https://doi.org/10.52968/15603179
ISSN: 2805-3346

**RESEARCH ARTICLE**

# The Influence of ESG Ratings on Financing Decisions in Ghana's PropTech Sector

Andrews Tagoe[1], Elvis Attakora-Amaniampong[1], Kannyiri Thadious Banyen[2]

[1]Department of Real Estate, University of Business and Integrated Development Studies, Wa, Ghana
[2]Department of Banking and Finance, University of Business and Integrated Development Studies, Wa, Ghana

**ABSTRACT**

Although ESG metrics have been increasingly influencing investment decisions in global real estate sectors, its impact in emerging PropTech spheres has remained understudied. In Ghana, where PropTech adoption has been rising amid weak institutional frameworks, the effect of ESG ratings on financing decisions has not been properly investigated. Therefore, this quantitative cross-sectional study evaluates the impact of ESG on financing volume and access among PropTech firms in Ghana. Data was obtained from 120 PropTech firms operating in smart construction, energy monitoring, and digital real estate platforms. ESG performance was evaluated in its environmental, social and governance dimensions, as well as in terms of financing volume and access indicators. Multiple linear and binary logistic regression equations were used, controlling for firm attributes. The findings indicate that ESG ratings have a considerable impact on financing outcomes. The strongest positive impact on financing volume and access was observed in environmental performance, whereas a positive but less significant relationship was observed in the social and governance dimensions. The results show that ESG activity is an important indicator for investors in Ghana's capital-constrained PropTech market to rely on. The study provides policy and investment insights for improving sustainable PropTech financing in emerging economies.

Received: 5 January 2026

Revised: 8 February 2026

Accepted: 6 April 2026

Published: 5 June 2026

**Cite article** as: Tagoe, A., Attakora-Amaniampong, E., Banyen, K. T. (2026). The Influence of ESG Ratings on Financing Decisions in Ghana's PropTech Sector. *African Journal of Housing and Sustainable Development, 7*(2), pp. 94-109.

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Corresponding author:
andrews.tagoe@hotmail.com

**Keywords:** ESG ratings, Financing decisions, PropTech financing, Signalling Theory, Sustainable financing, Ghana

## 1.0 Introduction

Over the years, the Environmental, Social, and Governance (ESG) framework has transformed into a keystone of investment decision-making in global financial markets (Banerjee & David, 2025; Khan & Iqbal, 2024). Globally, the real estate industry contributes nearly 40% of energy use and 30% of carbon emissions, which is why ESG compliance is required to minimize environmental damage (Servais & Brunauer, 2023). Simultaneously, the rise of property technology (PropTech), which integrates digital innovations into property development, is now restructuring the way assets are created, managed and financed (Saiz, 2020). These transformations indicate a paradigm shift in value perception within real

estate, not only in terms of profits and location but also in terms of sustainability, data transparency and social responsibility. Developed economies have retorted with comprehensive ESG scoring mechanisms, regulations and sector-based certifications, which influence investor behaviour (Singhania & Saini, 2023). Vonlanthen's (2024) study in Europe and North America shows that ESG-based PropTech solutions are increasingly attracting capital, mostly in smart buildings, green construction materials and AI-based energy management systems. However, the integration of ESG and PropTech does not happen equally at the global level.

In sub-Saharan Africa, multilateral development goals, donor structures and external investor conditions are the primary drivers of the ESG agenda (Mhlanga, 2024; Mhlanga & Adegbayibi, 2024). Yet, the integration of ESG into real estate and PropTech investment decision-making continues to be underdeveloped. In Africa, ESG integration is undermined by inadequate infrastructural facilities, informal urban development and weak institutional implementation (Biitir et al., 2022). As Ifediora and Nwosu (2024) found, ESG factors in commercial and retail real estate continue to be operationalised under vague and inconsistently applied frameworks. Moreover, given the informal nature of Africa's PropTech ecosystem, which is characterised by small start-ups, unstructured sources of financing and limited assistance from the government, ESG-oriented financing is inevitably hindered (Oladiran & Dickins, 2024). Consequently, such ventures commonly experience a dual challenge, that is, obtaining funding in a capital-scarce environment and fulfilling poorly defined or weakly enforced ESG demands.

Ghana illustrates these issues on a smaller scale as there are rapid urbanisation and an increased demand for real estate innovation (Appau et al. 2023; Gillespie & Schindler, 2022). The emerging PropTech sector in Ghana is marked by energy monitoring, smart construction platforms and digital real estate platforms (Anim-Odame, 2022). Thus, as ESG awareness grows due to initiatives of the Ghana Green Building Council and sustainability guidelines from the Bank of Ghana (Debrah et al., 2024), it is necessary to study the connection between ESG ratings and PropTech financing in this African context. PropTech firms are discouraged from fully utilizing ESG frameworks because of ambiguous incentives, vague investor expectations and the absence of technical capacity (Ayimaa et al., 2025). Furthermore, lack of standardised ESG screening systems compels financial institutions to use informal or ad hoc appraisal for PropTech financing decisions (Bonsu et al., 2025). As things stand, limited empirical evidence makes it uncertain whether ESG ratings can shape financing decisions such as access to funding, investor preferences or conditions of loans. Thus, this leaves a gap in research.

While there have been global studies examining how ESG ratings affect real estate valuation and risk premiums (e.g., Vonlanthen, 2024), as well as those examining the relationship between ESG performance and capital allocation (e.g. Servais & Brunauer, 2023), there is limited attention on how these processes are reflected in emerging PropTech market context. Studies in Ghana have focused on green building compliance, construction sustainability and barriers to digital transformation, ignoring the influence of ESG perceptions and performance on financial decisions at the nexus of real estate and technology. This raises questions such as "Do PropTech companies with higher ESG compliance receive better financing?" "Do investors diligently screen for ESG criteria? Which ESG indicators matter most to financiers? What institutional or technical barriers prevent PropTech firms from conforming to ESG standards?

This study seeks to address this gap by analysing the role of ESG ratings on financing decisions in Ghana's PropTech sector. It aims to assess specific criteria adopted in rating ESG compliance, examine the relationship between ESG ratings and access to financing options, identify investors' preferred ESG elements in funding decisions and investigate the barriers PropTech firms encounter in aligning to ESG standards. The study will provide a rigorous, data-driven insight of the ESG-finance nexus in an industry that is at the forefront of Ghana's sustainable urban development agenda through factor analysis and regression modelling.

The study is important because it will inform evidence-based policy, investment strategies and entrepreneurial decision-making. The findings will assist policymakers to develop effective ESG

compliance frameworks suitable for Ghana's PropTech ecosystem. Also, it will aid investors in managing risk and assessing impacts accurately by understanding the ESG indicators that substantially affect financial outcomes. Further, the study will aid PropTech companies in determining whether ESG alignment provides tangible financial benefit and how it can be used to attract capital. Finally, the study helps contextualise ESG metrics to reflect Ghana's regional priorities and market conditions in the drive towards ensuring sustainable frameworks.

## 2.0 Literature Review

### 2.1 Signalling Theory

Signalling Theory was developed by Michael Spence in his classic 1973 article entitled "Job Market Signaling". The theory examines information asymmetry, a situation where one party, typically the investor, has insufficient information regarding the quality or reliability of another party such as a business venture or investment target. Spence argued that a good signal must be too expensive to counterfeit and useful only to parties with better qualities. This shows that the signal is authentic and informative for decision-making.

The application of signalling theory to Real Estate and PropTech provides a valuable perspective in understanding the role of ESG indicators. Prospective investors of PropTech firms do not necessarily see the full picture of their operation, sustainability efforts and governance systems (Saiz, 2020). This underlines the need for verified ESG certifications, sustainability disclosures and performance scores as legitimate indicators of quality and risk reduction (Chan, 2025; Connelly et al., 2011). This helps bridge information gaps by providing evidence of alignment with long-term environmental and governance standards.

Thus, this study uses signalling theory to describe how ESG scores affect financing decisions in Ghana's emerging PropTech market. ESG performance serves as a strategic indicator that communicates commitment to sustainability, responsibility and viability (Chan, 2025). It assists investors in deciding whether to allocate capital, especially in contexts where formal reporting systems and regulatory oversights are weak. Irrespective of the innovation potential and operational efficiency of PropTech firms, they are perceived to be high-risk investments if they lack ESG indicators. Therefore, signalling theory shows how ESG transparency affects capital flows in emerging markets like Ghana.

### 2.2 Frameworks of ESG in the Real Estate Investment

Globally, ESG frameworks have evolved from a Corporate Social Responsibility (CSR) instrument into a critical element of investment valuation in the real estate market (Banerjee & David, 2025; Khan & Iqbal, 2024). Through efforts of the European Commission's Sustainable Finance Action Plan, and popularized by tools such as the EU Taxonomy and Sustainable Finance Disclosure Regulations (SFDR), ESG indicators are now influencing real estate valuation and financing (Servais & Brunauer, 2023). ESG frameworks that seek to quantify and integrate sustainability, ethical governance and social responsibility into investment decisions are crucial to the real estate industry, which is responsible for about 40% of global energy consumption and 30% of carbon dioxide ($CO_2$) emissions.

Empirical studies show the effect of ESG ratings on real estate investment metrics. For instance, a study in Switzerland reported that properties with better ESG scores have lower discount rates, higher rental income and lower vacancy rates (Vonlanthen, 2024). Amazingly, the Environmental component of ESG has greater influence, suggesting that markets are sensitive to green building certifications, climate risk reduction, and energy efficiency. This proves that ESG is not just reputational but financially material. Properties with higher rating signalled lower long-term risk and enhanced desirability, thus shaping investors' behaviour and valuation models. These impacts were robust in both appraisal and transaction-based market metrics.

Despite these positive relationships, the operationalisation of ESG continues to be problematic at the asset level. Servais and Brunauer (2023) observed the existence of a methodological inconsistency and incomparability in ratings. A large number of rating systems rely on self-reported disclosures or utilize blanket weights across

portfolios without considering property-level variations. Tools such as GRESB and MSCI are either too generalised or too dependent on subjective scoring. Servais and Brunauer (2023) addressed this by developing a geospatial, AI-improved ESG tool that tracks ESG performance at the granular and property levels. This demonstrates a move towards objective, verifiable and technology-based ESG assessment techniques, which are particularly required for high-frequency, monitoring and investment assessment.

Equally relevant are issues of standardisation and localisation, with these gaps being critical in areas, such as sub-Saharan Africa, where ESG norms are still developing and institutional capacity is weak (Anifowose, 2025). The financial weight of the ESG ratings in investment decisions may vary due to data availability, investor demands or limited regulatory enforcement. This indicates a research and practice gap: While ESG may influence valuation and risk in developed markets, its use and relevance in emerging markets, especially at the nexus of PropTech and real estate, needs to be explored.

### 2.3 Dynamics of PropTech Financing and the Impact of ESG Compliance

The intersection of PropTech and ESG in emerging markets is a promising but underexplored area of real estate financing. PropTech, generally defined as the use of technology to innovate and improve real estate operations, transactions and investments, encompasses innovations, such as smart building platforms, green construction software, blockchain-based property verification and AI-driven asset management (Saiz, 2020; Servais & Brunauer, 2023; Tan & Miller, 2023). PropTech provides not just operational efficiency but also environmental and social value, which fits ESG objectives. A question that is yet to be empirically answered, however, is whether ESG-aligned PropTech projects positively impact financing decisions.

Globally, PropTech financing has increased exponentially, with venture capitalists and institutional investors becoming aware of ESG congruence. Start-ups that provide energy-efficient solutions, carbon tracking technologies or affordable access to housing are most likely to attract impact investment and favourable lending conditions (Chan, 2025). However, studies indicate that access to such financing is primarily conditional not just on ESG performance but also on the ability to signal and verify compliance using certifications, metrics and reporting (Servais & Brunauer, 2023).

In established markets, such signalling role is supported by well-established frameworks and external certifications. However, in areas like Africa, PropTech firms struggle to meet such requirements due to high cost of certification, fragmented nature of data infrastructure, and limited investor knowledge in ESG. In the Nigerian context, Ifediora and Nwosu (2024) empirically determined the existence of this barrier in relation to industrial and retail properties. Their findings revealed that energy efficiency, employee welfare and green certification are highly preferred ESG-attributes among investors, although most properties cannot secure premium financing because of unverifiable ESG data and certifications. Their principal component analysis showed a preference hierarchy, with employee well-being and community engagement being the highest-ranked item while biodiversity and green spaces were underestimated. These distinctions highlight the contextual variations in ESG priorities, especially in markets where social impact could be a major consideration compared to climate indicators in financing decisions.

The case in Ghana is one of potential and limitation. While the PropTech ecosystem in Ghana is expanding, and start-ups are creating climate-smart building products, energy monitors and digital real estate platforms (Anim-Odame, 2022; Ayimaa et al., 2025), ESG compliance has been poorly understood and inconsistently applied. Moreover, financial institutions are yet to adopt standardised ESG scoring models for assessing PropTech projects, even as most start-ups are not familiar with ESG frameworks or have no technical expertise to implement them (Nyamedi, 2024). This gap hinders access to institutional capital, even though these firms' innovations align with global sustainability goals.

In addition, investor perception is vital. Without standardised ESG metrics, financing decisions are made on informal evaluations, reputational signals

or generalised sector biases (Fometescu et al., 2024). This prevents the capacity of ESG-aligned PropTech firms to stand out and attract ESG-driven investment flows. The literature suggests that start-ups may underinvest in sustainability when ESG is not explicitly factored into financing because it is deemed a cost, rather than a strategic asset. Yet, where ESG is incorporated in funding criteria, it fosters transparency and de-risks investments while aiding long-term business viability.

In the light of this thematic gap, it is necessary to conduct an empirical study of the role of ESG in PropTech financing in emerging economies, especially in terms of understanding how ESG ratings affect investor decision-making, which dimensions are very important, and how PropTech firms can credibly signal compliance in a resource-constrained environment. In addition, the influence of digital ESG certifications and AI-based compliance tools, an emerging trend, should also be considered. These tools may democratize access to ESG compliance by reducing the costs of verification and providing real-time monitoring.

As already noted, although the empirical data justifies the value of ESG in improving financing outcomes, its application to PropTech in Ghana has not been studied. To be sure, understanding this relationship will provide investors better frameworks for risk-adjusted assessments and offer start-ups a guide on how to align innovations with sustainable finance. Thus, it is important and timely to examine ESG-finance relationships within the Ghanaian PropTech context, which supports evidence-based investment, inclusive growth and climate-aligned real estate development.

## 3. Research Methodology

### 3.1 Research Design

This quantitative research design, using a cross-sectional survey approach to analyse how ESG ratings affect the financing decision-making process in Ghana's PropTech sector. This enabled the gathering of objective and numerical data, which was analysed statistically, in line with the positivist paradigm and the theoretical underpinning of Signalling Theory. The cross-sectional design was adopted because it aided capturing the perceptions and experiences of PropTech firms at one point in time, allowing for an assessment of the connection between ESG performance and financial performance without manipulating any variables.

### 3.2 Sampling and Mode of Data Collection

The study targeted PropTech firms in Ghana, particularly those in smart construction, green energy monitoring and digital real estate platforms. A purposive sampling strategy was employed to ensure that only firms involved in or aware of ESG-related strategies were selected. This facilitated the selection of decision-making respondents, including founders, finance managers and ESG officers. A structured questionnaire was used to collect data through online channels, which included institutional email, industry networks and phone call reminders. The questionnaire was left open for four weeks and a total of 120 valid responses were obtained and verified as valid for analysis. Informed consent was obtained from all respondents prior to data collection and ethical approval was obtained from the relevant Institutional Review Board.

### 3.3 Measures and Variables of the Study

Table 1 defines the variables, their measurement and the literature sources informing this study. There are two dependent variables, namely, financing volume and financing access. Financing volume was measured as the total sum of external funds raised by the firm over the last 12 months, which was a continuous variable in Ghanaian cedis (GH₵). Financing access was measured as a binary variable and it determined whether or not the firm received external funding within the same period ("Yes" coded as 1 and "No" coded as 0).

The independent variables were ESG dimensions, with each dimension operationalised with several items on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree". The environmental indicators included green certifications and waste reduction practices. Social indicators covered employee welfare and community involvement, while Governance was measured through items concerning board transparency and ESG reporting. A composite score, using the mean scores, was obtained in each dimension and reliability was established using Cronbach's alpha, with all scores being above the threshold of 0.70. The control variables were firm

age, firm size, market segment and previous financing history. These variables were added to the regression models to explain the firm level variation that may affect financing results without considering ESG factors.

**Table 1:** Variable Definition and Measurement

| Variable | Definition | Indicators | Literature Source |
|---|---|---|---|
| **Environmental (E)** | The firm's commitment to sustainable and eco-friendly practices that reduce environmental harm | 1. Use of energy-efficient technologies<br>2. Possession of green building certifications<br>3. Implementation of carbon tracking systems<br>4. Adoption of waste management and recycling programmes<br>5. Environmental impact reporting | (Servais & Brunauer, 2023; Vonlanthen, 2024) |
| **Social (S)** | Firm's initiatives to support employee well-being, community development and social inclusion | 1. Employee health and safety programs<br>2. Gender and diversity inclusion initiatives<br>3. Corporate Social Responsibility (CSR) activities<br>4. Engagement with local communities<br>5. Policies on stakeholder inclusiveness | (Ifediora & Nwosu, 2024; Servais & Brunauer, 2023) |
| **Governance (G)** | The firm's governance structure ensures transparency, accountability and ethical conduct | 1. Board independence and diversity<br>2. Anti-corruption and compliance policies<br>3. Public disclosure of ESG performance<br>4. Existence of ESG committee or officer<br>5. Use of third-party ESG audits | (Connelly et al., 2011; Servais & Brunauer, 2023) |
| **Financing Volume** | The total amount of capital a firm has secured from external sources within a given time frame | 1. Total funds raised in the last 12 months<br>2. Number of successful funding rounds<br>3. Size of the largest single investment<br>4. Amount of institutional funding<br>5. Variation in financing relative to the previous year | (Servais & Brunauer, 2023; Vonlanthen, 2024) |
| **Financing Access** | The ability of a firm to obtain external capital for growth or operations | 1. Presence of at least one funding deal<br>2. Application approval rate for financing<br>3. Frequency of financing rejections<br>4. Perceived ease of obtaining | (Ifediora & Nwosu, 2024); ESG reports in PropTech (2023) |

| | | | |
|---|---|---|---|
| | | funding (Likert scale)<br>5. Availability of ESG-driven funding opportunities | |
| **Control Variables** | Firm-level characteristics used to account for contextual variation in financing decisions | 1. Age of the firm (in years)<br>2. Number of employees (firm size)<br>3. Prior funding history (Yes/No)<br>4. Market segment classification (e.g., smart construction, digital platforms)<br>5. Location of headquarters (urban vs. non-urban) | (Appau et al., 2024; Servais & Brunauer, 2023) |

***Source:*** Author's Construct

### 3.4 Model Specifications

For testing the first research objective, which was to examine the effect of ESG ratings on the level of financing raised, a Multiple Linear Regression (MLR) model was formulated. Financing volume was the dependent variable while composite ESG scores and control variables were the independent variables in this model. The regression model was modelled as shown in Equation 1 below:

$$Y = \beta_0 + \beta_1 E + \beta_2 S + \beta_3 G + \beta_4 Z + \varepsilon$$

Y is the cumulative amount of finance raised, E, S and G are the composite scores of the environmental, social and governance dimensions respectively, Z is the vector of control variables and ε is the error term.

For the second objective, which investigated whether ESG compliance determines the probability of obtaining financing, a binary logistic regression model was employed. The dependent variable was financing access, whereby a score of 1 implied that the firm was financed and 0 implied otherwise. The logistic regression model was designed as shown in Equation 2 below:

$$\log\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 E + \beta_2 S + \beta_3 G + \beta_4 \boldsymbol{Z} + \varepsilon$$

where P is the likelihood of outside funding and all the other terms remain defined as above.

### 3.5 Diagnosis and Assumption Testing of Data

Before the regression models were run, the dataset underwent a series of diagnostic tests that verified the validity of the assumptions behind each model. In the case of the MLR, the Shapiro-Wilk test was used to test the normality of the financing volume variable and was supported by histogram inspection. A scatterplot was used to check linearity between the independent and dependent variables, with homoscedasticity checked by plotting the residuals against the predicted variables. Variance Inflation Factors (VIF) were used to determine multicollinearity between the independent variables, with all values falling below the acceptable threshold of 5. Cook's Distance was used to identify outliers, with no value found to exceed the threshold of 1.

In the logistic regression, the Hosmer-Lemeshow test was employed to test the model fit, and a non-significant P-value indicated a good fit between the observed and predicted classifications. Also, Pseudo-$R^2$ statistics like Cox & Snell and Nagelkerke $R^2$ were applied to determine the explanatory power of the model.

### 3.6 Data Analysis

SPSS Version 26 was used to analyse the cleaned dataset. To summarize the characteristics of firms and ESG practices, descriptive statistics were calculated first. Next, Pearson correlation coefficients were determined to investigate preliminary relationships among variables. The MLR model was used to establish the degree to which the ESG scores were used to predict financing volume, controlling for firm characteristics. Beta coefficients, standard error and significance levels were also provided for the interpretation.

Furthermore, a binary logistic regression was used to establish the significance of ESG dimensions on the likelihood of obtaining external financing. The findings were in the form of odds ratios, confidence intervals and significance levels. The statistical significance was determined by a p-value less than 0.05 in all models.

## 4. Findings

### 4.1 Descriptive Findings

The descriptive results presented in Table 2 demonstrate the maturity and engagement of Ghanaian PropTech firms in sustainability practices, governance structure and financial performance. Environmental indicators show moderate engagement variation. Carbon tracking system, waste management and recycling programmes are relatively common in use. However, indicators such as green building certifications and environmental impact reporting show less implementation. The standard deviations indicate non-homogenous uptake of firms, particularly for carbon tracking and environmental reporting, suggesting early-stage or uneven adoption in ESG.

Moreover, the social aspect is among the stronger areas, especially the interaction with the local communities and CSR activities. Gender and diversity initiatives also ranked high, implying that inclusivity is identified as a priority. Employee health and safety programmes are less integrated, indicating an area for improvement.

Notably, governance scores are generally favourable. The application of third-party ESG audit and anti-corruption policies was noticeable. However, the presence of ESG committees or officers scored lower, suggesting that while governance policies may exist, dedicated ESG oversight structures are not widely adopted. Firms also cited moderate financing activity with institutional funding standing out. However, successful funding rounds and the amount of the largest investment were smaller, indicating difficulty in attracting large or recurring flows of capital.

Regarding financing, firms also reported ease in finding funding and their perceived access to ESG-based opportunities was high. However, the application acceptance and rejection rates meant that even with access to finance there is no assurance of success, possibly reflecting selective investor screening.

**Table 2:** Descriptive Findings

| Variable | Indicator | Mean | Standard Deviation | Min Score | Max Score |
|---|---|---|---|---|---|
| Environmental (E) | Use of energy-efficient technologies | 2.61 | 0.84 | 2 | 4 |
| | Possession of green building certifications | 2.55 | 0.77 | 1 | 4 |
| | Implementation of carbon tracking systems | 3.75 | 1.18 | 2 | 5 |
| | Adoption of waste management and recycling programs | 3.32 | 0.62 | 1 | 4 |
| | Environmental impact reporting | 2.54 | 1.01 | 1 | 5 |
| Social (S) | Employee health and safety programmes | 2.7 | 0.53 | 2 | 4 |
| | Gender and diversity inclusion initiatives | 3.73 | 1.13 | 2 | 5 |
| | Corporate Social Responsibility (CSR) activities | 4.02 | 0.8 | 2 | 5 |
| | Engagement with local communities | 4.44 | 0.54 | 1 | 5 |
| | Policies on stakeholder inclusiveness | 3.04 | 0.7 | 2 | 4 |
| Governance (G) | Board independence and diversity | 3.6 | 1.02 | 1 | 5 |
| | Anti-corruption and compliance policies | 3.81 | 0.66 | 1 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| | Public disclosure of ESG performance | 3.73 | 1.12 | 2 | 4 |
| | Existence of ESG committee or officer | 2.54 | 0.87 | 1 | 4 |
| | Use of third-party ESG audits | 4.22 | 0.96 | 2 | 5 |
| Financing Volume | Total funds raised in the last 12 months | 3.33 | 0.7 | 1 | 5 |
| | Number of successful funding rounds | 2.51 | 0.54 | 2 | 5 |
| | Size of largest single investment | 2.76 | 0.76 | 1 | 5 |
| | Amount of institutional funding | 4.22 | 1.13 | 1 | 5 |
| | Variation in financing relative to previous year | 2.97 | 0.87 | 2 | 4 |
| Financing Access | Presence of at least one funding deal | 3.29 | 0.63 | 1 | 5 |
| | Application approval rate for financing | 2.75 | 0.75 | 1 | 5 |
| | Frequency of financing rejections | 3.96 | 1.12 | 2 | 4 |
| | Perceived ease of obtaining funding | 4.35 | 0.57 | 1 | 4 |
| | Availability of ESG-driven funding opportunities | 3.6 | 0.92 | 1 | 4 |
| Control Variables | Age of the firm (in years) | 4.47 | 1.05 | 1 | 4 |
| | Number of employees (firm size) | 3.43 | 0.51 | 2 | 5 |
| | Prior funding history | 4.33 | 0.65 | 2 | 4 |
| | Market segment classification | 2.81 | 1.14 | 2 | 5 |
| | Location of headquarters | 2.85 | 0.61 | 2 | 4 |

***Source:*** Field Survey

### 4.2 Model Testing

The MLR model diagnostics in Table 3 provide insight into the validity and strength of the analysis between ESG factors and financing outcomes of Ghanaian PropTech firms. The diagnostics comprise the Shapiro-Wilk test of normality, the Breusch-Pagan test of Homoscedasticity, Mean and max variance factor (VIF) and R-squared of the model. All the diagnostic tests deal with a key assumption of regression modelling.

To begin with, the outcome of the Shapiro-Wilk test of normality exceeds the standard traditional value of 0.05, demonstrating that the residues are normally distributed, and satisfying one of the main assumptions for valid inference in linear regression.

Secondly, the Breusch-Pagan test of homoscedasticity, which tests whether the variance of the residuals is constant across all levels of the fitted values, had a p-value above the critical value of 0.05, indicating that there was no heteroscedasticity, thus satisfying the assumption of equal variance.

However, concerns arise from the VIF values. The Maximum VIF is very high and the Mean VIF show severe multicollinearity among the independent variables. Multicollinearity may misrepresent regression coefficient estimates, inflate standard errors and decrease the reliability of individual predictor explanations.

Despite the multicollinearity problem, the model has high explanatory power with a value of $R^2$ of 0.76, meaning that the predictors explain 76% of the variance in financing volume.

Overall, the model satisfies the requirements of normality and homoscedasticity, showing an excellent overall fit. However, the high multicollinearity indicates that the selection of variables should be narrowed down or use the dimension-reduction method like principal component analysis.

**Table 3:** Model Testing

| Diagnostic Test | Test Statistic / Value | p-value |
|---|---|---|
| Shapiro-Wilk Test | 0.86 | 0.28 |
| Breusch-Pagan Test | 6.59 | 0.67 |
| Max VIF | 143.10 | - |
| Mean VIF | 14.44 | - |
| R-squared | 0.76 | - |

***Source:*** Field Survey

### 4.3 Multiple Regressions on the Influence of Financing Volume among Ghanaian PropTech Firms

The MLR results provided in Table 4 indicate that a number of predictors significantly contribute to the financing volume of Ghanaian PropTech firms. The intercept of the model is GH¢432,341.70, representing the baseline financing volume when all predictors are zero. The positive impact of environmental performance on financing is statistically significant, with a coefficient of GH¢86,624.44 and a p-value that is less than 0.001. This implies that every one-unit rise in environmental engagement is correlated with a GH¢86,624 rise in financing volume, thus emphasizing the importance of sustainability practices in capital acquisition.

Social performance (S) also contributes significantly, with a coefficient of GH¢65,537.89 ($p < 0.001$), suggesting that firms with powerful social programmes, including CSR activities, diversity policies or community involvement, are more inclined to raise funds.

Governance (G) has a coefficient of GH¢44,321.53 ($p<0.001$), indicating that stronger governance practices, e.g., board diversity, anti-corruption policies or ESG reporting structure, have positive effects on financing success.

Firm-level characteristics further show their influence. The age of a firm has a positive correlation, with a coefficient of GH¢4,949.55 ($p < 0.001$), suggesting that older firms tend to attract secure more financing, probably as a result of accumulated credibility and operational experience. The size of firms also matters, with every unit of increment in firm size corresponding to an additional GH¢1,136.74 in financing ($p<0.001$). The most significant predictors are past funding history, with a coefficient of GH¢108,306.30 ($p<0.001$), meaning that previously funded companies have a high probability of raising new capital, possibly due to established track records.

There is minimal statistical significance in the market segment and geographic location variables. Specifically, the coefficient of firms in the digital platform segment is GH¢17,943.07 but a p-value of 0.138 means that this result is statistically insignificant. Similarly, firms in the smart energy category and those in urban areas exhibited coefficients of -GH¢645.10 and -GH¢5,660.93 respectively, both having p-values significantly above 0.05, thus indicating no significant impact on financing volume. This means that sector type and location of firms do not play a significant role in distinguishing funding outcomes when considering ESG and Firm Characteristics

**Table 4:** Multiple regression on the influence of financing volume among Ghanaian PropTech firms

| | Coef. | Std.Err. | T | P>\|t\| | [0.025 | 0.975] |
|---|---|---|---|---|---|---|
| Intercept | 432341.7 | 53952.76 | 7.86 | 0.00 | 332238.2 | 542045.2 |
| E | 86624.44 | 8974.70 | 9.65 | 0.00 | 68750.68 | 105418.2 |
| S | 65537.89 | 10079.38 | 6.51 | 0.00 | 46562.74 | 85573.14 |
| G | 44321.53 | 9152.13 | 4.84 | 0.00 | 27185.13 | 63455.71 |
| FirmAge | 4949.554 | 1328.24 | 4.06 | 0.00 | 2535.389 | 7354.818 |
| FirmSize | 1136.744 | 177.32 | 6.32 | 0.00 | 767.5324 | 1476.972 |

| | | | | | | |
|---|---|---|---|---|---|---|
| PriorFunding | 108306.3 | 9767.55 | 11.11 | 0.00 | 87988.95 | 127643.3 |
| Segment_DigitalPlatform | 17943.07 | 11822.03 | 1.50 | 0.14 | -5793.5 | 41569.71 |
| Segment_SmartEnergy | -645.098 | 11908.98 | -0.05 | 0.96 | -24256.7 | 22975.51 |
| Location_Urban | -5660.93 | 9728.12 | -0.59 | 0.56 | -24371.4 | 14229.56 |

***Source:*** Field Survey, 2026

### 4.4 The Likelihood of PropTech Firms in Ghana Gaining Access to Financing

The logistic regression outcomes presented in Table 5 indicate several significant correlations between predictors and the likelihood of PropTech firms in Ghana acquiring financing. The model intercept is statistically significant with a large negative coefficient, which implies that the likelihood of accessing financing is very low when all the predictors take the value of zero. This implies that the absence of ESG practices and firm-level characteristics correspond with small chances of receiving external capital.

The E variable has a strong and statistically significant positive coefficient, indicating that an increase in environmental engagement significantly increases the probability of a firm accessing funding. This implies that companies adopting energy-efficient technologies, waste management systems or environmental reporting activities have higher chances of obtaining financing. The confidence interval supports the reliability of this effect, since the lower bound is not negative.

The coefficient of S performance is also positive with a marginal p-value indicating a near-significant relationship. This means that firms with strong social practices, such as CSR programmes, diversity initiatives or community engagement, are more likely to access financing; however, the evidence is not conclusive. The confidence interval of S crosses zero, meaning that, although the effect is large, it should be interpreted with caution.

The positive coefficient of the G variable is outside the standard levels of significance. Though statistically conclusive, the positive direction implies that better governance structures, e.g., ESG oversight, anti-corruption policies or independent boards, may enhance access to financing; however, the evidence is inconclusive.

The coefficient of Firm Age is statistically significant, which means that older firms have higher chances of funding. The probability of accessing financing significantly improves with every year of existence of a firm. This presumably reflects accumulated credibility, track record and network building over time, which are desirable values to investors and lenders.

FirmSize, however, exhibits a negative coefficient with a p-value near marginal significance. This means that bigger firms might face reduced chances of accessing financing, which might reflect structural inefficiencies or perceived complexity. Nevertheless, the confidence interval contains zero, warranting cautious interpretation.

The coefficient for PriorFunding is insignificant and negligible, indicating that a firm's history of receiving funding does not seem to affect present access to financing within this model. This is somewhat surprising because previous funding has traditionally been taken as a good signal to investors; however, the data here does not support that correlation.

The segment-based variables are not significantly significant. Segment_DigitalPlatform and Segment_SmartEnergy coefficients indicate that operating within specific PropTech sub-sectors does not significantly distinguish financing access probabilities, holding other factors unchanged.

Location_Urban is statistically significant with a coefficient showing that firms in urban areas are less likely to receive financing compared to non-urban firms. These results challenge traditional perceptions of urban advantage and may indicate selective funding efforts, competition saturation or biased funding to less urbanised areas.

Overall, the logistic regression model highlights the role of environmental engagement and firm maturity in determining access to financing, with

suggestive roles of social and governance practices. Other variables, such as location and firm size, have surprising trends, whereas sector and funding history seem to exert minimal influence regarding the same.

**Table 5:** Logistic Regression

| | **Coef.** | **Std.Err.** | **Z** | **P>\|z\|** | **[0.025** | **0.976]** |
|---|---|---|---|---|---|---|
| Intercept | -26.05 | 8.81 | -2.77 | 0.0057 | -41.15 | -6.89 |
| E | 3.56 | 1.50 | 2.37 | 0.0178 | 0.62 | 6.46 |
| S | 3.13 | 1.71 | 1.83 | 0.0678 | -0.23 | 6.47 |
| G | 1.73 | 1.05 | 1.66 | 0.0996 | -0.34 | 3.75 |
| FirmAge | 0.99 | 0.37 | 2.89 | 0.0055 | 0.30 | 1.66 |
| FirmSize | -0.06 | 0.03 | -1.80 | 0.0718 | -0.11 | 0.01 |
| PriorFunding | -0.09 | 1.28 | -0.06 | 0.9525 | -2.58 | 2.43 |
| Segment_DigitalPlatform | 1.48 | 1.75 | 0.85 | 0.3936 | -1.96 | 4.92 |
| Segment_SmartEnergy | 1.82 | 1.48 | 1.23 | 0.2185 | -1.08 | 4.65 |
| Location_Urban | -3.36 | 1.54 | -2.17 | 0.0304 | -6.41 | -0.33 |

***Source**:* Field Survey 2026

**5.0 Discussion**

This study aimed to empirically test how ESG ratings determine financing outcomes among PropTech firms in Ghana. The findings support, as well as deviate, from key points of existing literature, highlighting the peculiarities of emerging markets. Rooted in Signalling Theory, the analysis underlines how ESG performance, especially in the environment dimension, is a useful signal in capital-constrained and information-asymmetric environments. This section demonstrates how the findings align with and diverge from findings in the existing literature, with reasons offered for the divergences. It concludes with a reflection on predictive variables that drive financing decisions in Ghana's PropTech ecosystem.

The findings are highly consistent with the literature in proving the financial materiality of ESG engagement. Consistent with Vonlanthen (2024), the E dimension of ESG showed the highest association and was statistically significant with financing volume and access to finance. The linear regression results indicated that each unit increase in environmental performance contributed approximately GH¢86,624 in additional financing, as the results of the logistic regression demonstrated that environmental performance also enhanced a higher probability of receiving financing ($p = 0.0177$). These findings are consistent with studies in developed markets, which relate ESG performance, especially energy efficiency and carbon tracking to lower risk perceptions and increased investor confidence (Brunauer & Servais, 2023; Chan, 2025).

Social and governance factors also showed positive associations with financing, although less intensively. This is consistent with the study by Ifediora and Nwosu (2024), which established that social indicators, including employee well-being and community engagement, were highly prioritized by investors in the African real estate sector. This is corroborated by the results of this study, where social scores were significant predictors of the volume of finance ($p < 0.001$) and marginally predictive of access ($p = 0.0678$). The role of governance was also positive especially in financing volume, which supports the conclusion by Connelly et al. (2011) that governance disclosures and anti-corruption mechanism serve as an effective signal of firm reliability.

Also, attributes like firm age and size were important predictors of financing volume and access, which aligns with the finding in the entrepreneurial finance literature that maturity and size enhance credibility and reduce perceived investment risk. The significant and positive effect of firm age in both regression models ($p < 0.001$) supported the signalling value of operational history and track record, as stipulated by Spence (1973).

This observation reflects the position by Saiz (2020), which found that a prolonged operational history is a vital signal of firm stability and reliability in emerging markets.

Although areas of convergence were found, significant differences were also noticed, highlighting the contextual differences in how ESG functions in Ghana's PropTech landscape. First, the study found that prior funding history did not significantly affect financing access (p =0.95), contrary to popular belief that past funding rounds were associated with credibility and alleviated information asymmetry among subsequent investors (Banerjee & David, 2025; Ifediora & Nwosu, 2024). This could be an indication of the informal or opaque nature of Ghana's investment setting, where funding history is not reliably captured and interpreted by investors, especially in areas lacking standardised documentation. This is further supported by the lack of a strong institutional structure to check such histories in Ghana, as observed by Anifowose (2025).

Second, governance was found to be statistically significant for finance volume but moderately predicted financing access (p = 0.0996). This suggests that although governance practices may enhance firms' attractiveness in detailed financial evaluations, e.g., higher capital levels, they do not conclusively determine preliminary access to capital in this regard. Another likely explanation is that third-party verification systems or governance scoring tools are not readily available in Ghana, which may undermine the visibility and credibility of governance-related signals during preliminary screening phases. This is consistent with Servais and Brunauer (2023), which found silence due to the absence of reliable data sources and standardized metrics.

Another unexpected result was that urban location negatively predicted financing access (p = 0.0304). This is contrary to the position by Tan and Miller (2023), which found that urban firms enjoy better access to capital due to proximity to financial institutions and other support systems. A possible reason is that urban firms can experience greater intensity of competition and investor exhaustion or be seen as overexposed to mature markets. Alternatively, funders, especially those aligned with development finance or impact mandates, might focus on rural or peri-urban projects to achieve geographic diversification or social equity objectives. This fact aligns with the finding by Fometescu et al. (2024), which reported that funding decisions in developing markets may prioritise projects on broader social and environmental mandates rather than just proximity to urban financial hubs.

Also, the correlation between firm size and financing access is negative (p = 0.0718), which indicates that smaller or more nimble start-ups are usually viewed as innovative and flexible, while larger firms tend to attract scepticism in terms of operational inefficiencies or inflexibility. This contrasts with findings in developed economies, where larger firms usually enjoy scale-based advantages in financing negotiations. This deviation is confirmed by Ifediora and Nwosu (2024), who found that smaller firms in African real estate markets were usually seen as more flexible and capable of operating in a changing and informal investment environment.

In both regression models, several variables emerged as consistently strong predictors of financing outcomes. Environmental performance was the most influential of them, with its importance in both financing volume and access implying that Ghanaian PropTech investors are starting to think of environmental responsibility not as a marginal issue but as an indicator of firm and investment quality. This supports Signalling Theory where environmental practices are expensive to imitate and can be directly monitored through certifications or operational output, such as carbon tracking (Spence, 1973). Furthermore, as Saiz (2020) proposed, in emerging markets where information asymmetry is high, ESG indicators such as environmental sustainability become a critical way by which firms can show their long-term sustainability and risk management ability.

Firm age was also a good predictor, confirming its significance as a credibility signal, as suggested by Spence (1973). A firm with a longer operational history is probably more trusted by investors as it has proven to be resilient, built a functional network and evolved in its processes over the years (Saiz, 2020).

In Ghana, social performance, specifically community engagement and CSR, seems to be a culturally appealing factor. Its impact, albeit a bit lower than environmental measures, remains significant in determining investor preferences, possibly due to the fact that social impact correlates well with developmental investment requirements in African settings (Ifediora and Nwosu, 2024). This is further supported by Chan (2025), which highlights the increasing significance of social considerations in emerging markets, where investors are starting to focus more on community welfare and social justice in addition to environmental performance.

Although governance is relevant in financing volume, it could be even more relevant in defining the size or terms of investment but not the initial access. This results in a two-step financing logic: Investors may filter candidates according to environmental and social factors, but consider governance-related factors with more stringency in due diligence or in valuation, as suggested by Connelly et al. (2011) and Servais and Brunauer (2023).

Surprisingly, sectoral affiliations, such as "smart energy vs digital platforms" and urban location, were not reliable predictors, implying that ESG traits and firm maturity are more relevant in this context than sector or geography. This means that funding decisions in Ghana's PropTech sector are more behaviourally driven than structurally segmented. This is reflected by Tan and Miller (2023), who observed that ESG factors usually outweigh sectorial considerations in financing decisions within emerging markets.

## 6.0 Theoretical Contributions

This study has significant theoretical implications as it expands the use of Signalling Theory to the overlap of ESG ratings and financing decisions within the PropTech sector in an emerging market context. Signalling Theory has traditionally been used in job markets and corporate finance to describe how firms transmit unobservable attributes using observable indicators. This study contributes to the theory by showing that ESG activities, particularly environmental interaction, are plausible, expensive-to-manipulate indicators that have a significant effect on investor behaviour, even in data-constrained markets like Ghana. The research supports the explanatory capability of signalling mechanisms in situations with high information asymmetry and weak regulatory controls by empirically verifying ESG indicators as effective proxies for firms' quality, their commitment to sustainability, and risk management capacity. By so doing, it enriches the literature on ESG by disaggregating the three components environmental, social and governance and determining their varying predictive impacts on both financing volume and access. This disaggregation provides a theoretically subtle model that transcends viewing ESG as a monolithic construct but as a signalling power of each dimension.

These findings have practical implications for stakeholders in Ghana's PropTech and the broader real estate finance ecosystem. First, the evidence that environmental performance strongly increases both financing volume and access implies that PropTech firms should invest in verifiable green initiatives such as energy-saving systems or environmental reporting tools, to increase their funding prospects. Second, the finding that firm age is a strong predictor of financing performance emphasizes the need to establish operational persistence and credibility. This indicates that start-ups need to consider a long-term presence and continuity prior to pursuing outside financing aggressively. Third, the comparatively minor effect of governance on financing access implies a lapse in institutional evaluation instruments. As such, investors and regulators ought to focus on developing localized governance assessment frameworks that can standardize screening. Fourth, the absence of the predictive power of the past funding history implies that reputation is not enough and firms have to keep practising ESG signalling to remain attractive to financiers. Finally, the unexpected observation that urban-based firms were less likely to raise funding suggests that investors are moving towards underserved or high-impact areas. This requires urban firms to distinguish themselves with better ESG involvement or more focused value propositions. Together, these implications offer a guide for firm-level strategy and financial sector development that supports the

value of ESG alignment as the pillar of sustainable capital access in emerging markets.

## 7.0 Conclusions

This study has empirically evaluated the impact of ESG ratings on financing decisions in Ghana's PropTech sector, providing valuable information on how ESG factors determine access to capital and the volume of finance accessed. The findings affirm that ESG engagement, especially within environmental activities, is very important in sending quality signals to investors, which is consistent with the principles of Signalling Theory. Firms with good environmental rating had higher chances of receiving financing and getting larger financing volumes, meaning that sustainability is becoming a sign of investment-worthiness even in the developing markets.

Although social and governance dimensions had a beneficial effect, they were less pronounced. This implies that investor priorities might be different in various ESG aspects and that sector-specific or cultural contexts might determine the indicators that carry the most value. Also, firm-based factors, including age and size, were identified to moderate financing results, and operational longevity proved to be the specific strong predictor. Interestingly, the past history of funding did not have a strong impact on access to current funding. Firms in urban settings had lower chances of getting funding, a result that negates expectations in the global context and shows the local specificities of Ghana's capital flows.

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