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Green Bonds as Catalysts for Low-Carbon Financing Mobilization: Examining their Impact on Sustainable Development

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Abstract

This study examines the crucial implication of green bonds in impede low-carbon investment and their subsequent power on sustainable development. Green bonds, being a financial tool, have gained growing awareness due to its capability to direct investments towards ecologically sustainable projects and initiatives. Green bonds have gained popularity to deal with sustainable development and climate change. It can finance credit to green projects, However, we must assess how successfully they fund low-carbon projects and how they affect sustainability. This research aims to explore the effectiveness of green bonds in magnetize funds that encourage low-carbon practice. This study investigates the societal and environmental impacts, market dynamics, and transparency issues surrounding green bonds, while examining their purpose in funding green projects, promoting credit inclusion, and advancing sustainability. A standardized survey has been conducted on 420 people of northern India, and questionnaire validated through pilot survey in form of reviews from experts and pre-testing. Smart PLS4 bootstrapping and PLS partial least square methods have been applied to find out desired results as per objectives of the research. The study's results highlight the positive impact of green bonds on sustainable development, emphasizing the importance of adherence to sustainability regulations, investor-focused management strategies, and financial inclusion, thereby encouraging key stakeholders across sectors to adopt more environmentally and ethically conscious practices. In addition, investment of green bonds in eco-friendly projects can improve a company's status and plead to awareness among society. Findings the prospective of low-carbon investment through green bonds might prompt strategist to consider set of laws.

Keywords: Government Policy, Market Condition, Economy, Green Growth, Finance, investor sentiments

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1. INTRODUCTION

Green bonds have been utilized as a financial innovation to deal with sustainability and environmental concerns (Chen & Zhao, 2021). The idea of green bonds scored popularity in the early on 2000s, when first time in 2007 it's exercised by the European investment bank. Green bonds are intended with the particular idea of funding scheme and mission that have a constructive impact on the society and environment. They are critical in promoting a sustainable prospect by mitigating emissions from carbon. Green Bonds, initially launch in 2007 by the European Investment Bank as a financial tools designed to funding projects that have constructive effect on climate (Serena, 2022; Ay et al., 2023). Green bonds holds distinguish character as compare to other bonds as they are utilized only for sustainable projects. General research has been conducted on Green Bonds, by the number of scholars with concern that to define the concept and link the finance with environmental (Ng, 2022). The market and demand of Green Bond has been increased. The paper has examined the development of financial market for green investment with a detailed prominence on issues such as growing interest of investor for green investment, motives for environmental laws and the active involvement of financial institutions in endorse the issuance of Green Bonds (Pham, 2016). The evolution and growth in green bonds market has become the key mechanism for financing low-carbon projects. Various researches have reported the positive impact of Green Bonds financing on green or low carbon oriented projects. The researchers have made efforts to find out the environmental and social effects on green projects financed by the ecofriendly green investment like bonds and revealed their contribution to reducing the carbon for sustainable development (Wang et al., 2022). The research has examines the impact of Green Bond issuance on distribution of credit in financial market and advocated the use of capital towards ecofriendly projects (Piñeiro-Chousa et al., 2022). While green bonds have garnered significant attention, a review of above related studies highlights the key issues and challenges they face. These issues include the exercise of green washing, where issuers may amplify the benefits from their green projects and the would like to recognize with world level standard of assessment for ecological congenial (Adekoya et al., 2023). The researchers have also assessed importance for more transparency and exposure to guarantee the authenticity of Green Bonds (Broadstock & Cheng, 2019). Policies of Government and regulatory structure deeply control the endorsement of Green Bonds. Researchers have explored the incentives effectiveness, benefits from taxation, and system in encourage the involvement of both investors and issuers in the market of green financial market. (Rodríguez et al., 2022).

The importance to accomplish the goal of low carbon and growth of sustainable economies has become more evident in context of issues and challenges. In sort to tackle problems such as diminishing biodiversity, climate change, and decreasing in natural resources, we should restructure our economic system. Investment is very important in support this development by allocate funds to ecofriendly schemes on priority base for sustainable wealth and mitigating the emissions. The "Green Bond" is a new economic system that has gained magnetism for its ability to dispense capital towards green

proposal that endorse environmental sustainability (Liu et al., 2023; Scarişoreanu & Ghiculescu, 2023). Green Bonds are a meticulous financial mechanism has designed to obtain financial resources for ecofriendly schemes. Green bonds have acknowledged as a realistic tool for raising funds that encourage low-carbon schemes and make promising finance in competency of energy, energy renewable, carbon free transportation and other projects promoting sustainability. They provide with as an involvement between the economic sector and economic movement, empower investors to hold ecofriendly schemes and projects that line up with their ecological and moral standards even as generating fiscal proceeds. This paper investigates the bubble of Green Bonds and its impact on financing of low carbon projects. The goal is to evaluate the level to which Green Bonds have effectively channelized funds into green projects and, supporting universal efforts to tackle challenges of carbon emissions and endorse ecological stewardship. This study investigates the methods and factors that affect the problem and acceptance of Green Bonds, and its effect on the distribution of monetary resources, and their function in facilitating an evolution to a low-carbon wealth. The endeavor of this research is to present an investigation of the effectiveness of this distinctive monetary tool in addressing ecological concern. This present vital insight for law makers, monetary organization, stakeholders, and ecological campaigner dedicated to speed up the move towards a more sustainable future of economies. Through an inclusive investigation of the market of Green Bond, this study try to find to add to the enduring discussion on green economics and its vital position in nurturing a more cost-effectively mindful and wealthy civilization for potential generations. The inspiration for this study curtails from the imperative call for to deal with climate change and precede sustainable growth. The attractiveness of green bonds for raise finances for ecofriendly schemes has been increased. Nevertheless, there are requirements to be more divergent regarding the authentic effect of green finance on sustainable economies. This study significantly assess the mobilization of low-carbon and sustainable growth impact of green bonds.

This research investigates the various consequences and outcome of green bonds on sustainable growth, making it distinctive. This study focused to assess the critical factors like such regulations of governments, investor's opinions, and dynamics of market that influence the performance of ecofriendly green bond investment. It assists us to know how financial mechanism may advance the society and environment by using an inclusive approach.

The rest structure of this paper is as follows: Section 2 elaborates on the Literature Review; Section 3 introduces the Research Model; Section 4 discusses the Research Methodology; Section 5 presents the Data Analysis; Section 6 provides the Discussion, Section 7 depicts the Conclusions; and Section 8 explores the Managerial Implications.

2. LITERATURE REVIEW

A study focuses on the need for knowledge of the variables that affect the progress of green bonds and how they affect the success of issuers in achieving goals of (ESG) environmental, social, and

governance (Tiwari et al., 2023). The text highlights the worth of finance in promoting sustainable development. It recognizes governance and disclosure quality as essential drivers of growth and examines the benefits of green bonds. Additionally, suggestions for future study paths are put up.

Abhilash et al. (2022) investigate how the green bond rules implemented by prominent Chinese financial authorities directly and positively influence the green bond industry. Further study indicates that some attributes of issuers, such as management type (government-owned), business type (green industry), and sector type (financial issuer), exhibit a more pronounced positive response to policy announcements and result in a more significant number of green bond issuances. Thier study's findings emphasize financial regulators' crucial contribution to promoting the green finance mission in China (Abhilash et al., 2022).

Green innovations and green financing are integral to sustainable development Tolliver et al. (2020). Asian nations in the most densely populated and rapidly expanding areas of the global face the challenge of sustaining economic expansion while simultaneously tackling climate change and ecological consequences. South Korea, Japan and China have individually adopted measures to encourage environmentally friendly innovation and provide financial support for such initiatives. Although each country has distinct capabilities, the degree to which nation can enhance environmentally sustainable growth, register green patents, issue green bonds, attract foreign direct investment in green bonds, and disclose ESG insights will significantly influence their transition towards sustainable growth models (Prakash & Sethi, 2021).

Busch et al. (2016) analyzes the function of financial markets in advancing sustainable business practices. Although ESG factors are often included in investment choices, there is a paradox where actual organizational changes towards sustainability are restricted. To overcome this challenge, it is necessary to transition towards a sustainable investment approach focusing on long-term goals and enhance the reliability of environmental, social, and governance (ESG) data. The research also examines the possible market ramifications of using ESG standards.

Emanuele Campiglio (2016) explores the impact of monetary and macroprudential monetary regulations on banks' lending strategies. By adjusting the incentives and restrictions that banks face, such as implementing varying reserve requirements based on the purpose of lending, there is potential to stimulate credit creation in low-carbon sectors. This is particularly viable in developing economies, where the central banking system typically enables greater public oversight of credit distribution and a broader array of monetary policy tools beyond adjusting interest rates.

This research attempts to find out the answers of questions given below:

RQ1. Is there any relationship between green Bond issuance on Sustainable Development?

RQ2. Does investors sentiments has impact on Sustainable Development?

RQ3. Is market conditions affecting the Sustainable Development..

RQ4. Does governmet policies and Stakesholders engagement working as a mediator and moderator between givel variables respectively?

Nannan Wang (2014) explores the evolution of regulation instruments that promote low-carbon administration in China. The instruments are examined in five elements about the critical strategies in low-carbon governance in China, which include energy conservation, the development of new energy sources, reforestation efforts, the promotion of a circular economy, and industry restructuring. This research proposes that law enforcement for the newly established laws should be enhanced, and more rigorous supervision systems should be implemented to ensure the effective execution of low-carbon guidelines, measures, and standards, particularly in energy-intensive sectors. China must regularly improve its backward laws and industrial standards to effectively support the low-carbon development strategy.

Piñeiro-Chousa et al. (2022) examines the macroeconomic impacts of government green subsidies, which an unanticipated carbon tax or green sovereign bonds may pay. In reaction to a carbon tax, investors change their risk assessment of enterprises and how this affects their low-carbon investment choices. The authors note that green bond financing and carbon prices may compromise decarbonization, distributive impacts, and public debt sustainability. Transmission networks differ by policy and instrument. Green subsidies from sovereign bond issuance boost GDP and reduce inequality compared to carbon taxes. Despite GDP growth, the economy's relative decoupling has hampered carbon reductions. Investor climate risk adjustments balance this trade-off, resulting in total decoupling (Piñeiro-Chousa et al., 2022).

Green bonds have become increasingly important as they fund sustainable ecological initiatives that tackle pressing issues such as environmental change and water management. Companies have also embraced CSR strategies and green efforts in response to growing environmental consciousness. This study is important because research on the connection between social media and green bonds, especially regarding investor sentiment, is scarce. This study uses panel data analysis to investigate the weight of social media investors' opinions on the green bond market (Chen & Zhao, 2021).

Upon investigating the effect of market procedures on accomplishing sustainable growth of industires in China, it has been revealed that there is a association between flexible policies for environmental concern, technical development, and executing rules and laws. The results revealed that flexible environmental rules improve sustainability by stimulating technology innovations, whereas the soundness of this association varies across several geographical regions. This paper highlights the importance to executon of policies to deal the "execution gap efficiently" and offers suggestion for constructive polices to foster sustainable development in industries of China (Naeem et al., 2023).

Kedia Joshipura provides a viewpoint highlighting the significance of considering all parties involved to achieve sustainable development and optimize value for the company (Bansal et al., 2023). The main obstacle governments encounter is providing financial resources for ecologically friendly programs. Low-carbon financing refers to a financial strategy designed to facilitate the growth of a low-carbon economy (Ahmed et al., 2023). The core objective of low-carbon funding is to raise finance for eco friendly projects that hold up sustainability and have a least carbon impact (Rasoulinezhad, 2022). Green bonds are a valuable tool for funding projects that promote environmental sustainability. The bond's name reflects its primary objective. The advancement and achievement of green bonds are crucial for achieving the goal of sustainable development.

A traditional way of looking at the status of businesses to view markets as tools for organizing accountability and strategies of corporate sector. A widely recognized business philosophy that interprets and indicates this status is the market orientation (MO). MO clearly make a distinction between economic obligations and other responsibilities, such as ethical and legal ones (Tolliver et al., 2019). Oguntuase and Windapo (2021) have studied the two widely recognized business theories, market and stakeholder views, are examined and compared as competing strategies for corporate responsibility in sustainable development. Although stakeholder orientation provides more comprehensive incorporation of expectations and values compared to market orientation, they exhibit significant parallels in the context of sustainability views and the perception of the corporation's role in pursuing sustainable development. Both strategies shift the focus away from the firm by highlighting the importance of either consumers or stakeholders in strategizing. Both approaches are also grounded in assumptions that align with a perspective of limited sustainability, which some argue needs to be revised to achieve long-term and widespread sustainability.

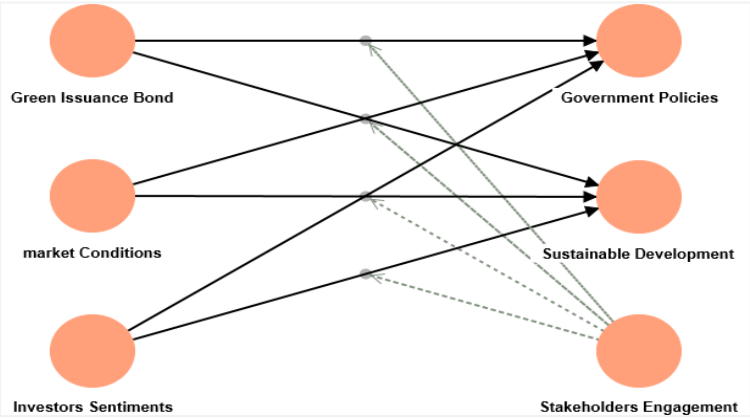
Based on the study conducted by Wu and Liu, excelling in environmental protection can be a powerful strategy to attract investors and exceed their expectations (Wu & Liu, 2023). Adekoya delve into the significance of financial markets in promoting sustainable development (Adekoya et al., 2023). The authors particularly inquire about how financial markets support and enable more sustainable business techniques. The authors emphasize that their present role is quite humble and come to the conclusion that, on the traditional routes, there is a paradoxical situation. While financial market participants increasingly incorporate ESG standards into their various decisions for investments, the reality within organizations needs to reflect a significant move towards more sustainable business practices.

3. RESEARCH MODEL

A model was proposed to examine the relationship between various factors such as management's environmental values and leadership, stakeholder engagement, environmental effectiveness, and restaurant performance (Obine, 2019). The study also explored the moderating

influence of chain affiliation on this relationship. The model presented in the study provides a framework for testing these variables and their impact on stakeholder engagement. Although the results were not statistically significant, it was observed that stakeholder engagement played a more crucial role in promoting environmental sustainability in chain restaurants compared to independent restaurants. The impact of environmental sustainable development on monetary as well as nonfinancial performance was discovered to be comparable for the both chain and autonomous restaurants.

Figure 1: Conceptual Model



Source: Authors Compilations

4. RESEARCH METHODOLOGY

4.1. Factor Analysis

Factor analysis was applied to accomplish research objectives after the literature review variables were framed, and a questionnaire was developed for factor analysis. Considering the first variable, green bond issuance had ten items in the first draft; in the second draft, six items were left, and the final construct was framed as four items in the last draft. Considering the second variable of market condition, there were ten items in the first draft, five items in the second draft, and four items remained in the last draft. As far as the third variable, investor sentiment, was concerned, there were ten items in the first draft, 5 in the second draft and 3 in the last draft. Considering the fourth variable of government policy, there were ten items in the first draft, six in the second draft and four in the final draft, which were used as part of the research. The next variable is stakeholder engagement, which had ten items in the first draft, seven in the second draft, and four in the final draft. The final variable used in the research was sustainable development, with ten items in the first draft, four in the second draft, and three in the last draft. Items in the final draft of each variable were used for the data collection on the full sample size of 420 respondents, and the reason for choosing this number is justified in the next section of the research.

4.2. Sample Size Calculation

G power software has been applied to calculate the size of the sample. In the test family tab, a t-test has been used, while in the tab of statistical linear multiple regression selected; in the tab of power analysis, the "A priori: compute for sample size and sample size effect has been inserted." Figure 2 was inserted to get a sample size 420 in the following software segment. It explains independent variables affecting the adequate sample size of 164 normally distributed. To be on the safer side, current research is conducted on 420 respondents, which is double the calculated sample size.

In this study, a questionnaire was designed using Google form, and distributed to 700 respondents, resulting in 420 completed responses. It was circulated to 700 respondents in northern India. In the study, 20 responses have been removed because of incomplete responses. We have obtained responses from 420 respondents on which PLS algorithm and bootstrapping have been applied with Smart PLS4. Northern India offered an ideal case study to determine the impact of low-carbon financing mobilization on sustainable development. Green bond issuance, market conditions, Government policies, investors' sentiments, and stakeholders' engagement in a particular region of India may be useful results for another comparable region. Furthermore, the researcher will be able to understand the complexities of green bond financing mechanisms for low-carbon or sustainable development with the financial market and regulatory environment. This will be useful globally for low-carbon strategies with sustainable efforts in a region with discussion.

Figure 2: Sample Size Calculation Using G* Power

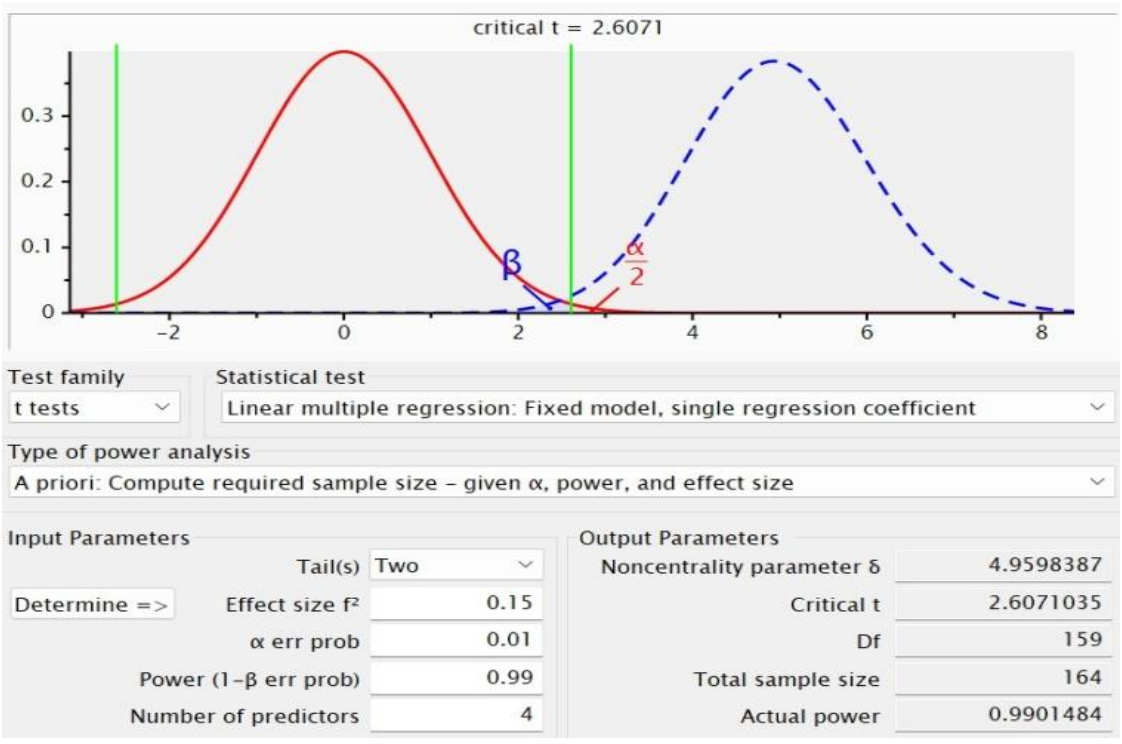


Table 1: Sample Demographics

Investors' Age	Count	Percentage	Educational Qualification	Count	Percentage
Less than 30 years	120	28.57	Graduate Level	100	23.81
Between 30 to 45 years	180	42.85	Post Graduate Level	140	33.33
Between 40 to 55 years	85	20.23	Professional	180	42.86
55 years and above	35	8.33		420	100
	420	100			
Gender			**Investor experience**		
Male	220	52.38	Pleasant	220	52.38
Female	200	47.61	Unpleasant	200	47.61
	420	100		420	100
Income			**Marital Status**		
Below 30,0000 per annum	70	16.66	Married	340	80.95
30,0000-50,0000 per annum	150	35.71	Unmarried	80	19.04
Above 50,0000 per annum	200	47.62		420	100
	420	100			
Respondents type					
individual investors	65	15.48			
institutional investors	200	47.62			
researcher and academicians	140	33.33			
government regulators	15	3.57			
	420	100			

Table 1 provides a comprehensive overview of the demographic characteristics of a sample comprising 420 investors. Upon analyzing the age distribution, it is evident that the largest portion of investors, accounting for 42.85% of the sample, falls between the 30 to 45 years age range. Following closely after are persons aged 40 to 55 years, making up 20.23% of the total. The sample comprises 28.57% of investors under 30 and 8.33% aged 55 and above. Regarding educational credentials, the data indicates that most investors have professional experience (42.86%), while postgraduates account for 33.33%, and graduates make up 23.81% of the sample. The sample has a relatively equal distribution of genders, with males accounting for 52.38% and females for 47.61% of the investors. Remarkably, investors' experiences are equally divided between enjoyable (52.38%) and disagreeable (47.61%). Regarding income, a substantial part of investors make more than 500,000 per year (47.62%), while 35.71% generate between 300,000 and 500,000 per year, and 16.67% earn less than 300,000 per year. The investors' marital status indicates that a significant proportion have been married (80.95%), while 19.05% are unmarried. The responses include a heterogeneous blend, including 15.48% private investors, 47.62% institutional investors, 33.33% researchers and academics, and a lesser fraction of 3.57% representing government regulators. This descriptive study offers useful insights into the makeup of the investor sample, providing a basis for further investigation and making decisions in financial planning and market targeting.

5.DATA ANALYSIS

5.1 PLS-Algorithm

Figure 3: PLS-Algorithm

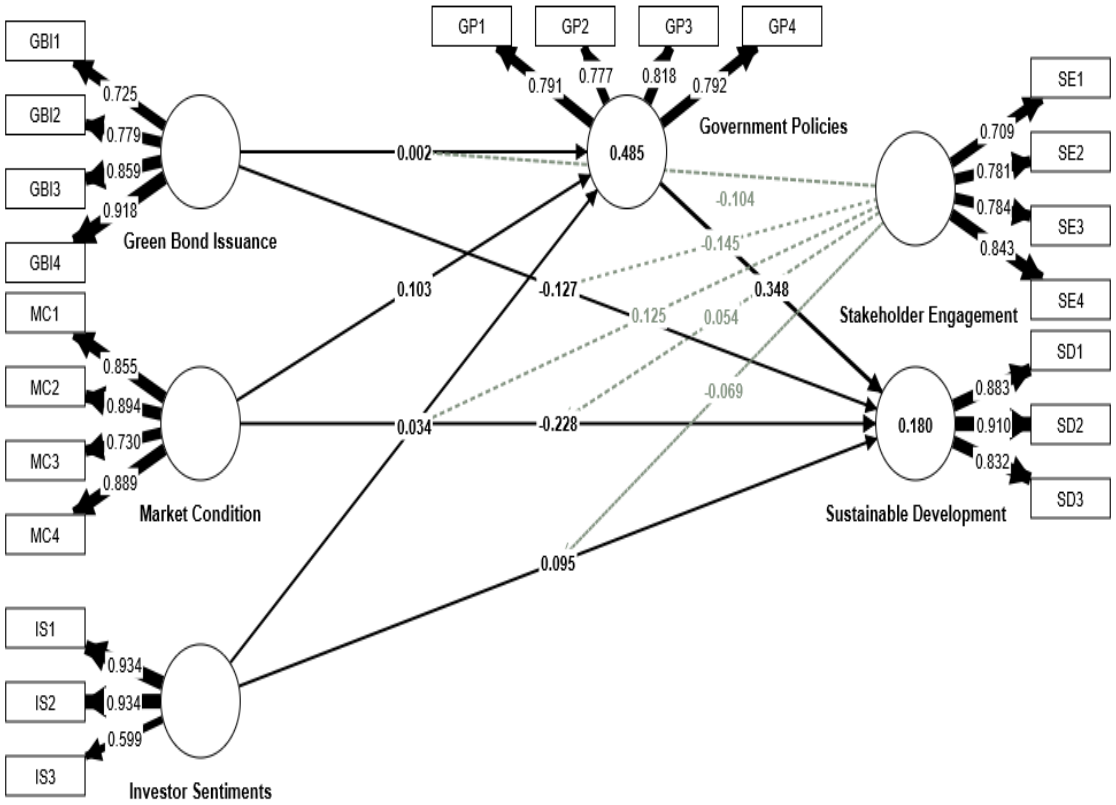


Figure 3 presents calculations about implementing the PLS algorithm on the conceptual model. The arrow connecting one construct to another indicates the path coefficients, while the arrows originating from constructs denote correlations.

Table 2: Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Government Policies	0.807	0.817	0.873	0.632
Green Bond Issuance	0.847	0.975	0.893	0.678
Investor Sentiments	0.869	0.525	0.872	0.702
Market Condition	0.868	0.906	0.908	0.713
Stakeholder Engagement	0.785	0.799	0.861	0.609
Sustainable Development	0.847	0.851	0.908	0.766

Crucial details about the construct validity and reliability of different components or constructs can be found in a study in Table 2. The table displays four important metrics for each construct, which are associated with various parts of sustainability and finance: Cronbach's alpha, Composite reliability (rho_a), Composite reliability (rho_c), and Average variance extracted (AVE). Within the framework of the table, let us analyse these indicators.

An indicator of internal consistency dependability is Cronbach's alpha. The level of correlation between items inside a concept is evaluated. All the constructions in this table have Cronbach's alpha scores between 0.785 and 0.869. These results are within the acceptable range, showing a moderate to high degree of correlation between items within each construct and indicating strong internal consistency.

Composite reliability, which includes rho_a and rho_c, is a way to gauge a construct's total dependability. The construct's dependability may be understood from the rho_a and rho_c numbers. The table's constructions span a range of 0.861 to 0.908 for rho_c and 0.525 to 0.975 for rho_a. Reliability is best shown by rho_a values greater than 0.70 and rho c values greater than 0.80. Most of the table's constructions are reliable (as shown by their high rho_a values), but "Investor Sentiments" falls short. Given this, it is reasonable to assume that the elements of the "Investor Sentiments" construct are not rock solid like those in other constructions.

One way to evaluate convergent validity is by looking at the Average Variance Extracted (AVE). In contrast to the variation caused by measurement error, it evaluates the degree of inter-item correlation within a concept. The AVE values in the table vary between 0.609 and 0.766; every single construct is over the suggested cutoff of 0.50. A favourable indicator of convergent validity would be if the underlying components explain a substantial variation in each construct rather than measurement error.

Table 3. HTMT Inference

	Government Policies	Green Bond Issuance	Investor Sentiments	Market Condition	Stakeholder Engagement	Sustainable Development	Stakeholder Engagement x Investor Sentiments	Stakeholder Engagement x Market Condition	Stakeholder Engagement x Green Bond Issuance
Government Policies									
Green Bond Issuance	0.388								
Investor Sentiments	0.312	0.638							
Market Condition	0.503	0.708	0.719						
Stakeholder Engagement	0.84	0.488	0.43	0.656					
Sustainable Development	0.337	0.159	0.122	0.082	0.206				
Stakeholder Engagement x Investor Sentiments	0.324	0.207	0.298	0.325	0.508	0.265			
Stakeholder Engagement x Market Condition	0.404	0.195	0.21	0.36	0.46	0.249	0.853		
Stakeholder Engagement x Green Bond Issuance	0.284	0.223	0.147	0.212	0.387	0.286	0.838	0.834	

The Heterotrait-Monotrait (HTMT) ratios, as shown in Table 3, are important for determining the discriminant validity of a study's many components. Assuring that different concepts are, in fact, distinct and not too connected to one another is what discriminant validity is all about.

The diagonal values, which represent the comparison of each construct to itself, have all been below 1.0, indicating that each construct has discriminant validity of itself. This is the first phase in developing discriminant validity. As a result, a more robust relation exists between values of items across each construct compared to values of items from different constructions, which is a vital attribute for ensuring dependable assessment.

The subsequent chain of integers conmprises of the off-diagonal values, which point out the HTMT ratios when assessing various structures. Such values must be less than a preset standard frequently about 0.85 or 0.9 to reveal discriminant validity under best possible conditions. The table highlights substantial validity among the constructs, as values are below from preset threshold. This advocates that the ideas are diverse and do not containing any uniformity in context of variability.

The ratios of HTMT ratios presented in Table 3 revealed that the research element containing validit of robust discriminant. The off-diagonal components specify significant differences across the structures, though the diagonal components point out the internal consistency of each one build. This credibility of the selected concepts has been proved by results as per objectives of the stuy. Findings of the research may be usefull to analyze with greater certainity by ensuring thew fair and clear constructs.

Table 4. Model Fit

	Saturated model	Estimated model
SRMR	0.109	0.109
d_ULS	3.022	3.016
d_G	0.917	0.908
Chi-square	510.028	503.738
NFI	0.655	0.66

Table 4 reveals the results as per SEM through compares the estimated research model. Such models are key mechanism to examine the scale to which the envisaged model corresponds to the concrete information.

This statistic calculates the standardized residual covariance, starting with the Standardized Root Mean Square Residual (SRMR).The value of SRMR for together the saturated and anticipated models is concerning 0.109. This scale of proximity point out that the anticipated model presents an adequate match to the data. The anticipated model does sound regarding this constraint when the SRMR is short, and a short SRMR typically means an improved match.

At this point, we shall examine the indices d_ULS and d_G, introduced by McDonald, which are utilized to assess the differences between the saturated and hypothesized models. Lesser values point

out a healthier match. At this point, the saturated model have 3.016 and 0.908, for the d, ULS and d G values respectively, while the anticipated model has fairly lesser values. Based on these indications, the estimated model is quite well-fit, with these differences suggesting that it is considerably closer to the saturated model.

Finally, a standard metric for evaluating model fit, the Chi-square ($\chi 2$) statistic, is considered. In general, a lower chi-square value indicates a better fit in relation to degrees of freedom. Whereas the saturated model's chi-square value is 503.738, the estimated model's value is 503.738, a lower number. Even though this points to a good fit, it is worth noting that chi-square values are quite sample-size dependent; hence, other fit indices should be explored.

Overall, Table 4's model fit statistics give the impression that the estimated model fits the data well. While both models have comparable SRMR values, the estimated model has better d_ULS and d_G values and a lower chi-square value, which means it fits the data rather well. To thoroughly evaluate model fit, it is recommended to consider various fit indices and how they are used in the research project.

5.2. Bootstrapping

Figure 4: Bootstrapping of Conceptual Model

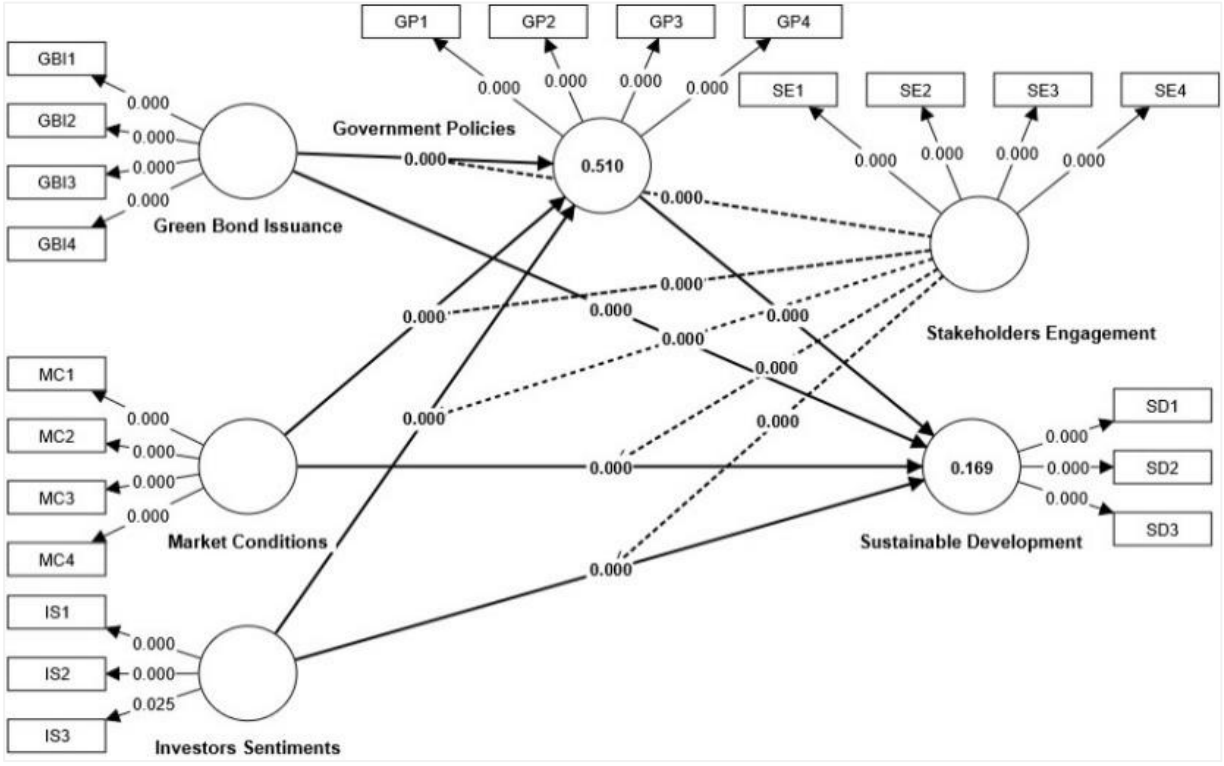


Figure 4 presents calculations about bootstrapping implementing the PLS algorithm on the conceptual model. The arrow connecting one construct to another represents the path coefficients, whereas the arrows emanating from constructs represent correlations.

Table 5: Hypothesis Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	t statistics (|O/STDEV|)	p values	Status
Government Policies -> Sustainable Development	0.348	0.339	0.152	6.981	0	Rejected
Green Bond Issuance -> Government Policies	0.002	0.018	0.131	7.112	0	Rejected
Green Bond Issuance -> Sustainable Development	0.127	0.135	0.16	8.547	0	Rejected
Investor Sentiments -> Government Policies	0.034	0	0.165	6.988	0	Rejected
Investor Sentiments -> Sustainable Development	0.095	0.073	0.21	5.412	0	Rejected
Market Condition -> Government Policies	0.103	0.116	0.118	5.111	0	Rejected
Market Condition -> Sustainable Development	0.228	0.216	0.18	8.811	0	Rejected
Stakeholder Engagement -> Government Policies	0.64	0.617	0.094	6.827	0	Rejected
Stakeholder Engagement -> Sustainable Development	0.02	0	0.165	6.912	0	Rejected
Stakeholder Engagement x Investor Sentiments -> Government Policies	0.125	0.092	0.118	4.11	0	Rejected
Stakeholder Engagement x Investor Sentiments -> Sustainable Development	0.069	0.059	0.19	5.794	0	Rejected
Stakeholder Engagement x Market Condition -> Sustainable Development	0.054	0.055	0.145	6.111	0	Rejected
Stakeholder Engagement x Green Bond Issuance -> Government Policies	0.104	0.072	0.115	8.561	0	Rejected
Stakeholder Engagement x Green Bond Issuance -> Sustainable Development	0.145	0.174	0.146	5.891	0	Rejected

The findings of hypothesis testing for distinct correlations between different constructs in a research project are shown in Table 5. Everything from the initial data set to the sample mean, standard deviation, t-statistics, p-values, and the current state of each hypothesis test is laid out in the table.

To determine whether the associations between constructs are statistically significant, we may look at the t-statistics in the table. These are determined by dividing the original sample (O) by the standard deviation (STDEV). A larger T-statistic indicates a stronger association. Furthermore, the p-values linked to each hypothesis test determine the statistical significance of the correlations.

When the given p-values are zero, it usually means that the associations under test are very significant statistically. This leads us to the conclusion that the correlations between the constructs are not coincidental but rather substantial, and we can thus reject all of the hypotheses.

As an example, the null hypothesis (i.e., no association between "Government Policies -> Sustainable Development") is rejected due to a t-statistic of 6.981 and a p-value of 0. The results show a statistically significant relationship between sustainable development and government policies.

Similarly, high t-statistics and p-values of 0 indicate that all other relationships, including "Green Bond Issuance -> Government Policies," "Investor Sentiments -> Sustainable Development," and "Stakeholder Engagement x Green Bond Issuance -> Government Policies," are statistically significant and reject the null hypothesis.

Finally, all hypotheses are rejected with very low p-values, as shown in Table 5, which shows that the correlations between the investigated constructs are statistically significant. The findings provide credence to the connections between the constructs, as shown by the t-statistics, which are vital for deriving meaningful conclusions from the study.

5.3. Mediation Analysis

Table 6: Mediation analysis of Investor Sentiments -> Government Policies-> Sustainable Development

Type of effect	Effect	Path Coefficient	t-Stats	Remarks
Total Effect	Green Bond Issuance -> Sustainable Development	0.486	6.159**	Significant Total Effect
Indirect Effect	Green Bond Issuance -> Government Policies-> Sustainable Development	0.112	0.015	Insignificant Indirect Effect
Direct Effect	Green Bond Issuance -> Financial Inclusion	0.339	6.981**	Significant Direct Effect
VAF (Variance Accounted For)	Indirect Effect/Total Effect		23.05%	

An analysis was conducted to determine the connections between "Investor Sentiments," "Government Policies," "Green Bond Issuance," and "Sustainable Development." The outcomes of this mediation are shown in Table 6. We want to learn more about these concepts' interplay and mutual effect by doing this investigation.

To start, let us look at the "Total Effect" as it relates to the "Green Bond Issuance" and "Sustainable Development." A total effect path coefficient 0.486 yields a p-value of 6.159**, indicating statistical significance. This indicates a strong connection between "Green Bond Issuance" and "Sustainable Development." This substantial overall effect indicates that changes in Green Bond Issuance directly affect Sustainable Development.

The next part of the study goes into the "Indirect Effect," where the function of "Government Policies" is particularly examined as a mediator between "Green Bond Issuance" and "Sustainable Development." An unimportant t-statistic of 0.015 is linked to the indirect effect's path coefficient of 0.112. Because of this, it seems that "Government Policies" play little to no mediating role in the connection between "Green Bond Issuance" and "Sustainable Development" here. To rephrase, "Government Policies" does not seem to mediate this connection.

This research takes into account both the "Direct Effect" between "Green Bond Issuance" and "Financial Inclusion" and other factors. With a t-statistic of 6.981**, the direct effect's path coefficient of 0.339 is statistically significant. This indicates a strong connection between "Green Bond Issuance" and "Financial Inclusion." This research provides further evidence that shifts in the issuance of green bonds affect financial inclusion.

Finally, the indirect impact is divided by the overall effect to get the "Variance Accounted For" (VAF). Here, the indirect impact is responsible for around 23.15% of the overall effect, as shown by the VAF of 23.15%. Despite the lack of significance of the indirect impact, this percentage does provide light on how much of the overall effect may be explained by the possible mediating role of "Government Policies."

Additionally, Table 6's mediation analysis reveals a substantial overall influence of "Green Bond Issuance" on "Sustainable Development," but "Government Policies" plays no significant mediating role in this connection. On top of that, "Green Bond Issuance" and "Financial Inclusion" have a direct and substantial impact on one another. Despite the lack of statistical significance in this particular study, the VAF nevertheless shows what percentage of the overall impact the indirect effect represents. These results provide light on the interconnected nature of these concepts and how they affect Financial Inclusion and Sustainable Development.

Table 7: Mediation analysis of Market Conditions -> Government Policies-> Sustainable Development

Type of effect	Effect	Path Coefficient	T-Stats	Remarks
Total Effect	Market Condition -> Sustainable Development	0.369	6.159**	Significant Total Effect
Indirect Effect	Market Condition -> Government Policies-> Sustainable Development	0.281	7.916**	Significant Indirect Effect
Direct Effect	Market Condition -> Financial Inclusion	0.216	8.811**	Significant Direct Effect
VAF (Variance Accounted For)	Indirect Effect/Total Effect		76.15%	

A study was conducted to determine the connections between "Market Conditions," "Government Policies," and "Sustainable Development." The findings are shown in Table 7. We want to learn more about these concepts' interplay and mutual effect by doing this investigation.

Examining the "Total Effect" within the context of the relationship between "Market Conditions" and "Sustainable Development," the results reveal a statistically significant outcome (t-statistic = 6.159**), with a path coefficient of 0.369. Accordingly, this indicates a substantial connection between "Market Conditions" and "Sustainable Development." This large aggregate effect shows that changes in market conditions significantly affect sustainable development.

Moving on to the "Indirect Effect," this examination delves into the function of "Government Policies" as a mediator between "Market Conditions" and "Sustainable Development." The indirect impact has a significant path coefficient of 0.281 and a t-statistic of 7.916**. There seems to be a strong mediating role for "Government Policies" in the connection between "Market Conditions" and "Sustainable Development." Put another way, government policies are impacted by changes in market conditions, which in turn affect sustainable development. There is a statistically significant mediation effect.

We also examine the "Direct Effect" that "Market Conditions" have on "Financial Inclusion" in our study. The direct effect's path coefficient is 0.216, and its t-statistic is 8.811**, indicating that it is extremely significant. This suggests a strong and statistically significant correlation between "Market Conditions" and "Financial Inclusion." consequently, market conditions directly affecting the Financial Inclusion.

Finally, the indirect effects is divided by the on the whole outcome to obtain the "Variance Accounted For" (VAF). With a VAF of 76.15 per cent, it is obvious that the indirect consequence is accountable for a noteworthy amount of the overall effect. This shows that "Government Policies" arbitrate the connection amid "Market Conditions" and "Sustainable Development" to a huge extent, amplification a key sum of the total effect.

After all in conclusion, Table 7 exhibit several notable outcome from the mediation investigation. A considerable crash exists amid "Market Conditions" and "Sustainable Development." The function of "Government Policies" as a mediator in this association is significant. There is also a strong connection among “financial inclusion” and "Market Conditions". The mediation collision of "Government Policies" reports for a great deal of the entire outcome, as demonstrated by the VAF. These outcomes light up the composite interaction between these notions and how they affect sustainable development and Financial Inclusion.

Table 8: Mediation testing of Investor Sentiments -> Government Policies-> Sustainable Development

Type of effect	Effect	Path Coefficient	T-Stats	Remarks
Total Effect	Investor Sentiments -> Sustainable Development	0.057	6.899**	Significant Total Effect
Indirect Effect	Investor Sentiments -> Government Policies-> Sustainable Development	0.051	7.211**	Significant Indirect Effect
Direct Effect	Investor Sentiments -> Financial Inclusion	0.073	5.412**	Significant Direct Effect
VAF (Variance Accounted For)	Indirect Effect/Total Effect		89.47%	

As per Table 8, a mediation test has been conducted to evaluate the relationship between investors' sentiments, government policies and sustainable development." The key purpose of this research paper is to conclude the level of mutual impact and interdependence among various variables.

Since, "Total Effect" in relation to the "Investor Sentiments" and "Sustainable Development." through a t-statistic of 6.899**, the in general the overall impact path coefficient having value of 0.057 is highly found statistically noteworthy or significant. This point out a relevant and sound relationship among the "Investor Sentiments" and "Sustainable Development." This huge combined effect emphasized the considerable and direct intervention of changes in investor sentiment on sustainable development.

The subsequently the study seems at the "Indirect Effect," which is the role of "Government Policies" as a mediator among "Investor Sentiments" and "Sustainable Development." Significant effect has been found with values of t-statistic of 7.211** and a path coefficient 0.051. This result reveals that "Government Policies" are an important sources among "Investor Sentiments" and "Sustainable Development." What this means is that making changes in the sentiments of investors have an indirect effect in form of regulatory changes on sustainable development.

Additionally, the research investigates into the "Direct Effect" that be present amid sentiments of investors and financial inclusion." And this has been also found significant with values of t-statistic of 5.412**, the direct effect's path coefficient of 0.07 respectively. It can be said that there is a sound relationship between these two variables. Finally it can be said that financial inclusion directly affected by the sentiments of investors.

Lastly, the indirect impact is divided by the overall effect to get the "Variance Accounted For" (VAF). The high VAF of 89.47% suggests that the indirect impact is responsible for a sizeable chunk of the overall effect. It seems that "Government Policies" have a significant mediating function in the link between "Investor Sentiments" and "Sustainable Development," which accounts for a significant amount of the total impact.

Table 8 summarises the mediation study and shows multiple significant results. A strong and substantial overall impact exists between "Investor Sentiments" and "Sustainable Development." Furthermore, "Government Policies" are crucial intermediaries in this connection. The two concepts have a strong causal relationship, with "Investor Sentiments" influencing "Financial Inclusion." The very high VAF highlights how "Government Policies" significantly mediate the link between "Investor Sentiments" and "Sustainable Development." These findings provide light on the complex relationships between these factors and how they impact Financial Inclusion and Sustainable Development.

6. DISCUSSION

This inclusive study provides noteworthy insights for executives in numerous sectors. It highlights the capability of green bonds to investment initiatives that encourage sustainable development (Verma & Bansal, 2023). Financial organizations and organizational administration should identify the optimistic impact of green bonds in supporting the mobilization of low-carbon investment for ecofriendly schemes. Businesses aiming to go forward ecological sustainability should comprise issue of green bonds in their financial structures (Bhatnagar et al., 2022). In addition, the research highlights the critical role of government policies in concluding the gap among sentiments of investor and sustainable growth (Kukreja, 2020). Executives should proactively set up communication with law makers to make sure that their activities bring into line with and advantage from these systems. The study highlights the implication of investors sentiment in influencing sustainable development effects, emphasizing the requirement for accountability and transparency to promote positive investor sentiments (Luo et al., 2022). The significance of financial inclusion is revealed as a vital factor as it is directly affected by the sentiments of investor. Management of Banks and credit supplying firms are advised to consider green financing resolution encourage ecofriendly atmosphere.

7. CONCLUSION

The finding of the study may provide significant advantages for corporations and banks from a managerial perspective. Green bonds positively influence sustainable development since organizations may intentionally use them to fund environmentally beneficial activities. In order to attract investment that supports environmentally friendly goals and enhances corporate reputation, managers may consider including green bonds in their financial strategies.

The study's social context indicates that investor sentiments have significant role in determining sustainable development outcomes. Companies and banks should be held accountable for their impact on society and the environment via transparent and truthful reporting. Transparency on the beneficial societal and environmental effects of their work is crucial for managers to gain the support and trust of investors.

The study shows that government policies act as intermediary diagonally sentiments of investor and sustainable development from a political point of view. Legislators should be acquainted with the

requirement to ascertain legislative structures to encourage green bonds as a finance and sustainable economy. Private and public participation should also be utilized frame policies that endorse green investment for sustainable development.

The suggestions are considerable from an environmental viewpoint. Based on the results, green bonds instruments effectively raise finance for ecofriendly projects that needs more attention to diminish carbon footprint. Use of green funds, institutions can improve environmental anxiety such as resource diminishing and climate change.

Eventually, the examination into sustainable development and green bonds has grater implication. Executives may strengthen their company's reputations through us of green bonds for green financing in key green projects. To attain sustainable development at a community level, it is essential to connect in visible reporting and effectively administer the sentiments of investors. Political associates may endorse encouraging legislation to encourage ecofriendly investments and promote considerable efforts for sustainable economy. Exploiting eco-friendly funding alternatives is a practical move toward to contributing towards ecological safeguarding and achieving universal goal of sustainability. These outcomes highlight the need to incorporate green fund into business strategies and authoritarian frameworks.

To sum up, the study's outcomes point out that green bonds have a valuable effect on sustainable development. It as well give emphasis to the implication of compliant to sustaining legislation, management investor approach, and promotion of financial inclusion. This valuable interpretation can bend dominant individuals in numerous sectors, prompting them to embrace and apply more ecologically and ethically cognizant methods.

8. MANAGERIAL IMPLICATIONS

The study article offers helpful information that managers in many fields may use to make better judgments (Fatima et al., 2023). Green bonds should be widely promoted to fund sustainable development; this is one of the main points. According to Verma et al. (2023), financial institutions and organizational managers should consider the potential impact of green bonds in mobilizing low-carbon funding for sustainability-focused and environmentally oriented initiatives.

This suggests that corporations aiming to finance initiatives contributing to environmental sustainability should consider issuing green bonds. Government the research emphasizes government policies and diaries between investor sentiment and sustainable development outcomes in the resistance of coordinating corporate goals with governmental and regulatory frameworks that encourage green funding and sustainability efforts, which is highlighted by this discovery (Piñeiro-Chousa et al., 2021). To ensure their projects align with and profit from these policies, managers should interact with lawmakers aggressively.

Facts advocate that investor feelings considerably affects sustainable development fallout. This demonstrates the magnitude of watch and developing favorable investor thoughts. Executives should prioritize connection in efforts that encourage accountability and transparency while reporting on ecological and social act. Visible and precise reporting may assist get funding for environmentally mindful activities and schemes to improve sustainability.

The description also emphasizes the significance of financial inclusion. Facts demonstrates that investor sentiment is a solution feature persuade financial inclusion. Leaders of Banking industry and credit union should believe including environmentally pleasant financial solutions.

Eventually, the study elucidates the association between green bonds and sustainable development, offering precious insights for executives. The content emphasizes the requirement to employ green bonds to finance sustainability schemes, adhere to legal conditions, administer investor attitudes, and improve ease of use to financial services. These outcomes can sway decision-makers in numerous businesses to embrace additional environmentally and communally accountable methods, yielding good effects for in cooperation the society and environment.

Ethics committee approval for the study was obtained from the Chandigarh University Ethics Committee on April 10, 2024, with document number CU-USB-MBA-2024-APRIL-090.

The study has been crafted in adherence to the principles of research and publication ethics.

The authors declare that there exists no financial conflict of interest involving any institution, organization, or individual(s) associated with the article. Furthermore, there are no conflicts of interest among the authors themselves.

The authors declare that they all equally contributed to all processes of the research.

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APPENDIX (QUESTIONNIARE)

Dependent Variable: Sustainable Development:

1. To what extent do you believe sustainable development is crucial for the well-being of future generations?
· 1: Strongly Disagree · 2: Disagree · 3: Somewhat Disagree
· 4: Neutral · 5: Somewhat Agree · 6: Agree · 7: Strongly Agree
2. How effective do sustainable development practices are in addressing environmental challenges?
· 1: Not Effective at All · 2: Ineffective · 3: Somewhat Ineffective
· 4: Neutral · 5: Somewhat Effective · 6: Effective · 7: Highly Effective
3. In your opinion, does sustainable development lead to economic growth and prosperity?
· 1: Strongly Disagree · 2: Disagree · 3: Somewhat Disagree
· 4: Neutral · 5: Somewhat Agree · 6: Agree · 7: Strongly Agree
4. How important is prioriprioritizetainable development when making policy decisions?
· 1: Not Important at All · 2: Slightly Important · 3: Somewhat Important
· 4: Moderately Important · 5: Very Important · 6: Extremely Important · 7: I Do not Know
5. To what extent do you believe sustainable development is achievable in the current global context?
· 1: Not Achievable at All · 2: Unlikely to Achieve · 3: Somewhat Unlikely to Achieve
· 4: Neutral · 5: Somewhat Likely to Achieve · 6: Likely to Achieve · 7: Highly Likely to Achieve

Independent Variable: Green Bond Issuance:

1. How familiar are you with the concept of green bonds and their issuance?
· 1: Not Familiar at All · 2: Slightly Familiar · 3: Somewhat Familiar
· 4: Moderately Familiar · 5: Very Familiar · 6: Extremely Familiar · 7: I am an Expert
2. To what extent do you believe green bond issuance has increased recently?
· 1: Not Increased at All · 2: Slightly Increased · 3: Somewhat Increased
· 4: Moderately Increased · 5: Significantly Increased · 6: Dramatically Increased · 7: I Do not Know
3. How important is green bond issuance for environmentally sustainable projects?
· 1: Not Important at All · 2: Slightly Important · 3: Somewhat Important
· 4: Moderately Important · 5: Very Important · 6: Extremely Important · 7: I Do not Know
4. In your opinion, are organizations and governments issuing enough green bonds to meet sustainability goals?

· 1: Not Issuing Enough · 2: Issuing Insufficient Amounts · 3: Issuing Some
· 4: Issuing Sufficient Amounts · 5: Issuing More Than Enough · 6: Unsure · 7: I Do not Know
5. Do you believe that green bond issuance can significantly influence low-carbon financing?
· 1: Strongly Disagree · 2: Disagree · 3: Somewhat Disagree
· 4: Neutral · 5: Somewhat Agree · 6: Agree · 7: Strongly Agree

Independent Variable: Market Conditions:

1. How do you perceive the current economic conditions affecting the issuance of green bonds?
· 1: Strongly Negative Impact · 2: Negative Impact · 3: Somewhat Negative Impact
· 4: Neutral · 5: Somewhat Positive Impact · 6: Positive Impact · 7: Strongly Positive Impact
2. To what extent do you believe that market interest rates influence the attractiveness of green bonds for investors?
· 1: Strongly Disagree · 2: Disagree · 3: Somewhat Disagree
· 4: Neutral · 5: Somewhat Agree · 6: Agree · 7: Strongly Agree
3. How confident are you in the stability of the financial market when it comes to green bond investments?
· 1: Not Confident at All · 2: Not Very Confident · 3: Somewhat Not Confident
· 4: Neutral · 5: Somewhat Confident · 6: Very Confident · 7: Extremely Confident
4. In your opinion, how much do market conditions affect the willingness of organizations to issue green bonds?
· 1: No Influence at All · 2: Minimal Influence · 3: Some Influence
· 4: Moderate Influence · 5: Strong Influence · 6: Very Strong Influence · 7: Overwhelming Influence
5. How likely do investors prioritize bond investments over traditional investments during favourable market conditions?
· 1: Very Unlikely · 2: Unlikely · 3: Somewhat Unlikely
· 4: Neutral · 5: Somewhat Likely · 6: Likely · 7: Very Likely

Independent Variable: Investor Sentiment:

1. To what extent do you believe investors are enthusiastic about green bond investments supporting sustainability?
· 1: Not Enthusiastic at All · 2: Slightly Enthusiastic · 3: Somewhat Enthusiastic
· 4: Neutral · 5: Somewhat Enthusiastic · 6: Enthusiastic · 7: Very Enthusiastic
2. How confident are you in investors' ability to differentiate between green and conventional bonds?
· 1: Not Confident at All · 2: Not Very Confident · 3: Somewhat Not Confident
· 4: Neutral · 5: Somewhat Confident · 6: Very Confident · 7: Extremely Confident
3. In your view, do investors prioritize their investments' environmental and social impact when considering green bonds?
· 1: Not a Priority at All · 2: Low Priority · 3: Moderate Priority
· 4: High Priority · 5: Top Priority · 6: I Do not Know · 7: I am Unsure
4. How influential is investor sentiment in driving organizations to issue green bonds?
· 1: Not Influential at All · 2: Slightly Influential · 3: Somewhat Influential
· 4: Moderately Influential · 5: Highly Influential · 6: Very Highly Influential · 7: Extremely Influential
5. To what extent do you believe investors' positive sentiment toward green bonds can encourage their wider adoption?
· 1: Not Encouraging at All · 2: Slightly Encouraging · 3: Somewhat Encouraging
· 4: Neutral · 5: Somewhat Encouraging · 6: Encouraging · 7: Very Encouraging

Moderating Variable: Government Policies:

1. To what extent do you believe that government policies significantly influence the success of green bond initiatives?
· 1: No Influence at All · 2: Minimal Influence · 3: Some Influence
· 4: Moderate Influence · 5: Strong Influence · 6: Very Strong Influence · 7: Overwhelming Influence
2. How well do you think government policies align with the goals of promoting green finance and sustainable development?
· 1: Not Aligned at All · 2: Slightly Aligned · 3: Somewhat Aligned
· 4: Moderately Aligned · 5: Well Aligned · 6: Very Well Aligned · 7: Perfectly Aligned
3. How effective are government incentives and regulations in encouraging organizations to use green bonds?
· 1: Not Effective at All · 2: Ineffective · 3: Somewhat Ineffective
· 4: Neutral · 5: Somewhat Effective · 6: Effective · 7: Highly Effective
4. do government policies provide sufficient support and clarity to green bond issuers and investors?
· 1: Not Sufficient at All · 2: Insufficient · 3: Somewhat Insufficient
· 4: Neutral · 5: Somewhat Sufficient · 6: Sufficient · 7: Highly Sufficient
5. How well do you think governments are at adapting their policies to the evolving needs of green finance and sustainability?
· 1: Not Well at All · 2: Not Very Well · 3: Somewhat Not Well

· 4: Neutral · 5: Somewhat Well · 6: Well · 7: Very Well

Mediating Variable: Stakeholder Engagement:

1. To what extent do you believe stakeholder engagement is critical in ensuring the success of green bond-funded projects?
· 1: Not Critical at All · 2: Slightly Critical · 3: Somewhat Critical
· 4: Neutral · 5: Somewhat Critical · 6: Critical · 7: Very Critical
2. How well do organizations engage with stakeholders (e.g., communities and environmental groups) when implementing green bond projects?
· 1: Not Well at All · 2: Not Very Well · 3: Somewhat Not Well
· 4: Neutral · 5: Somewhat Well · 6: Well · 7: Very Well
3. how important is stakeholder feedback in shaping the direction and impact of green bond-financed initiatives?
· 1: Not Important at All · 2: Slightly Important · 3: Somewhat Important
· 4: Moderately Important · 5: Very Important · 6: Extremely Important · 7: I Do not Know
4. How effectively do organizations involve stakeholders in decision-making processes related to green bond projects?
· 1: Not Effective at All · 2: Ineffective · 3: Somewhat Ineffective
· 4: Neutral · 5: Somewhat Effective · 6: Effective · 7: Highly Effective
5. How satisfied are you with transparency and communication between our organization's stakeholders regarding green bond initiatives?
· 1: Very Dissatisfied · 2: Dissatisfied · 3: Somewhat Dissatisfied
· 4: Neutral · 5: Somewhat Satisfied · 6: Satisfied · 7: Very Satisfied