Socio-political factors underlying the adoption of green bond financing of infrastructure projects: the case of Ghana

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Abstract

Purpose – There is a pressing need to increase investments in sustainable infrastructure to promote low carbon economic growth and ensure environmental sustainability. Consequently, this study examines the socio-political factors underlying the adoption of green bond financing of infrastructure projects.

Design/methodology/approach – Primary data was gathered from experts with advanced experience in, or knowledge of green bonds in the Kumasi Metropolis. To identify respondents with pertinent knowledge that is relevant to the study, purposive and snowball sampling techniques were used. One-sample *t*-test and relative importance index were used in this study's statistical analysis.

Findings – 'Training and experience with sustainable finance' was seen as the most important social factor underlying the adoption of green bond financing of infrastructure projects by the respondents and 'Governmental tax-based incentives' was rated as the leading political factor.

Originality/value – This pioneering research attempts to ascertain the socio-political factors affecting the adoption of green bond financing of infrastructure projects. Emergent results of analysis and concomitant discussions add knowledge to fill a void in literature on the social and political factors affecting the adoption of green bond financing of infrastructure projects in developing countries.

Introduction

Climate change is becoming more obvious and severe and more frequent weather extremes, such as wildfires, hurricanes and floods, have become more common over the last decade (Nawaz *et al.*, 2021). According to the authors (Nawaz *et al.*, 2021), this has increased the pressure on government officials to act quickly in order to accomplish climate goals and achieve long-term economic growth. Concerns about climate change and global warming have fuelled substantial interest in environmentally friendly investments (Taghizadeh-Hesary *et al.*, 2021; Sinha *et al.*, 2021) geared to protect the natural environment and preserve human health (Kocaarslan, 2021). Kocaarslan (2021) posits that, this observed convergence of environmental and financial issues has engendered curiosity in how the two are connected and how they may be resolved simultaneously. From carbon markets to payments for ecosystem services, catastrophe bonds to biodiversity offsets, fossil fuel investment and clean infrastructure investment, the entanglements between finance and the environment are becoming increasingly diversified and entrenched (Deschryver and De Mariz, 2020). Financial oligarchs' growing interest in the environment is indicative of the sector's meteoric rise in global economic prominence, as it seeks out new investment opportunities (Deschryver and De Mariz, 2020). Recent debates have focused on how to accomplish economic development in a sustainable manner that resides in harmony with the natural environment (Barua and Chiesa, 2019). Hence, fostering green projects is crucial for government policies that seek to embed long-term sustainable economic growth using environmentally friendly public or private investment (Bhandary *et al.*, 2021). Sustainable growth policies must be implemented by focussing on the potential benefits of climate-resilient financial instruments (Reboredo and Ugolini, 2020). Banga (2018) observed that green bonds have risen in prominence among the climate and sustainability finance schemes at the heart of the international capital mobilisation in recent years.

Agliardi and Agliardi (2019) define green bond as any type of bond instrument where the proceeds will be exclusively applied to finance or refinance, in part or in full, new and/or existing eligible green projects. The Climate Bond Initiative (CBI) certifies many green bonds, ensuring that they are in congruence with the Paris Agreement's goals and that the proceeds support environmentally responsible initiatives (Explaining Green Bonds, 2021). Green bond issuers must invest in projects that fit into one of six categories: energy conservation, pollution prevention and control, resource conservation and recycling, clean transportation, clean energy, ecological preservation and climate change adaptation in a controlled environment (Agliardi and Agliardi, 2019). Zhang (2020) indicated that to deploy financial resources to environmentally beneficial developments, countries must attract private funding and stimulate financial sector development. The author (Zhang, 2020) further indicated that more financial resources can be allocated to critical green initiatives by developing green markets with appealing financial products. Green bonds, according to Agliardi and Agliardi (2019), are an excellent instrument for investors and companies to accomplish a range of objectives, including diversification and financial return, while being a small fraction of the global bond market.

Despite the increased interest in green bonds and their inherent capacity to accelerate the implementation of green projects, research focused on developing nations has received scant attention, particularly in terms of socio-political elements that guide the issuance of green bonds for financing infrastructure projects. Consequently, this study sought to fill this knowledge gap in the advancement of green bond financing of infrastructure projects by examining the socio-political factors that influence its issuance. Associated objectives are to: educate future investors in infrastructure projects in developing countries on the social and political factors that could affect the patronage of green bonds in the financing of infrastructure projects; and elicit wider and renewed polemic debate on this globally crucial alternative means of financing infrastructure projects. The rest of the paper is organised as follows: The following section contains a literature review on the concept of green bonds, the need for green financing and an overview of the socio-political factors affecting the adoption of green bond financing of infrastructure projects; the study then discusses the research technique and details of the approach to data collecting and analysis before closing with a discussion of the theoretical and practical contributions, research limits and recommendations for future research.

Overview of green bonds: a literture review

The term "Green Bond" refers to an innovative financial mechanism used to fund investments that have a positive environmental impact and/or reduce vulnerability to environmental change (Morel and Bordier, 2012). The authors (Morel and Bordier, 2012) stated that the concept also covers "climate bonds", which are investments aimed at mitigating or adapting to climate change. Green Bonds are a novel type of debt financing that is highly supported by the worldwide capital market, with conditions and processes that differ from traditional debt financing (Ng, 2018). The European Investment Bank issued the first green bond in 2007 with a five-year maturity and a value of 600 million Euros, and ever since its inception, Green Bonds' market has steadily developed (Explaining Green Bonds, 2021). In comparison to the traditional bond market (which was around 2.42% in 2018), the market is still modest (Fatica *et al.*, 2021). Pre-issuance assurance on the reported information on sustainability is frequently necessary for such new debt funding channels (Explaining Green Bonds, 2021). The proceeds from these bonds are intended for green initiatives but the issuer's entire balance sheet is backed by them (Explaining Green Bonds, 2021).

Figure 1 presents a pictorial view of green bond financing milestones from 2007 to 2020. The first ever green bond was issued in 2007, by the European Investment Bank. From 2007 to 2020, there had been an increment in the value of green bonds issued from United States dollar (USD) 807.2 million to USD 1 trillion – thus illustrating market expansion.

The need for green finance

The approval of the United Nation's sustainable development goals (SDGs) and the Paris Climate Agreement were significant accomplishments for international organisations and national governments, demonstrating a stronger commitment to environmental sustainability (Khan *et al.*, 2021). Green financing has emerged as a critical pathway for industrialised countries to achieve long-term progress (Muganyi *et al.*, 2021). Similarly, Sinha *et al.* (2021) argue that governments are progressively embracing green bond financing to fulfil SDGs.

Ng (2018) posits that using revenues from green financing through the Global Financial Centre of China (GFCC) will allow large financial resources from the international capital market to be allocated to sustainable infrastructure development throughout a geographical region. Muganyi *et al.* (2021) used text analysis and panel data from 290 Chinese cities to

Source(s): Explaining Green Bonds (2021)

examine the impact of green finance-related policies between 2011 and 2018, showing that green finance-related regulations have beneficial environmental consequences. Green finance initiatives appear to have resulted in a 38% reduction in SO_2 emissions, a 28% reduction in industrial gas and smoke output, and a 20% reduction in SO_2 produced in China's cities over the study period. Khan *et al.* (2021) sought to quantify green finance as "climate mitigation finance" and examine its impact on the ecological footprint across twenty-six Asian economies. The study found that environmentally responsive investment/financing improves environmental quality by lowering carbon dioxide (CO_2) emissions and the ecological footprint.

Sachs *et al.* (2019) looked into the importance of green finance in achieving the SDGs and guaranteeing energy security and discovered that global investment in renewables and energy efficiency declined by 3% in 2017, with the risk of further slowing. This, according to Sachs *et al.* (2019), could threaten the growth of green energy, which is required to provide energy security and meet climate and clean air goals. Climate change, ecological disaster and energy security are all issues that demand the development of green finance (which improves innovative capacity and economic green transformation). Green finance must, however, develop in a sustainable and balanced manner. Cui *et al.* (2020) created a game model that included governments, financial institutions, businesses and consumers. The impact of each participant on changes and development in the green financial market was investigated using analogue simulation. The study's findings demonstrated that the integrity of the green finance system has a favourable impact on long-term sustainability and cleaner output.

Green bond market in Africa
Africa is the world's most climate-vulnerable continent (Tyson, 2021). The author (Tyson, 2021) observed that rising temperatures and sea levels, and more irregular rainfall are increasing the frequency and intensity of natural disasters, interrupting agricultural productivity, damaging infrastructure and jeopardising urban sustainability. Ngwenya and Simatele (2020) were of the view that on-going economic expansion that is compatible with climate goals is therefore required. The authors (Ngwenya and Simatele, 2020) postulate that national governments and foreign donors are unlikely to meet these demands hence; the

mobilisation of private capital is needed. The green bond market is one potential source of such private financing. Globally, the market has grown dramatically in the last decade, with the market being valued at $2 trillion with 40 countries involved (Tyson, 2021). This has been fuelled by complementary expansion in the supply of green assets, most notably green infrastructure predominantly funded by green investors. However, sub-Saharan Africa is not a part of these patterns with only 16 bond issuances, accounting for only 1.5% of total worldwide bonds and less than 0.3% in terms of value (Tyson, 2021). Banga (2018) postulates that governments (sovereign and local) and financial institutions are the preeminent investors, with the majority of proceeds going into infrastructure (including energy, water and transport). Table 1 shows the sub-Saharan Africa green bonds issues from 2014 to 2020.

Social factors underlying the adoption of green bond financing of infrastructure projects
While Sinha et al. (2021) argue that the socio-ecological benefits of green bonds have not been effectively communicated to industrial players; high green bond penetration combined with low SDG achievement may have a gradual negative transformational impact on environmental and social responsibility. Furthermore, the statistics suggest that this is a classic outcome-output trade-off, with strategic myopia about industrial participants' potential role in ensuring long-term growth being one of the key causes. To address this problem, the authors (Sinha et al., 2021) proposed the creation of an effective supplementary policy tool for the green financing channel. As businesses use green bonds to save money on

Issuer	Value (issue CCY)	Issuing currency	USD value (M)	Issuer	Country	Year	Use of proceeds
Standard Bank Group	200	USD	200	Financial Institution	South Africa	2020	Water, Energy, Buildings
Acorn Project Limited	4300	KES	40.9	Corporate	Kenya	2019	Buildings
Federal Government of Nigeria	15,000	NGN	41.4	Sovereign	Nigeria	2019	Conservation, Energy, Transportation
Nedbank	1,662	ZAR	116.7	Financial Institution	South Africa	2019	Energy
North South Power	8,500	NGN	23.5	Corporate	Nigeria	2019	Energy
Access Bank	15,000	NGN	41.5	Financial Institution	Nigeria	2019	Energy
Bank of Windhoek	66	NAD	4.6	Financial Institution	Namibia	2018	Energy, Transportation
Republic of Seychelles	15	USD	15	Sovereign	Seychelles	2018	Conservation
Growthpoint	1,100	ZAR	97.3	Corporate	South Africa	2018	Conservation
Federal Government of Nigeria	10,690	NGN	29.7	Sovereign	Nigeria	2017	Energy
City of Cape Town	1,000	ZAR	73.8	Municipal	South Africa	2017	Conservation Urban Infrastructure
City of Johannesburg	1,460	ZAR	137.8	Municipal	South Africa	2014	Energy, Transportation

Table 1.
Sub-Saharan green bonds issues (2014–2020)

taxes, governments must ensure that the social effect of the financing approach is also accomplished.

Due to their lack of experience, financial intermediaries may be hesitant to see the promise of green financing, and they may also fail to adequately assess and underwrite the risk involved with these investments. As a result, the industry will have mismatched investor motivations, unbalanced risk-reward calculations and substantial inefficiencies, according to the paper (Guild, 2020). According to Sinha *et al.* (2021), introducing an incentive scheme could improve the effectiveness of policymakers' promotional efforts to explain the socio-ecological benefits of green bonding to industrial participants. Due to local banks' lack of expertise and understanding of international banks, sustainable finance implementation is still sporadic, ad hoc, unregistered and unpublished (Halimatussadiah *et al.*, 2018). According to the authors, this was owing to a lack of sustainable finance knowledge, training and experience among local institutions, who had "low awareness of international best practice and international principles of sustainable financing".

Saravade and Weber (2020) investigated the institutional characteristics that drive India's green bond market using a mixed-method exploratory approach. The findings reveal that a variety of social actors, ranging from formal institutions like regulators and investors to informal ones like advocacy groups, are critical in determining the validity of the green bond market. According to the authors, institutional pressure from regulators, investors and advocacy groups will ultimately define the breadth and validity of the green bond finance market, as well as its ability to respond to climate change.

Political factors affecting the adoption of green bond financing of infrastructure projects
Cao *et al.* (2021) states that regulatory organisations could tighten control of green bond funds and offer green bond issuers lower financing costs. Agliardi and Agliardi (2019) claim that tax-based incentives are occasionally used to promote green lending. Green bond markets can flourish if central and local governments take steps to attract funding from investors. These rules can be beneficial, especially at first, when investors are acquiring confidence in new financial instruments and issuers are establishing a green credit history. Incentives for renewable energy and green construction bonds exist in the United States, whereas India has implemented financial benefits in the form of tax exemptions (Agliardi and Agliardi, 2019). Tolliver *et al.* (2020) found that institutional drivers of traditional bond market growth, such as capital account openness, rule of law and regulatory quality, are also driving green bond market growth.

Banga (2018) investigated the potential of green bonds in mobilising adaptation and mitigation finance for developing countries, the findings of the study revealed that the lack of appropriate institutional arrangements for green bond management acts as a barrier to green bond development in developing countries. To meet this challenge, Banga (2018) put it that local governments must provide local green bond issuers with guarantees aimed at covering the transaction costs associated with green bond issuance. Furthermore, the world's political leaders pledged to *"encourage the development of local green bond markets and promote international collaboration to facilitate cross-border investments in Green Bonds"* during the 2016 G20 conference in Hangzhou (Banga, 2018).

Institutional investor allocations to sustainable energy projects remain restricted (Kaminker and Stewart, 2012), particularly concerning direct investment that can assist reduce the financing gap. Institutional investors are hesitant for a variety of reasons, including a lack of knowledge and experience on the type of direct infrastructure investment required to finance renewable energy projects, as well as a potentially unfavourable regulatory environment (Kaminker and Stewart, 2012). The authors observed that the lack of adequate investment vehicles that provide the risk/return profile that institutional investors

require to manage the risks associated with renewable energy projects exacerbates these issues. Regulatory risk stemming from a lack of transparency in terms of environmental and climate policy, and retroactive modifications to support mechanisms, are among the numerous types of risk (Kaminker and Stewart, 2012). Banga (2018) suggests that while companies and local governments in developed and emerging countries are increasingly issuing green bonds to fund their adaptation and mitigation projects, developing countries are unable to reap the full benefits of green bonds due to: institutional and market barriers; a lack of understanding of how green bonds work and ineffective institutional arrangements for green bond administration.

Singla et al. (2019) found that local governments face a demanding, dynamic and potentially restricted policy environment as they investigated which alternative tools governments chose to use and the factors that influence those decisions. Traditional methods of satisfying the insatiable demand for infrastructure may be constrained by fiscal constraints, state government limitations and political considerations. Green bond growth, according to Chen and Zhao (2021), is a viable option for sustainable finance, which is especially important for growing nations like China and India to overcome investment gaps in climate-friendly green projects. Nonetheless, because of inconsistent requirements and unsuitable government engagement linked with green bonds, the market's huge potential for development has not been completely fulfilled. Weber and Saravade (2019) state that the continuing development of the green bond market requires appropriate government regulation and marketing. Governments should provide guidelines or establish relevant rules or incentive-based policies and climate-related regulations (such as credit enhancement, fiscal and tax incentives, or capital requirements), according to the authors, in order to support the growth of the green bond market and promote the low-carbon transition. Regards green projects, it appears that significant funding is required from investors, whether private or public. The government may use several policies and measures to encourage the development of cleaner technology, such as financial subsidies, special investment allowances and low-interest loans. Despite rising demand for green bonds on the capital markets, Guild (2020) predicts significant fund allocation transaction costs due to a lack of awareness and understanding of these products, as well as restrictive legislation in Indonesian financial intermediaries.

On both the issuer and investor sides of green bonds, the presence of supportive policies and the lack of restrictive regulations play a critical role in the development of a green bond market. Environmental laws and regulations that encourage demand and supply for green projects and assets are especially vital and successful (Cui et al., 2020). Environmental standards and enforcement, environmental licences and permits, and environmental taxes (such as carbon, landfill, emissions and resource-use taxes) are examples of these (Williams et al., 2017).

Research methodology

This study is underpinned by the positivist philosophical stance (Saunders et al., 2015; Edwards et al., 2019). Positivism is an epistemological stance which is linked to the philosophical position of the natural scientist and includes dealing with observable social reality to develop law-like generalisations (Omopariola et al., 2021). Positivists employ deductive, structured, large samples, measurement and typically adopt quantitative methods (Saunders et al., 2015). The objective of positivism is to use existing theory to develop hypotheses, test and draw conclusions for further development of the theory (Saunders et al., 2015; Aghimien et al., 2020).

An extensive literature review was conducted to identify the relevant social and political factors underlying the adoption of green bond financing of infrastructure projects (Edwards et al., 2021). A pilot study was then undertaken using two academic experts and

two investment analysts – both with considerable experience in green bonds. The respondents were asked to comment on the variables, suggest additional variables and rate their likelihood of being included in the study. If at least three experts agreed on a variable, it was considered for inclusion in the study. Following this exercise, 16 social factors (see Table 2) and 11 political factors (see Table 2) underlying the adoption of green bond financing of infrastructure projects were proposed. Based on the anticipated social and political elements, a structured closed-ended questionnaire was constructed and disseminated to experts as part of a major survey sample. Each variable was graded on a five-point Likert scale with 1 representing strongly disagree and 5 representing strongly agree.

The study employed the use of the survey research design because it is considered one of the best likely choices of research instrument when collecting detailed information and meaningful data on populations too large to observe directly (Nachmias and Nachmias, 2008).

Social factors	References
Communication of green bonds to the industrial players effectively	Sinha *et al.* (2021)
Implementation of complementary policy mechanism for the green financing channel	Sinha *et al.* (2021)
Policymakers ensuring that the social outcome of financing mechanism is fulfilled	Sinha *et al.* (2021)
Level of human capital	Guild (2020)
Experience with novel financial instruments like green bonds	Guild (2020)
Presence of an incentivisation scheme	Sinha *et al.* (2021)
Knowledge and understanding of green bonds by local banks	Halimatussadiah *et al.* (2018)
Training and experience with sustainable finance	Halimatussadiah *et al.* (2018)
Local banks' understanding of international best practice and international standards of sustainable finance	Halimatussadiah *et al.* (2018)
Accountability to identifiable stakeholders	Maltais and Nykvist (2020)
Legitimacy seeking and the social licence to operate	Maltais and Nykvist (2020)
Social support	Anh Tu *et al.* (2020), Wang and Zhi (2016)
Socio-environmental linkage	Anh Tu *et al.* (2020)
Institutional pressure from formal institutions like regulators and investors to informal ones like advocacy groups	Saravade and Weber (2020)
Increased investors' green awareness	Agliardi and Agliardi (2019)
The existence of an efficient legal framework	Anh Tu *et al.* (2020)
Political factors	
The oversight of green bond funds by regulatory bodies	Cao *et al.* (2021), Tolliver *et al.* (2020a), Elliott and Zhang (2019)
Promotion of green lending by government	Agliardi and Agliardi (2019)
Appropriate institutional arrangements for green bond management	Banga (2018)
Provision of guarantees to local green bond issuers by local governments	Banga (2018)
International collaboration facilitating cross border investments in green bonds	Banga (2018)
Incentive-based policies and climate-related regulations by government	Weber and Saravade (2019)
Policies and measurements fostering the development of cleaner technologies by government	Weber and Saravade (2019)
Political stability	Anh Tu *et al.* (2020)
Government regulations	Elliott and Zhang (2019), Weber and Saravade (2019)
Governments' long-term economic growth policies	Bhandary *et al.* (2021)
Governmental tax-based incentives	Agliardi and Agliardi (2019)

Table 2.
Social-Political factors underlying the adoption of Green Bond Financing of Infrastructure Projects

The study's population included investment analysts, financial analysts and Academics who have advanced experience in or study green of bonds. Respondents were chosen based on two criteria, namely: 1) understanding of green bonds and 2) sufficient knowledge of green bonds trend in Ghana. Respondents who met these criteria were chosen. For identifying respondents with rich information that is relevant to the study, purposive and snowball sampling techniques were used. Purposive sampling facilitated the selection of participants who can best fulfil the study's goals (Kissi *et al.*, 2020) whereas snowballing enabled a large sample to be gather from a small initial sample of known contacts. The sample size was based on the participants' knowledge and understanding of the subject and willingness to participate in the research who works at financial/investment institutions and/or educational institutions. Consequently, the sample size for this study was 50 experts with extensive experience in or knowledge of green bonds within Kumasi Metropolis. The survey questionnaire was distributed by e-mail and face-to-face to the targeted population. There was an intensive follow-up on the respondents to aid yield a significant response rate over a period of two months.

The statistical tools employed in the analysis of primary data collected from the field survey included: Reliability test; relative importance index (RII) and One-sample *t*-test. RII measures the relevance of awareness factors related to a phenomenon under study (Gamil and Abdul Rahman, 2020). The indices are ranked to indicate the relevance level of each causal factor. In this study, RII was used to determine and rank the relevance of the social and political factors underlying the adoption of green bonds in the financing of infrastructure projects.

Out of the 50 targeted respondents, 36 questionnaires were returned, resulting in a 72% response rate. The high response rate of 72% was achieved due to a thorough follow-up with the respondents. Respondents were required to describe their profession in their own words. The various professions were categorised into three areas of expertise (investment analyst, financial analyst and academia) from the 36 responses retrieved. Table 3 reports upon the demographic profile of respondents. It is evident that most of the respondents were investment analysts (frequency (*f*) = 18 or 50.0%), closely followed by were financial analysts (*f* = 16 or 44.4%), while the remaining two respondents representing (*f* = 2 or 5.6%) were academics who have advanced knowledge in green bonds. With respect to the years of work as a financial analyst, investment analyst or an academic, most recorded was <11–15 years with *f* = 14 or 38.9% followed by 6–10 years with *f* = 10 or 27.8%; 16–20 years with *f* = 7 or 19.4%; and >20 years with *f* = 3 or 8.3%. Respondents were required to specify their greatest degree of academic qualification as part of establishing their capacity to understand the

Position	Frequency	Percentage
Financial Analyst	16	44.4
Investment Analyst	18	50.0
Academia	2	5.6
Years of Experience		
1–5 years	2	5.6
6–10 years	10	27.8
11–15 years	14	38.9
16–20 years	7	19.4
Over 20 years	3	8.3
Academic Qualification		
Master's Degree (MSc/MPhil)	36	100
Total	*36*	*100.0*

Table 3.
Demographic data of respondents

survey and determining its legitimacy. Deducing from Table 4, all the respondents had attained a master's degree. This high academic qualification of the respondents shows the high inclination of the respondents to adequately give accurate responses for the study.

Data analysis and discussion of results
The co-efficient values for the social and political factors were >0.700, hence, it can be concluded from Table 4 that there was good internal consistency among the variables.

Social factors underlying the adoption of green bond financing of infrastructure projects in Ghana
From Table 5, *training and experience with sustainable finance* was rated as the most important social factor underlying the adoption of green bonds in the financing of infrastructure projects with [RII = 0.961; Standard Deviation (SD) = 0.401]. *Social support* was next with [RII = 0.900; SD = 0.507]. *Level of human capital* [RII = 0.878; and SD = 0.494]; *increased investors' green awareness* [RII = 0.872; and SD = 0.487] and *green bonds experience* [RII = 0.872; and SD = 0.683] ranked 2nd–5th, respectively. The least ranked social factors were: *legitimacy seeking and the social licence to operate* [RII = 0.767; and SD = 0.910]; *communication of green bonds to the industrial players effectively* [RII = 0.744; and SD = 1.111]; and *knowledge and understanding of green bonds by local banks* [RII = 0.728; and SD = 1.437]. Although these factors were ranked least, the factors recorded high mean score

Socio-political factors	Cronbach's Alpha Co-efficient
Social Factors (16) items	0.980
Political Factors (11) items	0.750

Table 4.
Reliability analysis

S/N	Social factors	Mean	Std. Dev.	RII	Rank
1.	Training and experience with sustainable finance	4.81	0.401	0.961	1st
2.	Social support	4.50	0.507	0.900	2nd
3.	Level of human capital	4.39	0.494	0.878	3rd
4.	Increased investors' green awareness	4.36	0.487	0.872	4th
5.	Experience with novel financial instruments like green bonds	4.36	0.683	0.872	5th
6.	Accountability to identifiable stakeholders	4.28	0.701	0.856	6th
7.	Institutional pressure from formal institutions like regulators and investors to informal ones like advocacy groups	4.25	0.604	0.850	7th
8.	Presence of an incentivisation scheme	4.17	0.378	0.833	8th
9.	Local banks' understanding of international best practice and international standards of sustainable finance	4.11	0.667	0.822	9th
10.	Policymakers ensuring that the social outcome of financing mechanism is fulfilled	4.08	0.439	0.817	10th
11.	The existence of an efficient legal framework	3.94	0.984	0.789	11th
12.	Socio-environmental linkage	3.89	0.950	0.778	12th
13.	Implementation of complementary policy mechanism for the green financing channel	3.86	0.867	0.772	13th
14.	Legitimacy seeking and the social licence to operate	3.83	0.910	0.767	14th
15.	Communication of green bonds to the industrial players effectively	3.72	1.111	0.744	15th
16.	Knowledge and understanding of green bonds by local banks	3.64	1.437	0.728	16th

Table 5.
Relative importance index of social factors underlying the adoption of green bond financing of infrastructure projects in Ghana

and RII values indicative of their contribution as social factors to the adoption of green bonds in the financing of infrastructure projects.

To determine the relative importance of the variables, one sample *t*-test was used similar to the study of Kissi *et al.* (2022). For the one-sample *t*-test, the study used a hypothesised mean of 3.5, indicating that a component with a mean score of 3.5 or above is a significant social factor underpinning the adoption of green bonds in infrastructure funding.

Table 6 shows that all of the components' *t*-values (test strength) were positive, indicating that their mean values were significantly greater than the hypothesised mean. Furthermore, the social components recorded *p*-values not exceeding 0.05, indicating that their mean values do not deviate substantially from the hypothesised mean of 3.5.

Political factors affecting the adoption of green bond financing of infrastructure projects in Ghana

From Table 7, *governmental tax-based incentives* was rated as the most significant political factor underpinning the adoption of green bond financing of infrastructure projects with [RII = 0.967; and SD = 0.378]. Following next was *political stability* with [RII = 0.956, and SD = 0.422]. *Governments' long-term economic growth policies* [RII = 0.950; and a standard deviation = 0.439]; *Government Regulations* [RII = 0.944; and a standard deviation = 0.454]; and *the oversight of green bond funds by regulatory bodies* [RII = 0.933; and standard deviation = 0.478] ranked 3rd, 4th and 5th respectively. The lowest ranked political factors underpinning the adoption of green bond financing of infrastructure projects were: *international collaboration facilitating cross border investments in green bonds* [RII = 0.844; and a standard deviation = 0.591]; *appropriate institutional arrangements for green bond management* [RII = 0.817; and a standard deviation = 0.770]; and *provision of guarantees to local green bond issuers by local governments* [RII = 0.706; and a standard deviation = 0.774]. Although these factors recorded the least RII scores, the factors are seen to contribute to the

Test value = 3.5 (95% confidence level)

S/N	Social factors	*t*	Df	*p*	Null hypothesis
1.	Communication of Green Bonds to the industrial players effectively	1.200	35	0.038	Not rejected
2.	Implementation of complementary policy mechanism for the green financing channel	2.499	35	0.017	Not rejected
3.	Policymakers ensuring that the social outcome of financing mechanism is fulfilled	7.970	35	0.000	Not rejected
4.	Level of human capital	10.787	35	0.000	Not rejected
5.	Experience with novel financial instruments like green bonds	7.570	35	0.000	Not rejected
6.	Presence of an incentivisation scheme	10.583	35	0.000	Not rejected
7.	Knowledge and understanding of green bonds by local banks	0.580	35	0.046	Not rejected
8.	Training and experience with sustainable finance	19.516	35	0.000	Not rejected
9.	Local banks' understanding of international best practice and international standards of sustainable finance	5.500	35	0.000	Not rejected
10.	Accountability to identifiable stakeholders	6.653	35	0.000	Not rejected
11.	Legitimacy seeking and the social licence to operate	2.197	35	0.035	Not rejected
12.	Social support	11.832	35	0.000	Not rejected
13.	Socio-environmental linkage	2.457	35	0.000	Not rejected
14.	Institutional pressure from formal institutions like regulators and investors to informal ones like advocacy groups	7.456	35	0.000	Not rejected
15.	Increased investors' green awareness	10.606	35	0.000	Not rejected
16.	The existence of an efficient legal framework	2.710	35	0.010	Not rejected

Table 6.
One-Sample *t*-test of Social Factors Underlying the adoption of Green Bond Financing of Infrastructure Projects

S/N	Political factors	Mean	Std. Dev.	RII	Rank
1.	Governmental tax-based incentives	4.83	0.378	0.967	1st
2.	Political stability	4.78	0.422	0.956	2nd
3.	Governments' long-term economic growth policies	4.75	0.439	0.950	3rd
4.	Government Regulations	4.72	0.454	0.944	4th
5.	The oversight of green bond funds by regulatory bodies	4.67	0.478	0.933	5th
6.	Promotion of green lending by government	4.64	0.487	0.928	6th
7.	Policies and measurements fostering the development of cleaner technologies by government	4.42	0.500	0.883	7th
8.	Incentive-based policies and climate-related regulations by government	4.36	0.487	0.872	8th
9.	International collaboration facilitating cross border investments in green bonds	4.22	0.591	0.844	9th
10.	Appropriate institutional arrangements for green bond management	4.08	0.770	0.817	10th
11.	Provision of guarantees to local green bond issuers by local governments	3.53	0.774	0.706	11th

Table 7.
Relative importance
index of political
factors affecting the
adoption of green
bonds in the financing
of infrastructure
projects in Ghana

adoption of green bonds financing of infrastructure projects as the factors recorded relatively high RII values.

Discussion

Training and experience in sustainable finance was the most important social factor encouraging the adoption of green bonds in infrastructure funding. Financial intermediaries may be hesitant to identify the promise of green finance due to a lack of experience, and they may also fail to properly assess and underwrite the risk involved with these investments. As a result, the study anticipates skewed investment incentives, uneven risk-reward calculations and an inefficient industry.

From Table 8, it can be concluded that all the variables had a mean >3.5 which shows a high importance of the variables as key political factors underpinning the adoption of green

Test value = 3.5 (95% confidence level)

S/N	Political factors	t	Df	p	Null hypothesis
1.	The oversight of green bond funds by regulatory bodies	14.642	35	0.000	Not rejected
2.	Promotion of green lending by government	14.028	35	0.000	Not rejected
3.	Appropriate institutional arrangements for green bond management	4.546	35	0.000	Not rejected
4.	Provision of guarantees to local green bond issuers by local governments	0.215	35	0.831	Rejected
5.	International collaboration facilitating cross border investments in green bonds	7.333	35	0.000	Not rejected
6.	Incentive-based policies and climate-related regulations by government	10.606	35	0.000	Not rejected
7.	Policies and measurements fostering the development of cleaner technologies by government	11.000	35	0.000	Not rejected
8.	Government regulations	16.144	35	0.000	Not rejected
9.	Political stability	18.183	35	0.000	Not rejected
10.	Governments' long-term economic growth policies	17.078	35	0.000	Not rejected
11.	Governmental tax-based incentives	21.166	35	0.000	Not rejected

Table 8.
One-sample *t*-test
analysis of political
factors affecting the
adoption of green bond
financing of
infrastructure projects
in Ghana

bond financing of infrastructure projects. Hence, the respondents agreed that *governmental tax-based incentives* are the foremost political factor underpinning the adoption of green bond financing of infrastructure projects. Tax-based incentives are occasionally used to promote green financing, according to Agliardi and Agliardi (2019), therefore green bond markets can flourish if central and local governments take measures to attract capital from investors. These tax breaks can be beneficial, especially at first, while investors develop confidence in new financial instruments and issuers establish a green sector credit history. For example, to boost domestic demand for green bonds, India implemented tax breaks in the form of tax exemptions. Similarly, Weber and Saravade (2019) posit that continuing development of the green bond market requires appropriate government regulation and marketing, such as financial subsidies, special investment allowances and low-interest loans. Consistent with the findings of this study, Williams *et al.* (2017) observed that environmental standards and enforcement, environmental licences and permits, and environmental taxes are some governmental tax-based incentives that affect the issuance of green bond.

Conclusions

This study examined the socio-political factors underlying the adoption of green bond in funding infrastructure projects. *Training and experience with sustainable finance* was deemed as the most significant social factor underlying the adoption. *Social support*, *level of human capital*, *increased investors' green awareness* and *green bond experience* were some of the significant social factors affecting the usage of green bond to fund infrastructure projects. With regards to the political factors affecting green bond usage to fund infrastructure projects, *governmental tax-based incentives*, *political stability*, *governments' long-term economic growth policies* and *government regulations are some of the highly rated factors.*

In theory, this research contributes to the expanding body of knowledge on sustainability, green development and sustainable finance, all of which are linked to the United Nations' SDGs. The research illuminates the socio-political elements that have influenced the acceptance of green bond financing of infrastructure projects. Based on the findings, the following four key recommendations are made: 1) Green infrastructure financing and sustainable project funding should be encouraged through legislative implementation; 2) Stakeholders, particularly financial institutions, should be educated and trained on the benefits of green bond financing of infrastructure projects on a regular basis; 3) Policy making should embrace the concept of putting up environmentally friendly infrastructure projects which will yield eco-friendly projects and 4) Given the present drive for sustainability in all parts of life, authorities should focus on new approaches to finance environmentally friendly and socially inclusive projects through the use of green bonds. Such projects must be cost-effective in order to meet the requirements of the current generation without endangering the ability of future generations to meet their own needs. Due to the concept's novelty in Ghana and the small pool of professionals in this subject, the sample size was quite modest. Nonetheless, the respondents' level of knowledge and competence on the topic matter verify the study's validity for future reference. Further studies can be undertaken on a larger data set as the knowledge and experience of practitioners and academics expands. Future studies can also explore these issues in other developing nations to confirm, or otherwise, the study's findings.

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