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Understanding Green Building Investment Intention Through Perceived Behavioral Control: Evidence from Vietnam

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Abstract

In response to growing demand for sustainable construction, green building investment is a key strategy for mitigating environmental impacts and achieving climate goals. Drawing on the Theory of Planned Behavior (TPB), this study reconceptualizes perceived behavioral control (PBC) into two dimensions: Investor Capacity and Experience (INV) and the Green Building Investment Environment (ENV), to explain investors' intention to engage in green building projects in Vietnam. A structured questionnaire was distributed to professionals across three regions, yielding 116 valid responses. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), results show that both INV (β = 0.403) and ENV (β = 0.299) positively influence investment intention, with INV exerting a stronger effect. The adjusted R^2 for investment intention is 0.390, indicating that the included factors explain 39% of the variation in investors' willingness to invest. Findings underscore the importance of investors' technical, managerial, and financial capabilities, alongside a stable and supportive policy environment. The study advances TPB theory by disentangling PBC into actionable subcomponents and provides practical guidance for policymakers, including unified certification systems, streamlined financial incentives, and clearer regulatory frameworks for emerging economies.

1. Introduction

The worldwide construction sector is recognized as a leading contributor to global climate change, natural resource depletion, and environmental degradation [1, 2]. It consumes nearly 50% of total energy production, 40% of raw materials, and 16% of water resources, while generating approximately 35% of global CO_2 emissions [2]. Beyond these statistics, construction activities are also associated with air and noise pollution, excessive waste, and a variety of ecological threats [3].

Against this backdrop, the promotion of green building practices is widely acknowledged as a pivotal strategy to mitigate this environmental damage and support global efforts to address climate change and energy insecurity. Since their emergence in the early 1990s in the UK and USA [4], green buildings have gained substantial

international traction, being officially recognized as a core part of the solution to climate change during COP21 in Paris. Green buildings demonstrate a proven capacity to reduce energy and water consumption, minimize waste, and improve indoor environmental quality, thus offering compelling environmental, economic, and social benefits [5, 6].

In Vietnam, as in many rapidly developing countries, fast-paced economic growth has intensified the demand for housing, placing immense pressure on natural resources and the environment. Vietnam has made a powerful, clear commitment to achieving net-zero carbon emissions by 2050, a goal necessitated by its position as one of the most climate-vulnerable nations in the Asia-Pacific region. This ambitious national commitment is underpinned by a suite of policies promoting sustainable development and green construction.

While the number of certified green buildings in Vietnam has grown significantly in recent years, this progress is uneven. Most certified projects are concentrated in the high-end market, while the low- and middle-income housing segments, which are responsible for the highest overall energy consumption, remain notably underrepresented [7]. This market imbalance highlights the need for targeted investigation into the drivers influencing the implementation of green building practices across all investor segments.

The TPB [8] is known as an extensive approach in explaining pro-environmental and investment-related decisions, including the acceptance of green building practices. A substantial body of research confirms that the core concepts of attitude, subjective norms, and perceived behavioral control are significant predictors of sustainable behavior or green investment intentions [9-11]. However, despite these empirical advances, a major limitation persists in how many studies operationalize the PBC construct.

Many TPB applications continue to treat PBC as a unitary factor, which offers limited insight into the specific mechanisms through which perceived control shapes behavioral intention. Theoretically, PBC has long been understood to encompass both internal factors (such as self-efficacy, perceived skills, and personal capability) and external factors (including controllability, environmental constraints, and access to resources) [12].

The decomposed TPB framework proposed by Taylor and Todd [13] similarly separates PBC into self-efficacy and facilitating conditions, reinforcing the view that internal competence and external enablers constitute analytically distinct sources of perceived control. Related behavioral adoption models, such as the Unified Theory of Acceptance and Use of Technology [14], further highlight the role of facilitating conditions as a determinant of technology uptake. This parallel recognition across multiple theoretical streams underscores the importance of separating internal ability from external environmental support.

While these conceptual distinctions are well-established, their operationalization varies widely across domains. Crucially, PBC subdimensions have rarely been customized for the precise, practical obstacles facing sustainable construction investors in emerging markets. Existing TPB studies on sustainable construction often emphasize general control barriers such as financial difficulty or technological complexity without fully translating these abstract constructs into concrete, policy-relevant factors within developing-market contexts. This gap is specifically pronounced in developing markets, where institutional maturity, market readiness, and regulatory clarity vary substantially compared to developed countries. Here, PBC may depend more strongly on context-specific constraints [10, 11].

Vietnam provides a timely and relevant empirical setting for advancing this line of inquiry. Despite the country's strong commitment to green growth and increasing demand for sustainable buildings, investors encounter persistent, context-specific obstacles. These include limited technical expertise, uneven enforcement of green building regulations, insufficient financial incentives, and a lack of market transparency. In such contexts, the relative weight and nature of internal versus external control factors may differ significantly from those in more mature green building markets. Therefore, disaggregating PBC into meaningful, context-aligned components is analytically and practically critical for informed policy-making.

Against this background, the present study adopts a theoretically grounded approach by adapting and contextualizing established internal–external PBC distinctions to the specific characteristics of green building investment in Vietnam. More precisely, we conceptualize PBC as comprising two dimensions highly salient to investors:

- Internal control - investors' capacity and experience (e.g., knowledge, managerial expertise, and technical confidence in green building projects).
- External control - the investment environment (e.g., regulatory support, access to green finance, availability of qualified professionals, and market readiness).

By empirically examining these differentiated PBC components, this study contributes in an incremental but meaningful way to TPB scholarship. First, it clarifies how theoretically established PBC subdimensions manifest in an emerging-market green building context, addressing an underexplored gap in the literature. Second, it offers a policy-oriented operationalization of perceived control, linking its components to actionable levers such as training, regulatory reform, and financial mechanisms that can support sustainable construction in Vietnam and similar developing economies.

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Drawing on survey data from professionals actively involved in green building projects across Vietnam, the study employs PLS-SEM to assess the distinct effects of these PBC subcomponents on investment intention. The findings are expected to not only enrich the TPB literature by clarifying the operational structure of PBC but also offer practical insights for policymakers and investors seeking to scale up green building investment in developing economies.

Accordingly, the study will be guided by the following key questions:

- RQ1: What are the constituent components of perceived behavioral control, and how do they affect green building investment intention among investors in Vietnam?
- RQ2: What strategic and policy interventions could enhance these control perceptions and thereby promote greater green building investment?

The remainder of this paper proceeds as follows. Section 2 establishes the theoretical background and formulates the research hypotheses. Section 3 details the research design and methodology. Section 4 delivers the empirical findings, which are followed by the analysis in Section 5. Section 6 offers practical and policy implications. Finally, Section 7 wraps up the study, discussing its limitations and paths for future investigation.

2. Theoretical Foundation and Hypothesis Development

2.1 Understanding PBC in Green Building Investment Decisions

Green building investment has become a key strategy in addressing global challenges connected with climate change and energy security. In Vietnam, the concept of green buildings was introduced in 2007 and has since received growing attention from both the government and society. Green building projects typically involve a wide range of stakeholders including investors, consultants, general contractors, subcontractors, suppliers, government agencies, and customers each performing specific roles throughout the project lifecycle [3, 4]. Among these actors, investors hold a central function in initiating and directing the integration of sustainable construction practices [15].

A green construction project can only attract relevant stakeholders if it offers compelling benefits. These perceived benefits motivate investors to form an intention to invest, which is the most powerful determinant of observed behavior outcomes [8]. Hence, understanding the intention to invest in green buildings is a critical step toward promoting actual investment. This study therefore focuses on investment intention rather than observed behavior, consistent with the underlying theory of the TPB.

TPB is among the most frequently utilized models for explaining human behavior [16, 17]. TPB establishes that attitude, subjective norms, and perceived behavioral control are the three antecedents of behavioral intention [8]. Among these, PBC is particularly important in contexts where behavior is complex and resource-constrained, such as green building investment.

PBC captures the degree to which an individual believes they can perform the target behavior. It reflects both internal factors such as skills, experience, and resources and external factors such as institutional and regulatory conditions [8, 12]. Although TPB has been applied in diverse fields, including health, food, environmental science, and construction, few studies have explored the underlying structure of PBC in the context of green building investment [17]. Emerging evidence suggests that PBC is more complex than originally theorized, warranting further refinement [18, 19]. In response, this study reconceptualizes PBC by distinguishing its internal and external dimensions.

2.2 Internal Dimension: Investor's Capacity and Experience

Green buildings require advanced technologies, integrated design processes, and a high level of coordination, all of which impose technical and managerial challenges [20, 21]. Investors lacking familiarity with green design or sustainable technologies may struggle to manage such projects effectively. Moreover, green building projects often involve higher upfront costs and limited access to green financing, requiring robust financial capacity from investors [22]. In addition to capability, past experience is a recognized determinant of behavioral intention [10, 12].

Thus, this study measures INV using four observed variables drawn from relevant literature [10]:

- INV1: The investor has significant expertise to undertake green building projects.
- INV2: The investor possesses strong management skills for overseeing green building investments.
- INV3: The investor has sufficient financial capacity to fund green building projects.
- INV4: The investor has prior experience with green building investments.

2.3 External Dimension: Green Building Investment Environment

The investment environment refers to the political, legal, economic, and social conditions that shape opportunities and incentives for project development [23]. Inconsistent regulations, weak law enforcement, and unstable institutions have been cited as major barriers to green building investment in Vietnam [4, 5, 10]. Conversely, a favorable policy environment can enhance investors' perceived control, reduce risks, and stimulate intention to invest.

This study measures ENV using three observed variables based on previous studies [10, 20, 24]:

- ENV1: The green building investment environment is politically stable.
- ENV2: The green building sector is supported by a comprehensive and consistent legal framework.
- ENV3: The investment environment ensures fair competition among market actors.

These two constructs INV and ENV represent the internal and external constructs of PBC and are hypothesized to influence investment intention in green buildings.

2.3.1 Investment Intention

In conformity with the TPB [8, 25], investment intention is defined as the investor's motivational readiness and commitment to execute a subsequent action—specifically, investing in green building projects. TPB-based studies in the green building and sustainable housing domain have consistently measured intention using items that capture willingness, likelihood, and prioritization of the target behavior [26-28]. These studies confirm that TPB intention constructs are appropriate and transferable to contexts involving decisions about green buildings.

Building on this established literature, the present study operationalizes investment intention using three indicators adapted to the investment context of green construction in Vietnam. These items reflect the investor's deliberate planning, prioritization, and behavioral likelihood—corresponding to standard TPB intention measures:

- INT1: The investor intends to invest in green building projects in the near future.
- INT2: The investor will prioritize green building projects for future investment.
- INT3: The investor is likely to regularly invest in green building projects going forward.

2.4 Hypotheses

Prior studies have shown that increased PBC is observed to positively influence behavioral intention [8, 11, 29]. In the context of green building, this means that when investors feel more capable and perceive the investment environment as favorable, their intention to invest will be stronger.

Accordingly, the study proposes the following hypotheses:

H1: Investor capacity and experience has a positive and significant effect on green building investment intention.

H2: A favorable green building investment environment has a positive and significant effect on green building investment intention.

These hypotheses are tested using data collected from professionals in Vietnam's green building sector. The model features one dependent variable — investment intention and two independent variables — INV and ENV — which together represent a reconceptualized structure of PBC within the TPB framework.

3. Material and Methods

3.1 Data Collection

The measurement scales for the constructs embedded in the study's model were initially developed through an in-depth review of existing literature on the TPB and green building investment. To ensure that these scales were both contextually appropriate and aligned with the objectives of this study in the Vietnamese context, the authors conducted a round of detailed interviews with pertinent stakeholders. These included three academic scholars, two real estate investors, two consulting firms, and three contractors, all of whom had experience in managing or executing green building projects in Vietnam.

These interviews served to sharpen the measurement items by identifying context-specific influencing factors and clarifying the linkages connecting elements within the proposed model. Feedback from the interviews was used to revise and supplement the initial scales with additional observed indicators, thereby enhancing the construct validity and practical relevance of the measurement instruments. The finalized measurement scales were then used to design the structured questionnaire for the expert survey.

The survey instrument was structured around three primary parts. The first part detailed the research objectives, thereby apprising respondents of the study's aim. The second part gathered demographic and professional background data from the participants. The third section solicited expert evaluations of the factors

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influencing green building investment in Vietnam. In this section, participants were requested to provide their assessments based on personal experience with green building projects, using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

This study gathered its empirical data through a formal survey targeting professionals directly involved in green building investment projects in Vietnam. Preceding the major survey deployment, a pilot study was undertaken with five experts and three experienced researchers in the green construction sector to judge and refine the questionnaire. Following the pilot phase, the finalized questionnaire was administered to a purposively selected sample of 160 professionals across Vietnam's three major regions (North, Central, and South) between October and December 2024, ensuring that participants possessed relevant experience and decision-making authority in green building investment. Invitations were delivered via both online platforms (e.g., email) and in-person interviews. Every participant received details regarding the study's aims and was guaranteed non-disclosure and privacy, and provided voluntary consent prior to participation. The research adhered to standard ethical principles for social science surveys, including the protection of respondents' privacy and the responsible handling of data.

The final sample comprised 116 usable responses, which were utilized in the empirical analysis. Of this group, a majority (56.9%) possessed over three years of green building investment experience, and nearly half (46.6%) had contributed to a minimum of three green building projects in Vietnam. This sampling approach allowed us to capture informed perspectives on green building investment intentions while acknowledging the limitations of generalizing to the broader population. Table 1 provides the remaining demographic characteristics.

Table 1 *Demographic statistics*

Survey Information		Quantity	Percentage (%)
Experience in Green Building Investment	1 - 3 years	50	43.1
	4 – 6 years	30	25.9
	7 – 10 years	25	21.6
	> 10 years	11	9.4
Number of Green Building Projects Participated	1 - 2 Projects	62	53.4
	3 - 5 Projects	23	19.8
	6 - 10 Projects	21	18.1
	> 10 Projects	10	8.7

Multiple procedural controls were put in place to counter Common Method Bias (CMB). Anonymity of respondents was assured to reduce social desirability bias, and the questionnaire was carefully structured to separate items measuring independent variables from those assessing dependent variables, thereby minimizing potential priming effects. Additionally, pilot testing with experts and researchers in the green building sector allowed the modification and elimination of unclear or confusing questions, enhancing clarity and overall data quality. These procedural steps were designed to control for CMB and confirm the trustworthiness of the data obtained.

To evaluate potential non-response bias, we checked for equivalence between timely and delayed survey participants across the main constructs. No material disparities were found, indicating that non-response bias probably did not materially affect the findings.

3.2 Measurement

Among various statistical techniques available for multivariate analysis, Structural Equation Modeling (SEM) is considered a highly suitable technique for examining associations among latent constructs [30]. SEM is commonly categorized into two principal variants: Covariance-Based SEM (CB-SEM) and Partial Least Squares SEM (PLS-SEM).

For the purposes of this study, the selection of PLS-SEM was driven by several robust rationales:

- Suitability for small sample sizes: Unlike CB-SEM, PLS-SEM is well-suited for small to medium-sized datasets and does not require large samples for reliable estimation [24, 31].
- Greater explanatory power: PLS-SEM typically offers better predictive accuracy and higher explanatory power for endogenous (dependent) variables, which is essential for applied studies [30].
- Robust convergence performance: PLS-SEM is less prone to convergence issues, making it more stable and robust for complex models [32, 33].

To establish the requisite minimal sample size for PLS-SEM, the field advocates for two widely accepted benchmarks [31, 34]: (1) The count must be at least tenfold the greatest number of formative measures linked to any single construct; or (2) A ten-to-one ratio must be maintained with the maximum structural links (directional arrows) targeting any one dependent (endogenous) construct in the theoretical structure. Our current investigation complies with both of these requirements.

Given that all observed variables in the current model are reflective rather than formative, the first rule is not applicable. Therefore, the second rule was used to ascertain the minimal sample size needed. As presented in the conceptual model (Section 2.2), the construct investment intention is influenced by two structural paths (from the constructs INV and ENV). Based on this rule, the required minimum sample size is: 10 × 2 = 20 observations. The study collected a total of 116 valid responses, which significantly exceeds this minimum requirement, thereby ensuring adequate statistical power for the analysis.

Following data collection, a pre-processing stage was conducted, including cleaning and filtering the raw responses, coding relevant variables, and entering the data into statistical analysis software. All subsequent analyses were performed using SmartPLS 3.0.

The analysis proceeded in two main stages:

- The verification of the measurement model involved appraising the reliability of individual items, internal structural consistency (e.g., Cronbach's alpha and composite reliability), convergent validity (via the Average Variance Extracted - AVE), and discriminant validity (via Fornell-Larcker criterion and cross-loadings).
- Structural model assessment, which involved checking for multicollinearity (using Variance Inflation Factor - VIF), testing the significance and strength of hypothesized relationships, evaluating R^2 values to assess explanatory power, and examining the model's predictive relevance (e.g., Q^2 values).

This methodological approach provides a rigorous and robust framework for empirically testing the conceptual framework and proposed relationships in the context of green building investment in Vietnam.

4. Results

4.1 Assessment of Reliability, Convergent Validity, and Discriminant Validity

The reliability of the measurement items was verified using the outer loadings generated via the PLS Algorithm, as displayed in Table 2. Every observed variable demonstrated outer loading values that surpass the standard cutoff of 0.70, aligning with the recommended criteria by Hair J. F., et al. [31]. Furthermore, the cross-loadings show that all indicators load highest on their corresponding constructs and substantially lower on other constructs, supporting discriminant validity. These results confirm that all indicators demonstrate strong and statistically significant contributions to their corresponding latent constructs, thereby affirming their suitability for inclusion in the measurement model.

Table 2 *Results of outer loadings and cross loadings analysis*

	Green Building Environment	Intention	Investor's Capacity and Experience
ENV1	0.866	0.486	0.583
ENV2	0.792	0.390	0.511
ENV3	0.881	0.508	0.490
INT1	0.437	0.880	0.520
INT2	0.470	0.820	0.465
INT3	0.487	0.838	0.507
INV1	0.500	0.439	0.815
INV2	0.523	0.521	0.862
INV3	0.540	0.492	0.835
INV4	0.514	0.508	0.830

The reliability and convergent strength of the measurement scales were verified based on the results compiled in the Construct Reliability and Validity table (Table 3). Every construct exhibited Cronbach's Alpha coefficients higher than the recommended cut-off of 0.70, signifying suitable internal coherence. Likewise, the

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Composite Reliability (CR) scores for all constructs exceeded 0.70, thereby endorsing the reliability of the measurement model [31, 35].

In addition, the AVE values for all constructs were greater than 0.50, which demonstrates that the construct explains a dominant fraction of the variance in its corresponding indicators. These pieces of evidence unanimously attest that the measurement model satisfies the requirements for convergent validity, as suggested by Hair J. F., et al. [31].

Table 3 *Construct reliability and validity results*

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Green Building Environment	0.804	0.819	0.884	0.718
Intention	0.802	0.803	0.884	0.717
Investor's Capacity and Experience	0.856	0.859	0.903	0.698

The discriminant strength of the measurement scales was verified using two recognized techniques: the Fornell-Larcker Criterion (Table 4) and the Heterotrait-Monotrait (HTMT) Ratio (Table 5). Based on the Fornell-Larcker Criterion, discriminant validity is confirmed when the square root of the Average Variance Extracted for each construct (reflected in the diagonal values) is greater than the correlations with other constructs (values below the diagonal). This condition was satisfied for all constructs in the model. Additionally, all HTMT values were below the conservative threshold of 0.85, further supporting the existence of discriminant validity between the constructs [31]. Together, these results demonstrate that the measurement model fulfills the recommended criteria for discriminant validity.

Table 4 *Results of Fornell-Larcker Criterion*

	Green Building Environment	Intention	Investor's Capacity and Experience
Green Building Environment	0.847		
Intention	0.549	0.847	
Investor's Capacity and Experience	0.621	0.588	0.836

Table 5 *Criterion and Heterotrait-Monotrait Ratio Results*

	Green Building Environment	Intention	Investor's Capacity and Experience
Green Building Environment			
Intention	0.678		
Investor's Capacity and Experience	0.751	0.707	

Inner VIF values were used to evaluate the presence of multicollinearity among the structural model's forecasting variables. The highest inner VIF score is 1.629, which falls comfortably beneath the commonly accepted limit of 5.0, thus establishing that multicollinearity poses no risk to the model [31, 36]. These findings substantiate that the predictive constructs possess adequate separation and do not exhibit problematic levels of linear correlation, thereby ensuring the validity of subsequent path coefficient estimations in the structural model.

4.2 Structural Model Assessment

To verify the statistical importance of the proposed relationships in the structural model, a bootstrapping procedure was conducted utilizing 5,000 iterations, as suggested by Hair J. F., et al. [31]. The results, presented in Table 6, include the mean estimates, standard deviations (STDEV), t-values, f-square values, and p-values for each path coefficient. As shown in Table 6, every p-value is lower than the standard significance level of 0.05, thereby confirming that both exogenous constructs have a statistically significant effect on the endogenous variable. These

results offer empirical backing for the hypothesized links in the model and validate the structural robustness of the conceptual framework.

Table 6 *Effects of independent variables on the dependent variable*

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	F Square	R Square	R Square Adjusted	P Values
Green Building Environment -> Intention	0.299	0.303	0.079	3.763	0.091	0.401	0.390	0.000
Investor's Capacity and Experience -> Intention	0.403	0.406	0.087	4.620	0.166			0.000

The standardized path coefficients (Original Sample, O) for the two independent variables—Green Building Investment Environment and Investor's Capacity and Experience —are both positive, indicating a direct positive association between each predictor and the dependent variable, Investment Intention (see Figure 1).

The coefficient of determination (Adjusted R^2) for the outcome variable is 0.390 (Table 6), which means that the two predictors together account for roughly 39% of the fluctuation in green building investment intention. This level of explanatory power is considered moderate and acceptable within behavioral research contexts [31, 37].

According to Hair J. F., et al. [31], the size of the standardized path coefficient (β) signifies the comparative strength of the impact that each exogenous variable has on the endogenous variable. The study's outcomes show that Investors' Capacity and Experience possess the most substantial effect on investment intention, with the Green Building Investment Environment following in influence.

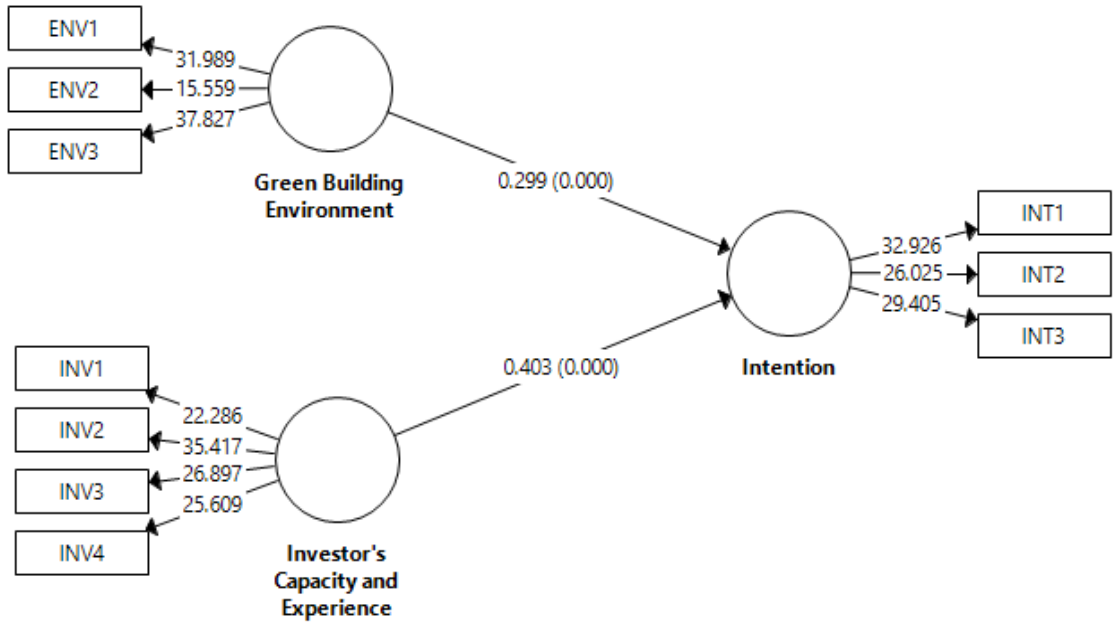

Fig. 1 *Influence of perceived behavior control on investor's intention*

To assess the predictive relevance of the structural model, this study adopts the Q^2 statistic, as proposed by Geisser [38]. In the PLS-SEM approach, the Q^2 value is obtained through Blindfolding analysis using the SmartPLS software. The computed Q^2 value of 0.273 (Table 7) exceeds the commonly accepted threshold of 0, indicating that the model possesses moderate predictive relevance [31]. This outcome implies that the model does not merely account for a significant degree of the fluctuation in green building investment intention but also demonstrates a reasonable ability to predict new, unseen data—thereby supporting its robustness for practical applications. The model demonstrates adequate fit (SRMR = 0.067), falling under the suggested limit of 0.08, which signals that the structural model is acceptable.

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Table 7 *Results of construct cross validated redundancy*

	SSO	SSE	Q^2 (=1-SSE/SSO)
Green Building Environment	348.000	348.000	
Intention	348.000	252.931	0.273
Investor's Capacity and Experience	464.000	464.000	

5. Discussion

The findings from the PLS-SEM analysis presented in Section 4 reveal important and noteworthy insights into how the decomposed components of PBC influence investors' intention to invest in green building projects in Vietnam. Our approach, which separates PBC into internal and external factors, provides a nuanced understanding of the investment landscape.

5.1 The Role of Investor Capacity and Experience

The analysis confirms that Investor Capacity and Experience has a strong and significant positive effect on green building investment intention (H1 supported, β = 0.403, p = 0.000). This finding underscores the internal resources and capabilities of investors as a decisive driver of sustainable investment decisions in Vietnam.

This significant relationship is mirrored by the substantial growth of the green building sector in Vietnam over the last 15 years, indicating a maturing market with increasing expertise. The number of green-certified projects has grown dramatically: from only one per year in 2010 and 2011, the figure rose to 20 in 2012, 58 in 2020, and 76 in 2023. Notably, 2024 marked a major milestone, with 163 certified green projects nationwide [39]. This trajectory reflects increasing confidence and competence within the local investment community.

A growing number of investors in Vietnam have demonstrated substantial competence and experience in successfully delivering green buildings. Notable examples include:

- Capital House Group (Genesis School – LOTUS Gold, ECOHOME 3 – EDGE),
- Phuc Khang Corporation (Diamond Lotus Riverside – LEED),
- FLC Group (The Coastal Hill – LEED Platinum),
- Hong Hac Dai Lai JSC (Forest in the Sky – EDGE), and
- Vinhomes (TechnoPark Tower – LEED).

The success of these projects reflects the technical expertise, management capability, and financial capacity of pioneering green building investors in Vietnam. These achievements help shape positive investor perceptions and foster a belief among peers that such projects are feasible and achievable, ultimately enhancing investment intention across the market. The tangible success of experienced firms acts as a powerful source of vicarious learning and self-efficacy for potential investors.

These findings align closely with earlier international research. Hwang, et al. [40] identified investor competence and experience among the five most critical factors influencing green building development in Singapore. Similarly, Yang, et al. [10] found that developers' experience and capabilities significantly impacted the advancement of green residential projects in China. Conversely, studies such as Häkkinen and Belloni [41] in Finland argued that a lack of investor expertise was a major barrier to sustainable construction.

5.2 The Role of the Green Building Investment Environment

The second key finding is that the Green Building Investment Environment was observed to have a beneficial and statistically significant influence on investors' intention to invest in green building projects (H2 supported, β = 0.299, p = 0.000). In this study, the green building investment environment was operationalized through three dimensions: political stability, a comprehensive and consistent legal framework, and the promotion of fair competition.

This finding can be interpreted through several key attributes of the Vietnamese context, particularly its political and regulatory stability.

5.2.1 Political Stability and Investor Confidence

Vietnam is internationally recognized for its long-standing political stability, which is a major factor contributing to national development and investor confidence. Political stability consistently ranks as one of the most critical factors cited in international assessments of Vietnam's investment climate. As a nation that places great value on peace and sovereignty, the country reinforces political steadiness as a strategic national priority. While

geopolitical tensions and instability persist in many regions globally, Vietnam continues to maintain a favorable image among investors through consistent and diplomatic foreign policy, providing a stable foundation for long-term green investments.

5.2.2 Supportive Legal and Policy Frameworks

Furthermore, Vietnam's establishment of a consistent and supportive legal framework has enhanced investor perceptions of the feasibility and success of green building projects. Consistent with the country's target of carbon neutrality by 2050 [42], the Vietnamese government has implemented numerous regulatory initiatives to support sustainable construction. These include:

- The amended Construction Law (2020), which explicitly encourages green building development [43];
- The National Green Growth Strategy [44];
- Resolution 55-NQ/TW on national energy development strategy;
- The National Program on Energy Efficiency 2019–2030 [45];
- Technical Regulation QCVN 09:2017/BXD on energy-efficient buildings [46]; and
- Decision No. 419/QĐ-BXD (2017) outlining the construction sector's Green Growth Action Plan [47].

These policies have collectively established a reliable legal foundation, reduced investors' perceived legal risks and affirming that green building projects are supported and protected under national law.

5.2.3 Financial Incentives

Additionally, financial incentives have contributed significantly to a competitive and enabling green investment environment. These incentives include low-interest green loans, preferential credit packages, credit guarantees, and corporate income tax reductions. According to the International Finance Corporation (IFC), Vietnam's green building sector represents the largest investment opportunity within the country's broader green finance landscape [39], underscoring the positive impact of these external facilitating conditions.

These results are in line with prior work emphasizing the external environment. Darko, et al. [4] highlighted the critical character of government regulations and strategies in driving green building adoption. Similarly, Khoshnava, et al. [48] emphasized that legal frameworks and public policy serve as the primary drivers of green building adoption. In the Vietnamese context specifically, Tran, et al. [15] also identified supportive government policies as principal contextual elements shaping developers' willingness to utilize green construction technologies.

5.2.4 Theoretical Refinement of PBC

The findings of this study successfully extend and refine the TPB by decomposing PBC into two actionable dimensions: Investor Capacity and Experience (Internal Control) and the Green Building Investment Environment (External Control). This decomposition allows for a more nuanced understanding of how different facets of control shape investment intention, moving beyond the traditional monolithic treatment of PBC [8, 13].

Consistent with prior research on self-efficacy and facilitating conditions [14, 49], the analysis shows a stronger effect for Investor Capacity and Experience ($\beta = 0.403$) than the Green Building Investment Environment ($\beta = 0.299$). This difference can be explained by investors' perception of personal competence and feasibility in making investment decisions. While a supportive external environment is essential for viability, the results suggest that the perceived ability to navigate project complexities, leverage experience, and successfully marshal financial and managerial resources is a more decisive and direct determinant of investment intention in the context of green building. These insights underscore the value of integrating internal and external control factors into TPB applications, providing both theoretical refinement and practical guidance for policy and managerial interventions.

6. Implications for Practice and Policy

Given the outcomes of this research, which emphasize the distinct roles of Investor Capacity and Experience (internal control) and the Green Building Investment Environment (external control) in driving investment intention, several practical strategies can be adopted by policymakers in Vietnam. These strategies aim to directly enhance investors' PBC, thereby strengthening their intention to invest in green building projects and supporting the government's broader sustainable development agenda.

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6.1 Addressing the External Investment Environment (Facilitating Conditions)

Our results indicate that a supportive external environment is a significant precursor to investment intention. Policymakers should focus on streamlining the institutional framework to reduce perceived external constraints.

6.1.1 Legal and Regulatory Frameworks

Policymakers must prioritize the expedition of development and issuance of comprehensive legal instruments that specifically regulate green building projects. This means establishing clear requirements, standards, and compliance pathways. Providing definitive legal clarity will reduce ambiguity and, critically, lower the perceived investment risks associated with pioneering green projects, thus enhancing external control for all investors.

6.1.2 Standardization and Certification

To minimize confusion and improve efficiency, it is crucial to develop a unified, nationally recognized green building certification system. This system should seek to integrate, harmonize, or clearly align existing international and national schemes (such as EDGE, LEED, LOTUS, and Green Mark) into a single, cohesive framework tailored to Vietnam's unique environmental, social, and economic context. A unified system will simplify the decision-making process for investors, improve market transparency, and facilitate rigorous monitoring and regulatory enforcement.

6.1.3 Financial Incentives and Support

The government should expand and clarify access to preferential financial policies. This includes tax incentives, low-interest loans, credit guarantees, and specialized green financial packages. To ensure these policies are effective, they must be clearly defined, easily accessible, and administered with transparency. Furthermore, establishing clear technical standards and eligibility criteria for green projects will support both investors applying for funding and financial institutions deploying green capital effectively, thus activating the largest reported green finance opportunity in the country.

6.1.4 Strengthening Internal Investor Capacity (Self-Efficacy)

Given that Investor Capacity and Experience exhibited the strongest direct effect on investment intention, strategies to strengthen internal competence are paramount.

6.1.5 Customized Education and Expertise Diffusion

It is essential to implement targeted training and knowledge-sharing programs designed specifically to enhance investors' technical expertise and confidence in green building project management, design, and execution. These programs should focus on practical skills related to sustainable materials, energy modeling, life cycle assessment, and navigating complex certification requirements. Increasing technical confidence directly translates to higher self-efficacy, which our findings show is the most critical determinant of investment intention.

6.1.6 Information Provision and Advisory Services

The government and industry associations should promote robust information provision and advisory services. These services should act as navigational tools, helping investors understand and comply with new regulations, efficiently manage the certification processes, and access available financing options. By lowering the cognitive and resource barrier to entry, these services effectively strengthen the internal sense of control and feasibility for prospective green building investors.

6.1.7 Broader Policy Implications

By combining strategic improvements in the external institutional environment with deliberate investor capacity-building initiatives, Vietnam can encourage broader and more diversified participation in green building investment. These dual-focused measures provide actionable levers to translate the decomposed PBC factors into practice, thereby maximizing the potential societal benefits, such as contributing to national sustainable development goals and achieving the net-zero emissions target.

Finally, these findings inform the direction of future research. The Internal Capacity/External Environment framework developed here can guide targeted comparative studies, longitudinal analyses, and experimental interventions. This focused approach will allow researchers to rigorously assess the causal effectiveness of specific policy instruments (e.g., a new tax credit), investor training programs, and financial incentive mechanisms across different national contexts and timeframes, facilitating evidence-based policy globally.

7. Conclusion

This study examined green building investment intention in Vietnam through the perspective of the TPB, reconceptualizing PBC into two dimensions: Investor Capacity and Experience and the Green Building Investment Environment. Using survey data from 116 professionals and analyzed via PLS-SEM, both INV and ENV were found to positively influence investment intention, with INV exerting the stronger effect. This highlights the importance of investors' technical competence, prior experience, and financial capacity, alongside the enabling role of a stable, transparent, and supportive policy environment.

Theoretically, the study refines TPB by demonstrating that decomposing PBC into internal and external components offers a more nuanced understanding of behavioral intention in sustainable investment, particularly in emerging economies.

Several limitations should be noted. First, the survey's single-point-in-time structure restricts the observation of dynamic shifts in investor sentiment. Second, focusing exclusively on Vietnam may limit generalizability to other contexts. Third, while expert respondents provide valuable insights, they may not fully represent all stakeholders involved in green building investment.

Future research could adopt longitudinal designs, expand to other ASEAN countries for comparative analysis, and extend TPB with additional constructs such as risk perception, institutional factors, or economic incentives to further enhance explanatory power. While concise policy recommendations are provided—enhancing investor capacity and streamlining institutional support—the study's primary contribution lies in its theoretical advancement, offering both a refined PBC framework and empirical insights for promoting sustainable construction investment in emerging economies.

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Conflict of Interest

The authors disclose that no conflict of interest exists in relation to the submission and publication of this work.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design****: Trong Tung Le, Van Thuan Do, Luong Hai Nguyen;* ***data collection****: Trong Tung Le, Luong Trung Nguyen;* ***analysis and interpretation of results****: Trong Tung Le, Luong Hai Nguyen, Luong Trung Nguyen;* ***draft manuscript preparation****: Trong Tung Le, Luong Hai Nguyen, Van Thuan Do, Luong Trung Nguyen. All authors reviewed the results and approved the final version of the manuscript.*

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