technologies are implemented. Energy usage continually adversely affects sustainability measures, while this link is tempered by the extent of renewable energy integration facilitated by green technical innovations. The findings indicate that specific financial policies promoting eco-innovation can dissociate economic growth from environmental damage, achieving optimal sustainability when green finance initiatives directly finance technological solutions that diminish the ecological impact of energy consumption while preserving economic productivity. The findings highlight the need for cohesive policy strategies that concurrently tackle financial, technical, and energy system changes to attain significant sustainability advancements.

Conclusion

Green finance has emerged as a prominent subject of discussion as the present generation recognizes the significance of a sustainable environment. Green finance refers to the provision of financial services for environmental protection initiatives, specifically “the aggregation of economic activities that rejuvenate the environment and enhance resource efficiency,” which includes the support of sustainable energy, clean and safe energy, eco-friendly transportation, and green building projects. The phrase “green” refers to efforts that reduce pollution, conserve natural resources, and promote sustainable development. The advancement of green finance encompasses the accessibility of loans to achieve a sustainable ecological environment. Green finance includes green securities, green credit sources, green investments, and carbon financing. Green money serves as a catalyst for ecological growth in two distinct ways. Firstly, it promotes businesses to adopt environmentally safe practices and goods; secondly, it reduces pollution by substituting high-energy machinery with energy-efficient alternatives. The advancement of green financing is contributing to poverty reduction by enhancing farmers' knowledge of green goods. Farmers should be incentivized to cultivate green and organic crops devoid of any substances that contribute to environmental harm.

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