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Modelling investment drivers in the Nigerian green sukuk market: Implications for sustainable infrastructure financing and environmental management

Olasunkanmi Olapeju[1*], Mukail Akinde[2], Olusegun Olaiju[3], Adebayo Emmanuel[4], Kehinde Aladelusi[5]

[1]*Department of Urban and Regional Planning, Federal Polytechnic Ilaro, Ilaro City, Ogun State, Nigeria.*
[2]*Department of Taxation, Federal Polytechnic Ilaro, Ilaro City, Ogun State, Nigeria.*
[3]*Department of Mathematics and Statistics, Federal Polytechnic Ilaro, Ilaro City, Ogun State, Nigeria.*
[4]*Department of Urban and Regional Planning Federal University of Technology Akure, Akure City, Nigeria.*
[5]*Department of Banking and Finance, Federal Polytechnic Ilaro, Ilaro City, Ogun State, Nigeria.*

Corresponding author: Olasunkanmi Olapeju (*Email: olasunkanmi.olapeju@federalpolyilaro.edu.ng*)

Abstract

This study adopted Structural Equation Modelling (SEM) to validate the seven hypothesized constructs as drivers of the intention to invest in the Nigerian Green Sukuk (GS) market. It provides a scientific premise for formulating policy suggestions aimed at potential issuers and regulatory authorities towards climate change and pollution mitigation in Nigeria. The study relied on literature and expert opinions in developing the constructs and relevant indicators to develop its framework. A questionnaire was used to collect information from potential investors in the GS market, including individual stockholders, institutional investors, and financial intermediaries. A total of 338 valid responses were obtained within the period scheduled for data collection, with 321 considered suitable for SEM. The findings revealed significant relationships between risk (β=0.986, $p<0.05$), attitude (β=0.739, $p<0.05$), perceived behavioural control (β=1.000, $p<0.05$), information availability (β=0.954, $p<0.05$), growth ((β=0.932, $p<0.05$), demographic factors (β=0.890, $p<0.05$) and the intention to invest in GS. The results present cost-effective strategies for prioritizing specific measures, providing pragmatic guidance to GS issuers and regulatory authorities, and formulating marketing policies to motivate green investments. The study offers insights into investors' motivations for purchasing GS and practical recommendations for ethical sustainability finance in Nigeria.

Keywords: Climate change, Finance, GS, Infrastructure, Investment drivers.

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1. Introduction

The cost of actualizing sustainable development increases with the normalization of carbon-intensive infrastructure, culture, and systems [1-3]. Yet, the task of ideating intelligent green solutions that can mitigate environmental problems comes with a cost [4]. The assessment of sustainable practices is considerably enhanced by incorporating green finance in sustainable growth endeavors [5-10]. Green finance is a significant driver of inclusive development, as it affords vistas for innovation and human capital improvement [11]. Many countries in the Global South are struggling with inadequate funding for low-carbon energy transitions [12-14]. Green financing attraction is a strategy for navigating the funding challenge [8]. The widespread energy poverty in Nigeria has led to a heavy reliance on unsustainable energy sources among its population [15]. These challenges result in deforestation, environmental degradation, air pollution, and security threats. To address these issues and achieve Sustainable Development Goal 7 (SDG7) - ensuring access to affordable, reliable, sustainable, and modern energy for all - Nigeria has initiated its Energy Transition Plan [16, 17]. The plan's funding, however, relies heavily on interest-based loans, private sector investment, and green bonds. As Khan et al. [18] revealed, green finance and environmental sustainability consciousness have heightened over the years, with Asian countries emerging as leading players. Socially Responsible Investments (SRI), such as green bonds, which are gaining traction globally, are nascent in Nigeria to finance green projects [19].

Similarly, Green Sukuk (GS), a non-interest, risk-sharing, and Sharia-based variant of green bonds, is gaining traction as a funding alternative and a major product of sustainability thinking in Islamic banking [20]. It presents a unique opportunity for ethical investors to promote environmentally sustainable infrastructure projects such as renewable energy generation [21, 22]. GS offers reasonable risk-adjusted returns and provides funding for environmentally sustainable projects. It could be attractive to environment-oriented investors when adequately advertised and governed by effective frameworks. Moreover, investors have confidence that, owing to its underlying Shariah principles, capital raised through the issuance of Sukuk must be invested in identifiable green ventures. The almost non-existent opportunity for diversion of investors' resources equally affords investors a sense of security.

In Nigeria, the vistas inherent in the GS remain largely unexplored. Only one "GS" valued at $2.4 million has yet to be issued by OneWatt Solar, despite Nigeria's over 90 million Islamic adherents and a large economy. This is notwithstanding the success of Nigeria's general Sukuk market, valued at $1.38 billion and the increasing demand for Nigeria's Sovereign Green Bonds, currently valued at NGN 58.51 billion [23]. Cueing from countries like Malaysia and Indonesia with fully developed GS markets, the planned behavioral impetus around the viability of the GS revolves around selected factors. These include awareness, political will, impact assessment, legalities, socio-religious persuasions, risk management, age of retail investors or managers of institutional investment companies, local capacity, qualification criteria, and greenness of school curricula. These factors that are yet to be explored within the Nigerian space are crucial for investigating risk growth variables and developing a research-based framework for GS financing.

Most studies conducted on GS are in Indonesia and Malaysia [24]. Limited studies exist on the viability and factors driving investment in GS in high-potential markets like Nigeria. The demographic opportunities inherent in Nigeria's profile as the 5th largest Muslim population [25] with a large proportion of the unbanked population (60%) [26] have not been leveraged in developing the GS market in Nigeria. However, due to its incipient nature, some exploratory studies have been conducted on GS in Nigeria. Yahuza et al. [27] examined the applicability of GSs in Nigeria but only identified prospects without addressing issues hampering its development, despite the market's impressive performance. Dalal et al. [28] broadly examined the GS market in Nigeria, neglecting unique issues in Sub-Saharan Africa, which could potentially boost or hinder its growth. AbdulKareem et al. [29] attempted to examine the key drivers of Sukuk investment for infrastructure development in Nigeria. However, its focus was generally on infrastructural development, not green projects, which this study intends to explore.

Albeit, Sukuk transactions are guided by the Investment and Securities 2007 Act, Nigeria's Security and Exchange Commission guidelines, the Central Bank of Nigeria guidelines, the Islamic Financial Services Board (IFSB), and the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) [30]. The fledgling GS market in Nigeria has yet to develop a scientific and research-oriented framework to govern the GS market and ultimately meet the needs of existing and potential issuers, investors, and regulators.

Furthermore, none of the studies conducted, either locally or internationally, have attempted to unravel the peculiar local-scale factors that can drive the intention to invest in Nigeria's GS market or develop an optimal model for its performance Faisal et al. [31] highlighted the crucial role of religious, functional, social, emotional, and knowledge value in influencing investment in GSs. However, there are broader issues around factors such as standardization, awareness, political will, age of retail investors and managers of institutional investment companies, impact assessment reporting, practical risk management tools, local capacity, qualification criteria, legal issues, socio-religious persuasions, and greenness of school curricula, among others. These factors, yet to be explored within the Nigerian space, are strategic to any quest to develop a sustainable research-based framework for viable GS financing.

In an effort to comprehensively model the broader factors motivating the intention to invest in GS, the study adjusted the variants of the Planned Behavioral Model, originally comprising Risk, Attitude, Norm, Ability, and Self-regulation (RANAS), as operationalized by studies such as Graf et al. [32], Inauen et al. [33], Alemu et al. [34] and AbdulKareem et al.

[29] to RAPIGDS- Risks, Attitude, Perceived Behavioral Control, Information Availability, Growth Factors, Demographics, and Subjective Norms. These expanded risks and growth factors form the anchors around which the factors driving the intention to invest in the GS market are calibrated. This study adopted Structural Equation Modeling (SEM) to justify the 7 hypothesized constructs as drivers of investment intention in GS, which provides the scientific basis for policy suggestions to issuers and regulatory authorities.

2. Materials and Methods

2.1. Data Collection

The study employed a survey methodology, utilizing a sampling frame obtained from the Securities and Exchange Commission (SEC) that comprised potential GS investors. This frame included a diverse range of entities, such as mutual funds, pension funds, hedge funds, banks, insurance companies, endowments, retail investors, brokerage firms, and registered shareholder associations. Ultimately, about 414 organizations were engaged in the survey. Next, a closed-ended questionnaire was distributed via email to the legal representatives of all listed potential GS investors provided by the SEC. Participants provided informed consent by receiving an introductory letter with the survey, which thoroughly explained the research's nature, ensuring they were fully informed before participating. Follow-up emails and phone calls were made to boost response rates, and data collection was completed within a six-month period. Ultimately, about 338 responses were obtained within the period scheduled for data collection. After the data was checked for errors, only 321 responses were considered good enough for SEM. To assess the validity of the hypothesized drivers of the intention to invest in the GS, SEM, using IBM AMOS version 27, was used to identify the best-fit indices and establish construct validity for the modeled relationships.

2.2. Constructs and Scale

The study aims to analyze the risk and growth factors of the GS market in Nigeria, focusing on seven new constructs. The study adapted the RANAS framework (Risk, Attitude, Norm, Ability, Self-regulation), which was operationalized into RAPIGDS, comprising Risks, Attitude, Perceived Behavioral Control, Information Availability, Growth Factors, Demographics, and Subjective Norms (based on [29, 32-34]). The Risk construct, focusing on perceived danger or potential failure, was measured using nine indicators (R1-R9): qualification criteria, quality of reporting standards, transparency, greenwashing, regulatory control effectiveness, risk management mechanisms, issuer fatigue due to overlapping roles, the possibility of issuer buyback, and macroeconomic factors like high inflation rates.

The Attitude construct, reflecting individuals' evaluations and inclinations towards specific concepts, was measured using 5 indicators (A1-A5): investment disposition, attitude towards underlying assets for derivatives, disposition towards green bonds, affinity for Shariah ideology, and inclination towards sustainability knowledge. Perceived Behavioral Control, representing individuals' perceived capacity to control their investment decisions in GS, aligning with their values, was assessed through 4 indicators (P1-P4): financial literacy, environmental awareness, sustainability knowledge, and understanding of Shariah principles.

The Information Availability construct, which captures the accessibility of relevant information, was defined by six indicators (I1-I6): availability of investment information, knowledge about derivatives, understanding of Sukuk operations, information about green bonds, access to sustainability knowledge, and the greenness of curricula content.

The Growth construct comprises 14 key indicators (G1-G14) that drive the development and expansion of GS investments. These factors are: robust legal infrastructure, technological capabilities, favorable interest rates, economic stability, local capacity, well-established market regulations, political will, potential for excess returns, portfolio diversification opportunities, enhancement of green image, Shariah compliance, investor demand, integration of Sustainable Development Goals (SDGs) into investment strategies, and the ability to attract new investors.

In contrast, the Demographics construct is defined by 5 key characteristics (D1-D5): ethnicity, religion, gender, income levels, and age. These demographic factors can significantly influence investment decisions and behaviors. For instance, millennials are more likely to be disposed to investing in long-term GSs than members of Generation X or boomers, who might consider them risky. Lastly, subjective norms, which relate to perceived social pressure from others, are measured by 3 indicators (S1-S3): knowledge of Sharia, socialization as Muslims, and political ideology. The study utilized a multi-item scale with a 10-point rating system, ranging from "extremely unimportant" to "significant".

2.3. Reliability and Validity Test

The Cronbach's Alpha test was used to assess the internal consistency of the research instrument's scale for the seven study constructs, with reliability thresholds above 0.7, as canvassed by Pallant [35]. Six (Risks, Attitude, Perceived Behavioral Control, Information Availability, Growth, and Demographics) out of the seven constructs underpinning the study's theoretical model complied with the reliability test requirement at Cronbach's Alpha test value above 0.7 on the first attempt. However, the attempt to improve the Cronbach's Alpha test value of 0.59 for the subjective norm by removing indicators with low corrected item-total correlation values and treating possible outliers proved abortive. Hence, the model was refined to exclude subjective norms. Table 1 presents the results of the reliability and sampling adequacy tests for the constructs examined in this study.

Table 1.

Reliability and Sampling Adequacy Tests for Constructs

Constructs	Cronbach's Alpha Test (Initial)	Cronbach's Alpha Test**	Kaiser-Meyer-Olkin Test
Risks	0.867		0.760
Attitude	0.700		0.670
Perceived Behavioral Control	0.700		0.640
Information Availability	0.800		0.700
Growth	0.900		0.800
Demographics	0.800		0.700
Subjective Norms	0.594	0.560	0.500

Note: ** After removal of low corrected item-total correlation values.

The study further employed exploratory factor analysis (EFA) to assess how well the indicators supported the underlying constructs. All the constructs loaded above 0.4 align with the recommendations of Hair et al. [36] and Paschke [37] that factor loadings below 0.4 should be expunged. Similarly, all the constructs have acceptable Kaiser-Meyer-Olkin (KMO) values beyond the 0.5 cut-off value. The Kaiser-Meyer-Olkin (KMO) values represent the measure of sampling adequacy.

2.4. Structural Equation Modelling Analyses

This study utilized a second-order construct to validate the factors influencing interest in committing to GS investments in Nigeria, employing a pooled measurement structure. The model was adapted from the Theory of Planned Behavior and modified to fit the context of GS investment, incorporating the following constructs: Risks, Attitude, Perceived Behavioral Control, Information Availability, Growth Factors, Demographics, and Subjective Norms (as seen in previous studies by) Graf et al. [32], Inauen et al. [33], Alemu et al. [34] and AbdulKareem et al. [29]. A 10-point multi-item scale, ranging from extremely unimportant to significant, was used to measure these constructs. While the Risk construct is measured by indicators labeled R1-R9, the Attitude construct is underpinned by five indicators (A1-A5). Four items, labeled P1-P4, measure the Perceived Behavioral Control construct. Furthermore, the Information Availability construct is evaluated using six indicators (I1-I6). The Growth factor is measured by 14 items (G1-G14), while five indicators measure the Demographic factor. The Subjective Norm factor, measured by three items (S1-S3), was expunged from the model. This is owing to its poor performance in the initial reliability test, even after being subjected to outlier removal.

2.5. Confirming the Measurement Model Using Pooled CFA

The study deemed it appropriate to validate the hypothesised model through the pooled Confirmatory Factor Analysis (CFA). As captured in Zainudin [38], there are three categories of model fit: absolute fit, incremental fit, and parsimonious fit. The model is expected to meet the cut-off values of one of the fitness indexes in each category. To that extent, while the Root Mean Square Error of Approximation (RMSEA) was adopted as the fitness index to consider from the absolute fit category, the Comparative Fit Index (CFI) was the adopted index from the incremental fit category. Moreover, the chi-square/df index was considered for the parsimonious fit category. However, on the first calibration, the outcomes of the pooled measurement model at RMSEA = 0.098, CFI =0.67 and Chisq/Df = 8.0 were far from the recommended cut-off values of < 0.08, > 0.90, and < 3.0, respectively.

2.6. Improving the Model Fitness

To meet the cut-off values of the fitness indexes, factor loadings below 0.6, as prescribed by Zainudin [38] initially, certain factors were considered for removal from the model to enhance its fitness indexes. After retaining factors and indicators with loadings above 0.6, the cutoff value for Average Variance Extracted was not achieved, leading to the exclusion of all indicators with loadings below 0.7. This implies a refinement of the model to exclude Transparency (R3), Availability of Risk Management Mechanism (R6), macroeconomic indices such as high inflation rate (R9), Disposition towards Investment (A1), Disposition towards green bonds (A3), and Disposition towards Sustainability Knowledge (A5). Other excluded factors include Financial Literacy (P1), Understanding of the Sharia creed (P4), Amount of Investment Information Available (I1), and Amount of Sustainability Knowledge Available (I5). Lastly, technology capacity (G2), economic stability (G4), local capacity (G5), likelihood to generate excess returns (G8), and the opportunity to attract new investors (G14) were also removed. Following the re-estimation of the model based on removing these indicators, none of the fitness indices achieved their required fitness levels. The model did not achieve the required level of fineness at RMSEA = 0.097, CFI =0.875 and Chisq/Df = 4.164. However, there was a prospect that validity tests would be positive.

2.7. Modification Indices (MI)

The model's refinement to exclude factors below 0.7 did not achieve the recommended fitness indexes, prompting an exploration of the activeness of redundant items. To that extent, the alternative steps to be followed, as advanced by Zainudin [38], are to either delete the redundant items or correlate the highest, and consequently make the redundant items free parameters. Table 2 displays the statistics for the proposed model, focusing on significant vulnerability variables after correlating errors with the highest modification indices. Specifically, items with the highest modification indices per change were freed as parameters in this analysis. This was achieved through the correlation of their errors. After iterating the covariation of e46 and e49; e20 and e37; e20 and e23; e15 and e49; e15 and e46; e15 and e31; e15 and e17; e7 and e48; e7

and 46; e7 and e25; and e1 and e47, recommended fitness indexes were achieved at RMSEA = .066; CFI =.903 and Chisq/Df = 2.456, as presented in Table 2.

Table 2.
Statistics of Proposed Model for Significant Variables.

Model Identification				**Model Fit Statistics**			
Number of distinct sample moments		153		RMSEA=		0.943	
Number of distinct parameters to be estimated		48		CMIN/Df=		2.456	
Degrees of freedom		105		CFI=		0.903	
Item			**Estimates**	**SE**	**CR**	**P**	**SMC**
PBC	<---	GSIINTENTION	1.000	0.092	10.86	**	0.970
RSK	<---	GSIINTENTION	0.986	0.075	13.14	***	0.972
DMC	<---	GSIINTENTION	0.890	0.079	11.26	***	0.792
INA	<---	GSIINTENTION	0.954	0.088	10.84	***	0.9096
GTH	<---	GSIINTENTION	00.932	0.81	11.50		0.980
ATT	<---	GSIINTENTION	0.739	0.066	11.19	***	0.545
R9	<---	RISK	0.697	00.76	9.17		0.486
R6	<---	RISK	0.721	0.096	7.51	***	0.519
R3	<---	RISK	0.661	0.087	7.59	***	0.437
D1	<---	DEMOGRAPHICS	0.747	00.82	9.12		.0.558
D3	<---	DEMOGRAPHICS	0.757	0.084	9.01	***	0.573
A5	<---	ATTITUDE	0.653	00.65	10.046		0.144
A3	<---	ATTITUDE	0.652	0.090	7.24	***	0.425
A1	<---	ATTITUDE	0.765	0.111	6.891	***	0.586
P4	<---	PBCONTROL	0.633	0.059	10.72		0.401
P1	<---	PBCONTROL	0.635	0.093	6.83	***	0.403
G2	<---	GROWTH	0.707	0.085	8.32	***	0.500
G4	<---	GROWTH	0.753	0.091	8.27	***	0.566
G5	<---	GROWTH	0.767	0.086	8.91	***	0.588
G8	<---	GROWTH	0.659	0.083	11.946	***	0.434
G14	<---	GROWTH	0.711	00.84	7.939		0.506
I1	<---	INFOAVAILABILITY	0.758	00.78	9.72		0.575
I5	<---	INFOAVAILABILITY	0.720	0.067	10.7	***	0.518

2.8. Measurement Model Validation

To validate the measurement model, the construct was assessed for unidimensionality, validity, and reliability. After re-estimating the model by removing items and constructs with low factor loadings and correlating errors with high modification indices, all fitness indices were achieved, indicating optimal model fit and unidimensionality. The validity of the constructs was further confirmed through convergent, construct, and discriminant validity assessments. Convergent validity has been achieved as most constructs' average variance extracted (AVE) is above 0.5. Further, with the optimality of fitness indexes for each of the constructs and subconstructs, construct validity can equally be confirmed to have been verified. Discriminant validity is attained because the square roots of the AVE of all the constructs retained in the model are above the correlations between the constructs. This is evident in the higher values of the diagonal figures compared to those in the rows and columns, as evident in Table 3.

Table 3.
Summary of Discriminant Validity Index.

Constructs	**Risk**	**Attitude**	**Perceived Behavioral Control**	**Information Availability**	**Growth**	**Demographics**
Risk	**0.870**	0.67	0.57	0.56	0.47	0.46
Attitude	0.67	**0.8555**	0.739	0.704	0.762	0.67
Perceived Behavioral Control	0.63	0.57	**0.774**	0.67	0.57	0.56
Information Availability	0.58	0.58	0.53	**0.836**	0.61	0.57
Growth	0.46	0.47	0.46	0.58	**0.918**	0.47
Demographics	0.45	0.56	0.57	0.45	0.53	**0.870**

2.9. Reliability

Two distinct criteria are essential in estimating the reliability of measurement models: Composite Reliability and Average Variance Extracted. As recommended by Zainudin [38], a standardized value of CR of ≥ 0.600 is required to attain the composite reliability of latent constructs. Fornell and Larcker [39] and Zainudin [38] offer the most straightforward formulae for calculating composite reliability:

$$CR = (\sum K)\ 2\ /\ [(\sum K)\ 2\ +\ \sum (1 - K2)] \quad \text{Eq 1}$$

Where *K* is the factor loading of every item.

Table 4 reveals that the composite reliability values for all constructs exceed the 0.6 threshold, except for the Resilience subconstruct of the Physical Factor (PR), which has a value of 0.530. Similarly, for Average Variance Extracted (AVE), the recommended optimal value is ≥ 0.500 [38]. The AVE was calculated using the formula:

$$AVE = \sum K\ 2/n \quad \text{Eq 2}$$

where K denotes the factor loading of each item and n denotes the number of items in the model.

Table 4 reveals that the AVE values for the measurement model constructs, except for the Resilience subconstruct at 0.361, are above the 0.5 mark, indicating adequacy.

Table 4.
Composite Reliability and Average Variance Extracted for Constructs.

S/N	Constructs	Estimated Composite Reliability	Estimated Average Variance Extracted
1	Risks	0.758	0.500
2	Attitude	0.732	0.500
3	Perceived Behavioral Control	0.600	0.410
4	Information Availability	0.700	0.546
5	Growth	0.843	0.500
6	Demographics	0.722	0.565

2.10. Normality Distribution Assessment of Items in the Model

Normality is typically defined by the skewness measure of items with models. The standard method for determining normality involves items with an absolute skewness value of 1.5, which is most valid when the sample size exceeds 200 [38]. The measurement model indicates that all items have absolute Skewness values below 1.5, which suggests that normality has been achieved.

3. Results

As shown in Table 2, risk (β=0.986, p<0.05), attitude (β=0.739, p<0.05), perceived behavioral control (β=1.000, p<0.05), information availability (β=0.954, p<0.05), growth ((β=0.932, p<0.05) and demographics (β=0.890, p<0.05) are the significant factors that drive the intention to invest in GS. As evident in the squared multiple correlations (SMC) obtained, 97.2% (R^2=0.972) of the variation of factors underpinning the tendency to invest in the GS flood is essentially explained by the awareness of the risk factor (RSK). Similarly, the coefficient of determination (overall R^2) of 0.545 indicates that the choice of investing in the GS is explained by 54.5% of attitudinal factors (ATT). Moreover, the choice of investing in the GS is explained by 97.7% (R^2=0.97) of perceived behavioral factors, 90.9% (R^2=0.909) of variables underpinning information availability, 98% (R^2=0.98) of growth factors, and 79.2% (R^2=0.792) of demographic factors.

The structural model demonstrates that a one-unit increase in awareness of risk factors would lead to a 0.986 increase in the intention to invest in GS. With a critical ratio of 13.14 standard errors above zero, the probability is less than 0.05, indicating statistical significance. This suggests that the regression weight of the risk factor (RSK) in determining the intention to invest in GS significantly differs from zero. Similarly, a one-unit increase in the attitudinal factor (ATT) would result in a 0.739 increase in the intention to invest in GS, with a critical ratio of 11.19 and a probability below 0.05, indicating statistical significance. This supports the hypothesis that the attitudinal factor influences the tendency to invest in GS. The model further reveals that a one-unit increase in perceived behavioral control (PBC) will lead to a one-unit increase in the tendency to invest in GS. It also shows a critical ratio of 10.86 with an absolute value below 0.05, indicating the significance of PBC in predicting the tendency to invest in GS.

Moreover, as the value of the information availability factor (IFA) increases by a unit, the intention to invest in Sukuk is expected to increase by 0.954. This connotes that IFA is a significant determinant of the intention to invest in GS, as the probability of achieving a critical ratio of 10.84 in absolute value is below 0.05. Further, a 0.932 increment in the value of the intention to invest in GS would be influenced by a unit increase in the growth factor (GRT). This implies that with a critical ratio of 11.50 standard errors above zero, the probability is less than 0.05, indicating that the beta coefficient of the growth factor significantly influences the intention to invest in GS. Likewise, a 0.890 increment in the tendency to invest in GS would be occasioned by a unit increase in the value of the demographic factor. Similarly, the possibility of achieving the

regression weight estimate of 11.26 standard errors above zero (Critical Ratio) is below 0.05. This makes the theorized logic of the nexus between demographic profile and the tendency to invest in GS significant.

4. Discussion

The findings have revealed significant theorized relationships between risk factors, attitude, perceived behavioral control, information availability, growth, and demographics, and the intention to invest in the GS. Given its low-reliability value, only the subjective norm factor did not meet the criteria for inclusion in the model. Notably, among the 9 indicators (R1-R9) used to measure the risk factor (RSK), only three stood out: transparency, availability of risk management mechanisms, and macroeconomic indices such as a high inflation rate. The factors (R3, R6, and R9) were considered for retention in the model because of their high factor loadings. This is supported by previous findings, such as Sadiq and Khan [40] that higher returns on investment, premised on higher risk, correlate with a higher tendency to commit to investments. This finding contradicts [41], which found that risk factors have no significant impact on the intention to invest in GS. However, our results align with the perspective that risk factors can be a disincentive to GS investment, highlighting the need for practical risk management tools to make GS more viable, as suggested by [28].

Moreover, out of the five variables (A1-A5) used to underpin the attitude construct (ATT), only three dispositions towards investments, disposition towards green bonds, and disposition towards sustainability knowledge (A1, A3, and A5) were retained in the model. Previous studies show how higher attitudes influence individuals' tendency to utilize Islamic services like the GS [42-44]. In the Nigerian context, AbdulKareem et al. [29] found that attitude significantly influences investment intentions in Sukuk for infrastructural development, indicating that the same factor can positively contribute to GS investment. This study confirms earlier findings [45, 46] that a positive attitude toward green products is associated with an increased intention to purchase green products. However, it is instructive to mention that the non-significance of the disposition to Shariah knowledge (A4) particularly suggests that being Shariah-compliant is insufficient to motivate investment in GS. Potential investors can still be influenced by Shariah-inspired attitudes towards investing in GS, regardless of any factor.

Of the four factors deployed to Perceived Behavioral Control (P1-P4), only two, financial literacy and the understanding of the Shariah creed (P1 and P4) were retained in the model for their high factor loadings. The significance of the perceived behavioral control factor as a contributory factor to the intention to invest in GS is supported by previous studies such as AbdulKareem et al. [29], Choi and Johnson [47] and Zhuang et al. [46]. The study indicates that increased confidence in the performance of green products such as GS can boost potential investors' intention to invest in them. The need for reliable information on the workings and benefits of GS is crucial for potential investors.

Concerning Information Availability measured by six indicators (I1-I6), only two amounts of investment information and the amount of sustainability knowledge available (I1 and I5) were considered for retention because of their high factor loadings. This finding aligns with Faisal et al. [31] concerning how knowledge value significantly influences the intention to commit to green finance investment, it is equally supported by some studies [29, 42, 48-53]. The studies suggest that investors more knowledgeable about GS or green finance are more likely to invest in them.

Moreover, when it comes to the growth factor measured by 14 indicators, only 5 high-loading indicators, technological capacity, economic stability, local capacity, likelihood to generate excess returns, and opportunity to attract new investors (G2, G4, G5, G8, and G14) were retained in the model. The significance of the growth factor aligns with the findings of Asian Development Bank [54], which captures the factors that motivate investment in green bonds. It also aligns with Dalal et al. [28] concerning some of the incentives that drive the intention to invest in the GS. Lastly, only ethnicity and gender (D1 and D3), indicators of the demographic factor, were retained in the model for their high factor loadings. This finding is inconsistent with Shah et al. [55] in that the previous study did not consider ethnicity and gender as significant factors influencing the decision to invest in bonds. Among other factors like age and education, Shah et al. [55], conforming with Aren and Nayman Hamamci [56] considered income level as the only significant demographic predictor of the propensity to invest in bonds.

This study distinguishes itself from prior research by specifically examining the theoretical constructs that may influence the intention to invest in GS within the Nigerian context. It should be noted that the use of theories to interrogate the viability of GS is currently limited. Alkadi [24] concludes that only 5 theories have been utilized out of the 62 articles reviewed. Similarly, most studies employing quantitative and empirical analysis methods to explore the factors driving the intention to invest in GS are limited and are essentially confined to the geographical contexts of Indonesia and Malaysia Alkadi [24]. The literature on the viability and factors motivating investment in GS in high-potential markets like Nigeria is limited.

While specifically focusing on the Nigerian GS market, the study is remarkably different from previous studies that have attempted to explore the Nigerian GS market from various dimensions. For instance, the study is notably different from Dalal et al. [28], whose investigation of GS was too broadly focused on Sub-Saharan Africa without deploying data to contextualize the potential factors that can enhance or constrain the growth of Nigeria's GS market. Similarly, Yahuza et al. [27] only exploratorily interrogated the applicability of GSs in Nigeria without data-based evidence of the growth and risk factors. AbdulKareem et al. [29] attempted to investigate the factors influencing Nigerians to invest in Sukuk was generally on infrastructural development and not on green projects that this study had advanced knowledge about. Whereas Faisal et al. [31] reportedly, how religious value, functional value, social value, emotional value, and knowledge value significantly influence the intention to invest in the GS; there are wider issues around factors such as standardization, awareness, political will, age of retail investors and managers of institutional investment companies, impact assessment reporting, effective risk management tools, local capacity, qualification criteria, legal issues, socio-religious persuasions, and greenness of school

curricula that were not explored within the Nigerian space. Yet, these are strategic variables for any quest to develop a sustainable, research-based framework for viable GS financing.

The study has been able to build upon previous research on the factors driving the intention to invest in GS, leveraging SEM to analyze field data within the particular research context of Nigeria. The study has also helped to highlight the relevance of local-scale indicators that underpin the factors that drive the tendency to invest in GS. By eliminating the insignificant indicators and constructs, the factor reduction of SEM could guide GS issuers to focus on critical factors, enabling better market policy formulation and optimal resource allocation to address limitations.

5. Practical Implications

The study finds significant theoretical relationships between several factors, including risk factors, attitude, perceived behavioral control, information availability, growth, and demographics and the intention to invest in GS. However, the factor of subjective norm, given its low-reliability value, did not meet the criteria for inclusion in the model. The implications of the study's findings are numerous.

Firstly, the study represents a consolidation of existing literature on the factors driving the intention to invest in GS and focuses on the Nigerian context. Secondly, the study has helped to highlight the relevance of local-scale indicators that underpin the factors driving the tendency to invest in GS. By eliminating insignificant indicators and constructs, SEM's factor reduction could allow GS issuers to focus on the most critical factors systematically while presenting the premises for formulating market policies, with resources more optimally channeled to address the most critical limitations.

Based on the findings, GS issuing organizations and regulatory authorities can be guided in formulating marketing policies to enhance investment in the GS market. This strategy could promote meaningful investments in sustainable infrastructural interventions that have mitigative effects on climate change and environmental pollution. For instance, the risk factor as a driver of the intention to invest in the GS can be addressed by formulating dedicated ESG guidelines and risk management frameworks. As noted by Dalal et al. [28] the Equator Principles - a risk management framework used in conventional financial institutions to identify, assess, and manage environmental and social risks in projects - serves as a valuable example. Concerning the attitudinal factor, GS issuing organizations can deploy promotion to modify the disposition of potential consumers towards investments, green bonds, sustainability knowledge, or primarily GS. Promoting a positive image of GS can be achieved by incorporating environmental education into school curricula and fostering green attitudes through mass and social media, as well as highlighting the benefits of green products to the public via online channels.

Moreover, perceived behavioral control also significantly influences the intention to invest in the GS. Confidence in purchasing abilities increases the likelihood of potential consumers investing in GS. To this extent, reliable information about the GS is needed to enhance the confidence of potential investors. In this regard, there is a need for intentional investment in financial literacy and the propagation of knowledge of the Shariah creed. The study has shown that when it comes to the intention to invest in the GS, knowledge of the Shariah creed is more significant than the disposition to Shariah knowledge. Knowledge of Shariah principles can drive potential investors to invest in GS, even if the Shariah creed does not necessarily persuade them. For instance, political leftists who identify as eco-socialists are more likely to be persuaded by green ideals and the equitable nature of Sukuk's principles, even without being Muslims.

The availability of effective information is an important factor in the decision-making process that culminates in investment in GS. It could also be anchored around providing investment information, sustainability knowledge, and the workings of the GS. There is a need for strategic communication of how investment in GS represents a practical commitment to environmental protection and climate change mitigation. This will ensure that potential investors have confidence in investing in the GS. Concerning the growth factor measured by 14 indicators, there is a need to offer growth incentives. For instance, tax incentives can be offered to investors in GS. GS's regulatory categorization as high-quality liquid assets, eligibility for Central Banks' reserve management, and its viability as collateral can significantly incentivize green investments.

Moreover, developing reporting and impact monitoring and assessment frameworks will improve the integrity of GS issuances. In line with Dalal et al. [28], Sharia compliance with GS projects requires a sustainability assessment based on *maqasid*. Hence, a viable framework that can increase confidence in the GS concept and the intention to invest in it should effectively combine both certifications, assuming that Sharia compliance also requires a sustainability assessment based on *maqasid*.

The demographic factors driving the intention to invest in GS necessitate targeting ethnic groups that are homogeneously non-Islamic, less financially literate, and sustainability-conscious gender and age cohorts for pervasive enlightenment. For instance, specially tailored campaign programs on GS can be developed for millennials and Gen Zs, who are more likely to invest in long-term GSs than members of Generation X or boomers, who might consider them risky. GS, an ethical investment, can mitigate climate change, incentivize investment, and create full employment in Nigeria, aligning with the country's sustainable monetary and fiscal plans.

6. Conclusions

The study examined and confirmed seven factors that impact the intention to invest in GS in Nigeria using structural equation modeling (SEM). A questionnaire collected 338 responses from potential investors, with 321 deemed suitable for analysis. The study findings revealed significant relationships between risk factors, attitude, perceived behavioral control, information availability, growth, demographics, and investment intention. The findings also highlighted the importance of local indicators and the focus on critical factors for GS issuers and policy formulation. Knowledge of the principles of Sharia guiding GS was found to be crucial, even for non-Muslim investors with eco-socialist drives. Suggestions include tackling

risk factors through ESG guidelines, encouraging positive attitudes through media, and establishing reliable information to build investors' confidence. Furthermore, growth incentives such as regulatory support, tax benefits, and enhanced reporting frameworks could advance investments. The limitation of the study is the complexity of interpreting the model with its multiple variables. This, however, offers the vista for the application of machine learning methods to train multiple models on the same data and combine their predictions for more robust outputs and clearer interpretations. In conclusion, GS offers Nigeria a promising strategy for sustainable investment and climate change mitigation, promoting environmental protection and economic growth.

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