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Review paper

INVESTOR DECISION-MAKING IN CONSTRUCTION DEVELOPMENT: DATA-DRIVEN STRATEGIES FOR OPTIMAL INVESTMENT CHOICES

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Abstract

Investment decision-making in construction development is a multi-layered process shaped by market dynamics, financial risk assessments, regulatory frameworks, and emerging industry trends. In an era of rapid urbanization, digital transformation, and increasing sustainability concerns, investors must integrate diverse data sources and analytical methods to optimize their decisions. This study explores the key factors influencing investor choices, emphasizing the role of structured feasibility assessments, technological advancements, and environmental considerations in shaping investment strategies.

To investigate these aspects, this research will employ a combined narrative and thematic literature review approach. The narrative review will provide a broad exploration of key investment factors, tracing the evolution of decision-making frameworks in construction, including traditional investment principles, financial assessment models, and the impact of regulatory and economic shifts. The thematic review will categorize findings into structured decision-making components, aligning with key investment phases such as market analysis, risk assessment, financial modeling, and stakeholder engagement. This dual approach ensures both flexibility in exploring diverse literature and a structured synthesis of key themes, offering a comprehensive understanding of how investors evaluate construction opportunities.

The findings of this study highlight the increasing reliance on financial modeling, regulatory compliance mechanisms, and sustainability-driven investment criteria in modern construction decision-making. By integrating traditional feasibility assessments with modern investment analytics, this paper provides an updated, structured framework for evaluating construction investment opportunities. The study will equip investors, developers, and policymakers with insights to navigate complex and volatile markets, optimize decision-making processes, and enhance long-term project viability.

Key words: *Construction Investment, Market Analysis, Risk Assessment, Financial Modeling, Sustainability, Stakeholder Engagement.*

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1. INTRODUCTION

Construction investment decisions critically influence urban development, economic expansion, and the sustainable evolution of the built environment. As global urbanization accelerates, investors must navigate increasingly complex environments shaped by regulatory frameworks, technological innovations, and sustainability imperatives [1]. The ability to make structured, data-driven investment decisions has thus become essential to achieving project resilience and success.

Recent global trends have intensified these complexities. Urban densification and the growing prominence of environmental sustainability are redefining construction standards and investor expectations [2]. Additionally, the digital transformation, characterized by the adoption of big data analytics, Building Information Modeling (BIM), and decision-support systems, is revolutionizing how construction investments are evaluated and managed [3]. In parallel, heightened economic volatility and regulatory shifts have made traditional static investment models less reliable for modern project appraisal.

Historical approaches to construction investment, heavily reliant on financial feasibility studies and intuitive judgment, increasingly fall short in adequately capturing the multifaceted risks and opportunities present today [4]. Modern investment frameworks now demand the integration of comprehensive market analytics, dynamic risk assessments, sustainability criteria, and digital tools to ensure informed decision-making. This shift reflects a broader trend toward structured, adaptive strategies in construction project evaluation and execution.

The purpose of this paper is to explore how investor decision-making processes have evolved under the pressures of urbanization, sustainability, and technological advancement. It aims to identify the key factors shaping optimal investment strategies and to propose a structured, updated framework for decision-making in construction development.

To achieve this, the study employs a dual literature review approach. A narrative review will trace the historical evolution of construction investment frameworks, outlining how economic, technological, and regulatory forces have transformed traditional models. A thematic review will then categorize and synthesize contemporary decision-making factors, focusing on critical domains such as market analysis, risk management, financial modeling, sustainability integration, and stakeholder engagement [5]. This methodology ensures a comprehensive and structured exploration of the literature.

Ultimately, the findings of this research aim to provide investors, developers, and policymakers with an actionable, data-driven framework capable of navigating the volatility, complexity, and sustainability challenges inherent in contemporary construction development.

2. METHODOLOGY

This study adopts a dual literature review methodology, combining a narrative review and a thematic synthesis to develop a comprehensive understanding of the factors influencing investor decision-making in construction development. This approach provides both a historical grounding and a contemporary lens through which evolving investment priorities, strategies, and risks can be critically examined. The narrative review traces the historical evolution of construction investment frameworks, highlighting how urbanization, regulatory reform, sustainability imperatives, and digital transformation have reshaped traditional decision models. This contextual analysis explores macroeconomic influences, policy transitions, and sectoral innovations that have contributed to the shifting priorities of construction investors over the past decade. To complement this, a thematic review organizes and evaluates the literature across five critical domains identified as central to construction investment decision-making: Market Analysis, Risk Assessment, Financial Modeling, Sustainability Integration and Stakeholder Engagement. Each theme was derived from observed frequency and analytical depth in recent academic and industry literature, and reflects the multifaceted nature of investment evaluation in modern construction contexts. To identify relevant literature, a structured search strategy was employed using AI-enhanced scholarly databases. Search queries were tailored for each thematic domain using targeted keywords such as “construction investment,” “ESG metrics,” “PPP,” “financial modeling,” and “cost-benefit analysis.” The following inclusion criteria guided the selection:

- peer-reviewed journal articles, conference proceedings, or institutional reports;
- publication year from 2018 to 2025 to ensure relevance;
- full-text accessibility, with preference for open-access publications;
- direct topical relevance to construction investment.

Initial queries yielded approximately 110 documents. Following two rounds of screening, first for topical scope and then for methodological quality and sector relevance. Total of 25 publications were selected for detailed review. Studies that focused on non-construction sectors or were not freely accessible were excluded. Sources were retrieved from platforms such as ResearchGate, MDPI, Springer, Frontiers, and institutional repositories. This methodological approach ensures that both historical context and current research priorities are integrated into the analysis, providing a robust foundation for evaluating construction investment decision frameworks.

3. LITERATURE REVIEW

3.1. Narrative Review

Traditional approaches to investment decision-making in the construction sector have long centered on financial feasibility studies. These models typically emphasized static economic indicators such as Return on Investment (ROI), Net Present Value (NPV), and Internal Rate of Return (IRR) to evaluate project viability. While adequate in relatively stable markets, such techniques often excluded dynamic risk factors, long-term sustainability impacts, and non-financial variables. Historically, construction investors relied heavily on intuition, personal experience, and narrow financial models to guide decisions, often overlooking broader market indicators or environmental constraints.

Over time, several macro-environmental factors began to challenge this traditional framework. The rapid pace of urbanization created new spatial, social, and regulatory complexities that conventional models failed to account for. Digital transformation introduced advanced technologies such as Building Information Modeling (BIM), data analytics, and geospatial forecasting, revolutionizing how construction planning and investment forecasting were conducted. In parallel, increasing regulatory scrutiny and international sustainability commitments placed environmental performance and ESG (Environmental, Social, and Governance) criteria at the forefront of investment evaluation. These shifts exposed the limitations of purely financial assessments and highlighted the need for a more holistic, integrated investment framework.

In response, a transition began toward structured and multi-dimensional investment evaluation methods. Investors began incorporating dynamic risk analysis, lifecycle costing, stakeholder analysis, and sustainability metrics into decision models. The integration of probabilistic modeling techniques such as Monte Carlo simulations and Bayesian Networks further enhanced the predictive power of investment evaluations in uncertain environments. These methods allowed for better quantification of risk and improved the adaptability of investment decisions in fast-changing markets [1][2]. In particular, ESG-specific adaptations for the construction industry emerged, framing sustainability as not only a regulatory obligation but also a value-generating investment principle [3].

This evolution from traditional feasibility models to integrated, data-informed frameworks sets the foundation for analyzing today's key investment decision factors. The thematic review that follows will explore how modern investors assess market potential, evaluate financial and operational risk, model returns, incorporate sustainability objectives, and engage with a wide range of project stakeholders.

3.2 Thematic review

3.2.1. Market Analysis

Market analysis forms the foundation of early-stage construction investment evaluation. Traditionally, this process focused on macroeconomic trends and general demand assumptions, often using outdated or static demographic data. However, modern approaches emphasize data-driven methods that account for spatial, economic, and urban development dynamics specific to the investment region.

Ekemode and Ogunba [1] highlight a significant weakness in feasibility appraisals of property development projects in Lagos, Nigeria namely, the inadequate use of localized market data and the failure to account for neighborhood-level demand patterns. Their study demonstrates how insufficient market scoping contributes to poor investment outcomes, suggesting that incorporating detailed, real-time indicators is essential for more accurate feasibility forecasting.

Similarly, Zhang [2] demonstrates the influence of urban land-use planning on the success of real estate development projects. The study outlines how zoning laws, transportation planning, and neighborhood typologies critically impact the viability of proposed developments. The integration of urban spatial logic into market feasibility represents a key advancement in aligning investment targets with local socioeconomic realities.

Together, these studies support the evolution of market analysis in construction from a generic economic indicator exercise to a precise, contextualized assessment using granular planning, demographic, and behavioral data. Modern investors are increasingly incorporating geospatial analysis, competitor benchmarking, and demand elasticity modeling into feasibility studies, moving toward a multidimensional framework for market evaluation.

3.2.2 Risk Assessment

Risk assessment is a central pillar in construction investment decision-making, given the sector's high exposure to financial, operational, regulatory, and environmental uncertainty.

Historically, investors relied on deterministic models or subjective assessments, often underestimating the compound effects of project delays, cost overruns, and external shocks. Today's methodologies prioritize quantitative modeling, scenario simulation, and multi-criteria decision analysis to navigate risk in volatile project environments.

Fischer et al. [5] demonstrate how probabilistic climate forecasting and actionable risk data can inform infrastructure investment planning under long-term environmental uncertainty. While not specific to real estate alone, the framework they propose is highly adaptable to construction projects, particularly those facing climate sensitivity or weather-dependent performance metrics. It illustrates the growing importance of integrating external, climate-related risks into standard investment risk portfolios.

From a methodological standpoint, Xiao et al. [3] offer a powerful construction-specific approach by combining Bayesian Networks with Analytic Hierarchy Process (AHP). This hybrid model allows for both qualitative and quantitative factors to be assessed simultaneously and is particularly useful in projects with uncertain labor conditions, complex site logistics, or layered contractor dependencies. The probabilistic output of such models enables better contingency planning and stakeholder confidence.

Namazian et al. [4] further advance probabilistic modeling in construction by integrating Monte Carlo simulation with Bayesian Networks to assess project completion time risk. This approach supports financial forecasting and contract structuring by generating a spectrum of potential completion dates, rather than relying on a single fixed timeline. The method is especially useful for megaprojects or PPPs, where time delays can critically erode returns.

Collectively, these studies illustrate how modern risk assessment in construction investment has shifted from reactive contingency planning to proactive, data-informed modeling. Investors now seek to quantify not only the likelihood of adverse events but also their cascading impact on financial feasibility and stakeholder trust, making probabilistic risk assessment essential in high-stakes construction environments.

3.2.3 Financial Modeling

Financial modeling serves as the quantitative backbone of construction investment decisions. It involves assessing the expected return on investment by projecting cash flows, evaluating life-cycle costs, and incorporating financing strategies and sensitivity analyses. While traditional models relied on static projections, contemporary methods account for variable risk profiles, environmental costs, and long-term asset performance under different economic scenarios.

Vagdatli and Petroutsatou [6] review a range of life cycle cost–benefit analysis (LCCBA) approaches applied to road infrastructure, emphasizing the growing use of net present value (NPV), internal rate of return (IRR), and cost-efficiency indicators in infrastructure investment appraisal. Their analysis highlights that model accuracy increases when operation, maintenance, and end-of-life disposal costs are internalized into investment evaluation, a practice becoming increasingly relevant to private and public developers alike.

Henke et al. [7] apply a mixed-method financial evaluation framework to transport sector investments, combining traditional cost-benefit analysis (CBA) with multi-criteria analysis (MCA) to account for social and environmental impacts. Their methodology is particularly relevant for large-scale urban projects and public-private partnerships (PPPs), where financial metrics alone cannot capture full project value. This integrative approach strengthens decision-making under political, economic, and environmental complexity.

Aroquipa and Hurtado [8] contribute a domain-specific model addressing probabilistic seismic risk in building portfolio investments. Their work bridges risk modeling with financial planning by simulating the social and market costs of seismic disruptions. The model's ability to incorporate spatial risk distribution into financial evaluation enhances the resilience of investment decisions in vulnerable urban environments.

Together, these studies reinforce the transition of financial modeling from a narrow accounting tool into a dynamic, risk-sensitive, and socially informed decision support mechanism. Investors are increasingly using these hybrid models to ensure projects are both profitable and adaptable to long-term changes in regulation, climate, and infrastructure use.

3.2.4 Sustainability Considerations

The integration of sustainability considerations into construction investment decision-making has moved from a fringe concern to a central evaluation criterion. Investors are increasingly expected to consider long-term environmental performance, resource efficiency, and societal impact alongside financial return. This shift is largely driven by regulatory developments, ESG (Environmental, Social, and Governance) reporting mandates, and the recognition that sustainable buildings yield long-term operational and reputational benefits.

Kim and Chang [9] propose a construction-specific adaptation of ESG known as C-ESG. Their review identifies critical sustainability indicators at the project level, including carbon emissions, energy intensity, water usage, and community impact. Importantly, they argue for dynamic ESG scoring mechanisms that adjust throughout the project lifecycle, improving transparency and aligning investor priorities with global sustainability standards. This framework helps quantify sustainability in ways that are compatible with financial models and investor decision tools.

Debrah [10] explores the economic feasibility of green buildings using life cycle costing (LCC) in the context of Ghana. The study demonstrates that although upfront costs for green buildings tend to be higher, their life cycle operational savings often exceed conventional designs. This cost-benefit framing strengthens the argument for green construction investment and underscores the importance of considering whole-life performance in the financial appraisal phase.

Liang [11] expands the discussion to financing, exploring instruments such as green bonds and sustainability-linked loans. These financing vehicles are increasingly used to support infrastructure and building projects that meet ESG benchmarks. Liang emphasizes that the credibility of these instruments relies on robust project evaluation frameworks that include measurable sustainability criteria, thus tying sustainability compliance directly to capital market access and investor risk appetite.

Collectively, these works demonstrate that sustainability in construction is no longer a passive label, but an active design and financing principle. Investment decisions that ignore sustainability criteria now risk not only environmental backlash but also financial underperformance in increasingly ESG-conscious capital markets.

3.2.5 Stakeholder Engagement

Effective stakeholder engagement has become a defining factor in the success or failure of construction investment projects. As construction increasingly intersects with public infrastructure, urban development, and community identity, investors must navigate complex networks of actors, including local authorities, private partners, end-users, and civil society organizations. Modern investment models view stakeholder alignment not only as a risk mitigation strategy but also as a means of generating long-term value, trust, and social license to operate.

Węgrzyn and Wojewnik-Filipkowska [12] examine stakeholder attitudes toward success in public-private partnership (PPP) construction projects. Their findings indicate that clear role definition, shared financial expectations, and early-phase involvement significantly influence project viability and investor confidence. The study demonstrates that misaligned objectives between public authorities and private investors can lead to project delays, contractual disputes, and funding shortfalls.

Hamdan et al. [13] extend this conversation to sustainable urban neighborhood projects, where stakeholder collaboration is essential for balancing ecological goals, economic development, and social inclusion. The authors propose a framework for participatory governance, emphasizing mechanisms such as stakeholder mapping, transparency protocols, and deliberative planning. These collaborative models increase the legitimacy of construction investments and are particularly valuable in contexts where environmental or zoning conflicts might arise.

Together, these studies reinforce the notion that stakeholder engagement is not a peripheral concern but a strategic pillar in construction investment decision-making. Investors now evaluate stakeholder dynamics through structured tools such as influence-interest matrices, engagement audits, and benefit-distribution analyses. Incorporating these techniques improves risk forecasting, accelerates project approvals, and enhances reputational performance in ESG-sensitive environments.

4.SYNTHESIS OF THEMATIC DOMAINS: STRATEGIC INTERACTIONS IN INVESTMENT DECISIONS

Building upon the thematic review in Section 3.2, this section presents a synthesis of how the core domains of construction investment, market analysis, risk assessment, financial modeling, sustainability integration, and stakeholder engagement, interact in shaping investor strategies. Rather than functioning in isolation, these dimensions form a dynamic and interdependent framework, where decisions in one area influence and condition choices in others. Recognizing these interconnections is critical for developing robust, forward-looking investment strategies in an increasingly complex and uncertain built environment.

4.1 Interdependence of Market, Risk, and Finance

Shifts in urban form, land use policy, and demographic dynamics directly shape investment opportunities while introducing new layers of uncertainty. Market volatility, inflationary pressures, and supply chain disruptions now demand that risk assessment is not a secondary phase but integral to early-stage feasibility. Investors must employ dynamic financial modeling tools, such as scenario-based cash flow simulations and probabilistic forecasting to account for the cascading effects of market risks on projected returns. In this interconnected context, static financial models are inadequate; adaptability and continuous recalibration are key to sound investment evaluation.

4.2 Embedding Sustainability and Technology into Financial Logic

Sustainability has become a core determinant of investment viability, not merely a compliance obligation. ESG performance influences not only approval timelines and public perception but also access to financing instruments like green bonds and sustainability-linked loans. Likewise, digital technologies, such as BIM, geospatial intelligence, and AI-enabled risk tools, enable real-time responsiveness to project complexity. When integrated into financial projections, sustainability indicators transform from external benchmarks into measurable, project-critical variables. This fusion of environmental and technological factors enhances both financial viability and long-term strategic value.

4.3 Stakeholder Alignment as Strategic Infrastructure

Investor decisions are increasingly influenced by the alignment, or misalignment, of stakeholder priorities. Regulatory authorities, community actors, and project partners impose expectations that extend beyond financial deliverables. Early and structured stakeholder engagement enhances project credibility, reduces friction in permitting or land acquisition, and mitigates reputational risk. By embedding stakeholder governance into the risk and financial planning processes, investors ensure that social license, institutional alignment, and public acceptance are strategically addressed alongside profitability and sustainability.

5. PROPOSED STRUCTURED FRAMEWORK FOR INVESTOR DECISION-MAKING

5.1 Process Flow and Key Components

The proposed framework for construction investment decision-making is organized as a sequential process integrating critical evaluation domains to enhance decision quality and project resilience. Each step of the process corresponds to a vital component, ensuring that investment decisions are comprehensive, data-driven, and adaptable to evolving project contexts.

The process begins with Market Analysis, where investors define a clear project vision aligned with broader strategic goals such as profitability, sustainability, or social impact. This phase includes identifying target markets, clarifying building function suitability (e.g., residential, commercial, mixed-use), and performing a competitor landscape analysis to highlight market gaps and differentiation opportunities. Detailed geospatial analysis, demographic studies, customer behavior trends, and policy reviews form the foundation of this stage, ensuring that project concepts align with actual market needs rather than relying on generalized assumptions [1][2].

Following market evaluation, the process advances to Risk Profiling and Scenario Planning. Here, probabilistic models, such as Monte Carlo simulations and Bayesian networks, are employed to simulate potential disruptions affecting timelines, costs, or regulatory approvals [3][4]. Risk assessment is not limited to internal project factors but extends to macroeconomic volatility, supply chain instability, and climate resilience [5]. By quantifying the likelihood and impact of risks, investors establish contingency measures early in the project cycle.

The third stage, Financial Feasibility and Flexibility Analysis, builds on market and risk insights to conduct a dynamic appraisal of expected returns, lifecycle costs, and financial sustainability. Preliminary business model screening, including analysis of potential revenue streams such as rental income, sales proceeds, or mixed-use models, is incorporated early to refine financial expectations. This phase integrates traditional metrics such as Net Present Value (NPV) and Internal Rate of Return (IRR) alongside scenario-based cash flow simulations. Investors also evaluate funding structures, such as the use of green bonds or mixed-financing strategies, to maximize capital efficiency and resilience [6].

Subsequently, Sustainability Integration is performed, embedding ESG (Environmental, Social, Governance) criteria into both project design and operational planning [9]. At this stage, environmental impacts, energy efficiency, social inclusivity, and governance mechanisms are evaluated against recognized frameworks such as LEED, BREEAM, and the EU Taxonomy. Sustainability considerations are treated not as externalities but as core investment value drivers, directly influencing project approval rates, financing costs, and long-term profitability [10][11].

The final critical step involves Stakeholder Engagement Strategy Development. Investors map key stakeholders, assess their influence and interests, and design targeted engagement strategies. Active management of stakeholder relationships, ranging from regulatory authorities and community groups to financial partners and end-users, ensures smoother project delivery and stronger risk mitigation [12][13]. Transparent communication channels, benefit-sharing mechanisms, and adaptive governance structures are prioritized to maintain alignment and trust across all project phases.

The sequential but interconnected nature of this process enables iterative refinement; insights from later stages can prompt recalibration of earlier analyses, fostering a dynamic and responsive investment strategy.

5.2 Implementation Considerations

Successful application of the proposed framework depends on access to high-quality, up-to-date data and the integration of advanced decision-support tools. Geographic Information Systems (GIS) for market analysis, Building Information Modeling (BIM) for design coordination and progress monitoring, and AI-based risk analytics are recommended to enhance decision accuracy and responsiveness [6]. Scenario simulation platforms further enable investors to model project behavior under a variety of macroeconomic and environmental conditions [5].

Flexibility is another critical consideration. Although the framework provides a structured sequence, it must be adapted to the specific scale, location, and type of project. Smaller projects may streamline certain analyses, while larger, more complex developments will require full integration of all components. Investors must also remain vigilant regarding regulatory changes, technological innovations, and shifting stakeholder expectations, updating their assessments accordingly throughout the project lifecycle.

Ultimately, the strength of the proposed framework lies in its ability to combine structured discipline with adaptive capacity, enabling construction investment decisions that are both robust and resilient in the face of growing complexity and uncertainty.

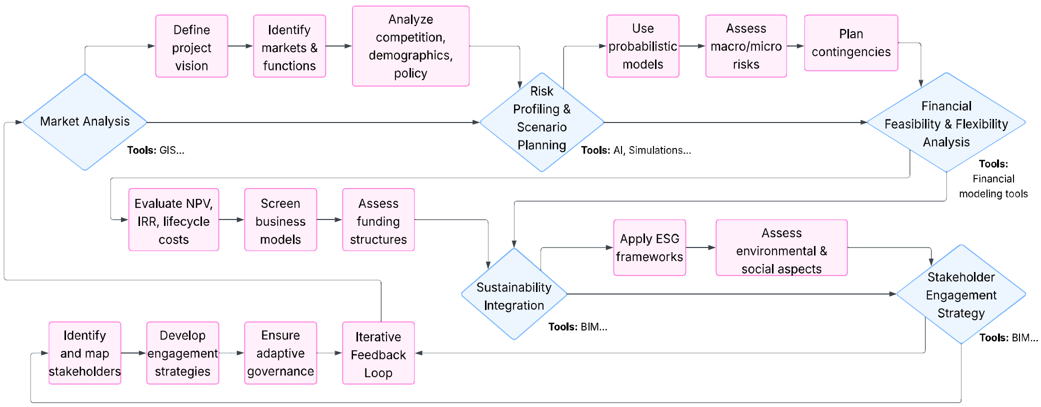

Figure 1. Structured Framework for Construction Investment Decision-Making, drawn by Authors

6. DISCUSSION

The structured investment decision-making framework proposed in this paper addresses a significant gap in contemporary construction project evaluation, namely the lack of integrated models that account for market, financial, risk, sustainability, and stakeholder dimensions in a unified process. By aligning feasibility analysis with evolving technological and regulatory landscapes, this model offers a multidimensional alternative to traditional linear or finance-centric appraisal tools.

In contrast to conventional industry practices, which often isolate financial viability from social, environmental, or stakeholder considerations, the proposed framework emphasizes a holistic, anticipatory approach. Early-stage investment evaluations typically rely on static financial indicators and past benchmarks, with limited integration of dynamic risk modeling, ESG factors, or stakeholder mapping. This narrow focus can lead to underestimation of long-term uncertainties and misalignment with regulatory or community expectations. The framework seeks to overcome these limitations by embedding probabilistic analysis, sustainability metrics, and stakeholder engagement into the core of pre-investment planning.

However, several limitations must be acknowledged. First, the framework assumes a relatively high degree of data availability and investor sophistication. Tools like Monte Carlo simulation or ESG scoring may be unrealistic for smaller developers, public bodies in emerging markets, or informal construction ecosystems. This presents an access barrier that could reinforce disparities in investment quality. Second, the model relies on digital tools (BIM, geospatial forecasting, AI analytics) whose outputs are only as reliable as the input data, raising concerns about transparency and false precision.

Additionally, the framework could be criticized for being normatively optimistic, it presumes stakeholders act rationally and that sustainability and profitability objectives are always reconcilable. In reality, conflict between financial and ESG performance often arises, particularly in time-constrained projects or politically sensitive zones. While ESG scoring provides a valuable structure, it can be gamed or inconsistently applied, leading to greenwashing or unintended exclusions.

To increase utility and inclusivity, future versions should consider a modular scaling system, with simplified templates for resource-constrained investors. Integrating real-time data streams, through IoT sensors, satellite data, or municipal dashboards, could enable more dynamic feedback during decision execution. Finally, to validate the model empirically, it should be piloted in real-world contexts across diverse geographies and project types (e.g., social housing, greenfield infrastructure, or brownfield redevelopment).

Despite these caveats, the framework represents a meaningful advance in how construction investments are conceptualized and assessed. Its structured, adaptive design enables decision-makers to synthesize fragmented insights into a coherent strategy aligned with modern challenges such as climate adaptation, digital transformation, and stakeholder accountability.

7. CONCLUSION

This study presents a structured framework for investment decision-making in construction, grounded in an integrated review of market, financial, risk, sustainability, and stakeholder dimensions. By moving beyond traditional single-focus evaluations, the framework responds to the increasing complexity and interdependence of factors shaping modern development projects.

A key strength lies in its ability to bridge conceptual domains often treated in isolation. Rather than prescribing rigid criteria, the framework offers a flexible architecture investors can adapt based on project scale, regulatory context, or sustainability priorities. This integrative logic positions the model as a forward-looking tool aligning investment strategy with both immediate feasibility and long-term resilience.

Nevertheless, the study is not without methodological constraints. The dual literature review approach, while effective for mapping broad thematic landscapes, is limited by source selection subjectivity and lack of empirical validation. Reliance on secondary data means emergent or context-specific practices may be underrepresented, particularly in under-researched regions or non-English literature. Excluding real-world testing also limits applicability beyond conceptual planning.

Looking ahead, further validation is essential. Future research should focus on field-based applications involving active construction projects to evaluate how the framework performs under real constraints and decision timelines. Mixed-methods studies, combining case implementation with stakeholder interviews, could refine the tool’s adaptability and identify operational barriers. Comparative analyses across investment contexts (e.g., public infrastructure vs. private development) would also offer insight into scalability and generalizability.

Ultimately, this paper contributes not a definitive model, but a structured foundation from which more evidence-based, integrated, and context-sensitive investment tools can be developed. As demands on the built environment evolve, so too must the frameworks that guide the decisions shaping it.

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