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The Economic Impact of Sustainable Valuation: A Multidimensional Framework for Real Estate Investment Efficiency and Policy Integration

Fjolla TRAKANIQI
https://orcid.org/0000-0002-4887-2225
College AAB, Faculty of Economy, Prishtina, Kosovo
fjolla.trakaniqi@aab-edu.net

Shqiponja NALLBANI- BERISHA[1]
https://orcid.org/0009-0004-1369-2488
College AAB, Department Marketing and Business
Faculty of Economy, Prishtina, Kosovo
shqiponja.nallbani@aab-edu.net

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Abstract
This study develops and evaluates sustainable real estate valuation by integrating policy frameworks, spatial productivity, and investment efficiency to provide a holistic understanding of property markets. Employing a multidimensional approach, the research examines how regulatory policies, market dynamics, and productivity metrics collectively influence property values and investment decisions. In this study, the multidimensional approach is conceptualized as an integrated framework combining policy inputs, spatial productivity indicators, and investment efficiency metrics to explain sustainable real estate valuation adjustments.

The findings highlight the critical role of sustainable valuation practices in enhancing market transparency, optimizing resource allocation, and promoting long-term economic stability. By bridging theoretical insights with practical applications, this work offers valuable guidance for policymakers, investors, and urban planners aiming to foster resilient and efficient real estate markets.

Keywords: sustainable real estate valuation; ESG in finance; spatial productivity; investment efficiency; policy integration; real estate markets.

JEL Classification: R33; Q01; G11.

[1] Corresponding author

Introduction

The global real estate market has undergone profound and multidimensional transformations in recent decades, shaped by rapid shifts in economic structures, demographic trends, technological innovation, and environmental pressures. Traditional property valuation models-largely anchored in historical sales data, comparative market analysis, and income-based approaches-are increasingly insufficient for capturing the broader dynamics that influence property value in contemporary markets. As urban systems become more complex and sustainability imperatives intensify, valuation practices must evolve beyond the narrow focus on transactional evidence to incorporate a more holistic understanding of policy, productivity, and investment efficiency.

At the macro level, the integration of strategic policy frameworks into real estate decision-making has become indispensable. Government regulations related to land use, taxation, environmental protection, energy performance, and urban development exert a direct influence on property markets. Policies promoting green infrastructure, climate adaptation, and energy-efficient buildings reshape both investor expectations and market-driven value formation (Nguyen et al., 2022; Li & Zhang, 2021). Similarly, place-based policies aimed at enhancing regional competitiveness, digitalization, and infrastructure quality-such as smart-city initiatives or transit-oriented development-affect spatial productivity and long-term market performance. In this context, valuation approaches must recognize how institutional quality, governance, and spatial policy coherence shape investment risks and opportunities.

Furthermore, the growing relevance of sustainability, environmental resilience, and social well-being has transformed the criteria through which value is assessed. Sustainable real estate valuation integrates environmental, social, and governance (ESG) factors, enabling a more accurate and forward-looking estimation of a property's contribution to long-term economic resilience (Chen et al., 2023). This multidimensional perspective supports not only private investors but also public authorities, developers, financial institutions, and urban planners in making informed decisions that balance profitability with broad societal goals. Such an approach is particularly crucial in emerging markets and transitioning economies, where institutional reforms, regulatory evolution, and market inefficiencies can amplify investment risks and distort value formation (Gashi et al., 2021a). Addressing these inefficiencies requires valuation models that better reflect real productivity potential, regulatory impacts, and environmental constraints.

From a microeconomic standpoint, the increasing availability of digital tools and advanced technologies has further reshaped valuation methodologies. Data-driven innovations-such as geographic information systems (GIS), spatial econometric modelling, automated valuation models (AVMs), and machine-learning-enhanced predictive analytics-have expanded the analytical capacity of valuation professionals while improving accuracy, scalability, and transparency. The integration of artificial intelligence into valuation processes (Islami, 2024) enables the detection of nonlinear relationships between property attributes, environmental indicators, and market behaviour, which traditional models often overlook. Additionally, ESG scoring systems, green-building certifications, and lifecycle cost analyses offer new dimensions for evaluating long-term property performance and sustainability impact.

In operational terms, the proposed conceptual framework positions sustainable real estate valuation as a synergistic process that aligns policy-sensitive, productivity-driven, and technologically enhanced valuation practices. By embedding policy analysis, spatial productivity metrics, and investment efficiency indicators into real estate assessment, the

framework bridges the gap between economic valuation, sustainability science, and strategic urban governance. This alignment helps ensure that asset pricing reflects not only present market conditions but also future-oriented risks and opportunities-including climate vulnerabilities, regulatory shifts, technological disruptions, and evolving investor preferences.

In essence, sustainable real estate valuation emerges as an indispensable tool in the contemporary built environment, enabling stakeholders to anticipate market transitions, allocate resources efficiently, and promote urban development pathways that are economically viable, environmentally responsible, and socially inclusive. Through the integration of advanced analytics, strategic policy insights, and sustainability-driven criteria, this approach supports the development of resilient property markets capable of contributing to broader economic stability and long-term development goals.

2. Literature Review

Sustainable Real Estate Valuation (SREV) has attracted significant scholarly attention in recent years due to the increasing pressures of climate change, rapid urbanization, and the global shift toward sustainable economic development. Traditional real estate valuation models have been widely criticized for their narrow focus on historical market prices and transactional data, while overlooking critical environmental, social, spatial, and political factors that influence long-term property value (Chen et al., 2023; Li & Zhang, 2021). As markets evolve and sustainability considerations gain prominence, these conventional approaches are no longer sufficient to capture the complexity and multidimensional nature of real estate systems. This is particularly evident in contexts where public policy, urban transformation, and socio-economic dynamics are accelerating simultaneously.

Recent scholarship emphasizes that sustainable valuation requires a holistic and multidimensional perspective, integrating three interrelated dimensions:

Policy and regulatory frameworks-including legal requirements, taxation systems, fiscal incentives, and urban planning regulations-directly shape property values, market stability, and investment efficiency (Goh & Lee, 2020; Nguyen et al., 2022; Ziberi & Gashi, 2021b). Policies promoting sustainable construction, green certifications, and energy efficiency tend to shift market demand toward long-term resilient properties, mitigating environmental and financial risks. Conversely, inconsistent or rapidly changing regulations may increase market uncertainty and reduce investor confidence. Thus, regulatory clarity and consistency are essential components of sustainable valuation.

Spatial productivity captures the interaction between land use, infrastructure quality, accessibility, and economic development dynamics. Areas with well-developed infrastructure, efficient public transportation, access to essential services, and strong economic activity exhibit higher real estate liquidity and greater potential for long-term value appreciation (Li & Zhang, 2021; Tran & Pham, 2021). In contrast, areas with inadequate infrastructure or poor spatial planning tend to experience economic stagnation, lower investor interest, and depreciating property values. Spatial productivity therefore plays a central role in shaping sustainable value creation by influencing market expectations and investment behaviour.

Investment efficiency refers to the capacity of real estate projects to generate stable, long-term returns while mitigating environmental and financial risks. Well-designed, energy-efficient, and sustainably oriented investments typically demonstrate higher operational performance, lower maintenance costs, and improved financial resilience (Chen et al., 2023; Rexha, et al., 2022). In emerging and volatile markets, such investments offer a competitive

advantage by ensuring long-term stability and reducing exposure to uncertainty. Investment efficiency is thus a core pillar of sustainable valuation, linking design quality, environmental performance, and economic outcomes.

This integrated perspective is particularly critical in developing and transitional markets, where regulatory environments are often dynamic, market transparency is limited, and entrepreneurial activity faces structural and institutional constraints (Gashi et al., 2021a). In these contexts, SREV not only provides a more advanced analytical lens but also contributes to improving market stability by incorporating dimensions that traditional valuation approaches tend to underestimate or overlook.

Regulatory and institutional policies represent one of the most critical determinants shaping property prices, investment efficiency, and the overall transition toward sustainable development standards. In many economies, public policies function as mechanisms that influence the behaviour of investors, construction-sector actors, and end-users by providing clear signals regarding strategic priorities in urban and economic development.

First, fiscal policies-including tax incentives, subsidies, and financial benefits for “green” certified buildings-have proven to be powerful drivers in increasing demand for energy-efficient and environmentally responsible properties. Evidence shows that such buildings not only achieve higher market prices but also demonstrate greater long-term stability, making them especially attractive for institutional investors (Zhang, et al., 2022a). Moreover, fiscal incentives reduce operating costs, enhance asset performance, and contribute to higher levels of urban productivity.

Second, urban and spatial planning policies play an indispensable role in shaping spatial productivity and investment attractiveness. Policies that promote moderate density, integrated public transportation systems, access to essential public services, and the expansion of green spaces improve quality of life and strengthen the economic functioning of cities (Tran & Pham, 2021). These interventions reinforce the link between spatial productivity and real estate performance, creating an environment conducive to sustainable and cost-efficient investment.

Despite these advancements, the literature still reveals a substantial gap in understanding how regulatory policies interact with spatial productivity and investment efficiency to influence sustainable property valuation. Existing studies often focus on isolated components-such as the effect of a single policy, the role of spatial productivity, or the impact of investment decisions-without fully accounting for the multidimensional and interdependent nature of these factors (Nguyen et al., 2022; Zhang et al., 2022b).

Consequently, an integrated theoretical framework is still lacking-one capable of analysing how regulatory policies, spatial productivity, and investment efficiency intersect and collectively shape the long-term value and sustainability of real estate markets. This creates a significant research gap, which the present study seeks to address through a more comprehensive analytical and conceptual approach.

Spatial productivity refers to the optimal and efficient utilization of land, infrastructure, and spatial resources in ways that maximize economic, social, and environmental value. It captures how the configuration of urban space-through transportation networks, mixed land use, density patterns, and infrastructural integration-contributes to economic performance and long-term property value. High spatial productivity areas are typically characterized by balanced and well-managed density, efficient access to transportation and essential services, proximity to employment centers, and opportunities for sustainable urban development (Li &

Zhang, 2021). These areas tend to facilitate stronger economic interaction, reduce commuting time and costs, enhance quality of life, and promote more sustainable patterns of urban growth.

Empirical evidence consistently demonstrates that locations with high spatial productivity deliver multiple advantages for real estate markets, including:

- More stable and predictable property price growth, as efficient spatial configurations support continuous demand and enhance market resilience in the face of economic shocks (Chen et al., 2023);
- Safer long-term investment returns, due to reduced environmental and infrastructural risks and improved economic dynamism, which collectively strengthen the financial stability of property assets (Tran & Pham, 2021);
- Greater market liquidity and depth, making such areas more appealing to institutional investors seeking stable, long-term investments with lower volatility and higher return potential (Goh & Lee, 2020).

These empirical insights highlight that spatial productivity is not simply a characteristic of well-planned cities but a critical determinant of real estate performance, influencing investment flows, risk assessments, and valuation accuracy. Ignoring spatial productivity leads to undervaluation or overvaluation of properties, especially in urbanizing regions where infrastructure and land-use patterns are rapidly changing.

Consequently, incorporating spatial productivity indicators into real estate valuation models is essential to ensure more realistic, future-oriented assessments. For sustainable real estate valuation (SREV), understanding spatial productivity provides a clearer perspective on how infrastructure quality, accessibility, and spatial efficiency contribute to long-term value creation and risk mitigation. This reinforces the argument that sustainable valuation cannot rely solely on historical or transactional data but must integrate structural and spatial dimensions that shape the evolution of property markets over time.

Table 1: Key Performance Indicators (KPI) for Measuring Spatial Productivity

Dimension	KPI	Measurement
Accessibility	Distance to transport hubs	minutes/km
Infrastructure	Road and utility coverage	index 0–100
Energy efficiency	Energy use intensity	kWh/m²/year
Land-use efficiency	Density ratio	built area/land area
Service access	Distance to schools/hospitals	minutes/km
Market liquidity	Transaction frequency	number of transactions/years
Digital connectivity	Broadband access	% coverage
Environmental quality	Green space access	m² per capita

Source: Author's own elaboration.

These KPIs provide a practical toolkit for valuers to operationalize spatial productivity in real estate appraisal.

Investment efficiency refers to the capacity of investors, developers, and financial institutions to generate optimal returns relative to the risks, costs, and resources allocated to real estate projects. It is a central concept in sustainable real estate markets, as it connects financial performance with economic resilience, environmental responsibility, and long-term asset stability. In a market increasingly shaped by technological, regulatory, and environmental

transformations, investment efficiency becomes essential for understanding property performance and long-term value potential.

Empirical research consistently demonstrates that investments oriented toward sustainability and located in areas with high spatial productivity provide several significant advantages:

- Higher risk-adjusted returns, as sustainable buildings and properties situated in well-planned, infrastructure-rich areas tend to maintain their value even during periods of market volatility, reducing exposure to financial, environmental, and operational risks (Chen et al., 2023);
- Positive contributions to local economic development, since well-structured investments stimulate employment, enhance local economic activity, and strengthen urban ecosystems-further increasing the attractiveness of the area for future investments (Nguyen et al., 2022; Gashi et al., 2021b);
- Substantial reductions in pollution and improved energy efficiency, which lower operational costs and reinforce the long-term financial performance of real estate assets. These ecological and economic benefits are especially important for institutional investors and sustainability-focused asset management funds (Zhang et al., 2022a).

For these reasons, analysing investment efficiency is an essential component of sustainable property valuation. This analysis involves evaluating factors such as:

- energy performance of buildings,
- sustainable architectural design,
- quality of risk management,
- long-term operational cost cycles, and
- positive impacts on communities and urban development.

Integrating these factors into real estate valuation models not only improves the accuracy of assessments but also supports investment strategies aimed at sustainability and financial stability. Moreover, investors who incorporate investment efficiency indicators are better positioned to build resilient portfolios that are more adaptable to future market conditions.

Consequently, incorporating investment efficiency into property valuation processes is crucial for shaping effective portfolio management strategies, enhancing decision-making, and fostering sustainable development within real estate markets. This dimension forms a core pillar of advanced sustainable valuation frameworks and promotes long-term, balanced, and environmentally responsible investment outcomes. Despite considerable progress in contemporary property valuation research, several critical gaps continue to constrain both theoretical advancement and practical implementation. These gaps reflect the fragmented nature of existing studies, the increasing complexity of real estate markets, and the growing need for sustainability-oriented valuation frameworks.

First, only a limited body of work integrates policy dynamics, spatial productivity, and investment efficiency within a single, unified analytical framework. Most studies examine these dimensions separately-focusing either on regulatory effects, spatial-economic conditions, or investment performance-without capturing the complex interdependencies that collectively shape sustainable property valuation. This siloed approach limits the ability to understand how these factors operate together and influence long-term value creation.

Second, there is a notable lack of robust empirical evidence from developing and transitional markets, where institutional structures, regulatory environments, and spatial productivity patterns are often unstable or insufficiently documented. Existing findings are inconsistent and sometimes contradictory, highlighting the need for deeper empirical studies grounded in real market data (Ibraimi et al., 2025). This empirical gap restricts the development of reliable valuation models tailored to the realities of emerging markets.

Third, many traditional valuation models continue to overlook environmental sustainability factors, despite the increasing emphasis placed by modern investors, financial institutions, and policymakers on energy performance, low-emission construction, and environmental resilience (Ziberi, 2022). The absence of sustainability indicators in standard valuation frameworks can result in assessments that fail to capture long-term risks, operational vulnerabilities, and the enduring economic benefits of environmentally efficient properties.

Together, these gaps underscore the need for more comprehensive conceptual and analytical frameworks that integrate economic, spatial, regulatory, and environmental dimensions into a unified evaluative structure.

This study addresses these gaps by proposing a multidimensional framework that combines theoretical analysis, mixed-methods research, and real market data. This approach aims to:

- capture the complex interactions among regulatory policies, spatial productivity, and investment efficiency;
- provide robust empirical evidence from developing-market contexts; and
- embed sustainability considerations as central components of contemporary valuation practice.

Through this comprehensive perspective, the study contributes to the advancement of sustainable real estate valuation by offering a more accurate, resilient, and context-sensitive analytical foundation for research, policy development, and investment decision-making.

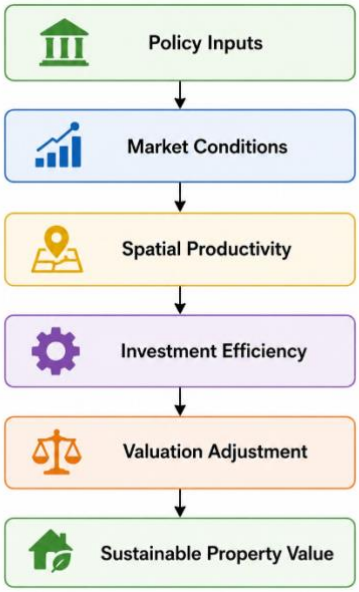
3. Theoretical Framework

The valuation of real estate has traditionally relied on financial and market-based models that prioritize indicators such as historical transaction prices, rental yields, capitalization rates, and comparable property benchmarks. Although these models provide important insights into short-term market dynamics, they often fail to account for the broader macro-structural determinants that shape property markets in a more systemic and long-term perspective. Consequently, traditional valuation approaches risk underestimating the influence of governance systems, spatial economic performance, and the strategic efficiency of investment behaviour, particularly in emerging and transitioning economies.

Recent interdisciplinary scholarship has recognized the need to integrate policy frameworks, spatial productivity, and investment efficiency within a unified theoretical lens to achieve sustainable and future-oriented valuation outcomes (Nguyen et al., 2022; Chen et al., 2023).

To better illustrate the operational logic of the proposed multidimensional framework, Figure 1 presents the sequential relationship between policy inputs, spatial productivity, investment efficiency, and sustainable property valuation outcomes. As illustrated in below Figure 1, the proposed conceptual framework conceptualizes these three components as mutually reinforcing pillars that jointly determine the sustainability, resilience, and long-term value trajectory of real estate assets.

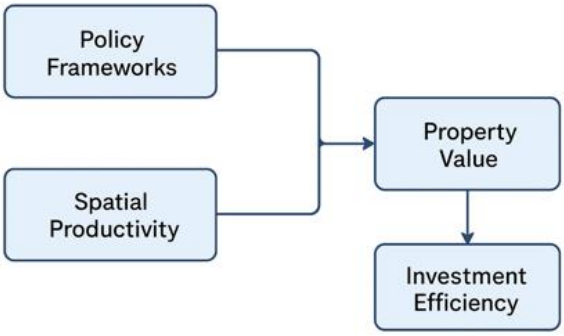
Figure 1: Policy-Driven Sustainable Valuation Flowchart



Source: Adapted from United Nations Environment Programme (UNEP, 2020)

While Figure 1 illustrates the operational sequence through which policy mechanisms influence valuation outcomes, Figure 2 presents the broader conceptual structure linking policy frameworks, spatial productivity, and investment efficiency within a unified sustainable valuation model.

Figure 2: Conceptual Framework: Multidimensional Sustainable Real Estate Valuation



Source: Adapted from Chen, et al. (2023).

Policy frameworks encompass public interventions such as taxation systems, land-use regulations, zoning ordinances, fiscal incentives for green buildings, energy-efficiency directives, and strategic urban development plans. These regulatory instruments fundamentally shape the operational landscape in which real-estate market's function. From the perspective of institutional economics, policies play a central role in reducing transaction costs, improving transparency, clarifying property rights, and mitigating information asymmetries. Well-designed regulatory structures enhance investor confidence, stimulate liquidity, and promote market stability-conditions that are strongly associated with higher asset values and more predictable returns (Goh & Lee, 2020; Rexha et al., 2021).

Moreover, sustainable policies such as green-building certifications, carbon-emission reduction targets, and incentives for renewable energy integration are increasingly becoming core valuation determinants. These policies not only reduce environmental risks but also signal long-term asset resilience and compliance with international sustainability standards.

Spatial productivity, a concept deeply rooted in urban and regional economics, refers to the level of economic output, efficiency, and value creation that occurs within a specific geographic space. It is shaped by several interlinked factors:

- Infrastructure quality (transportation networks, digital connectivity, public services);
- Accessibility and proximity to labour markets, consumers, and key economic nodes;
- Land-use planning and urban design;
- Agglomeration and clustering effects, which generate productivity spillovers.

Theoretical foundations derived from location theory, hedonic pricing models, and urban agglomeration economics suggest that properties located in high-productivity zones tend to exhibit more stable rental demand, higher occupancy rates, improved liquidity, and stronger long-term appreciation (Li & Zhang, 2021; Tran & Pham, 2021). Integrating spatial productivity into valuation models enables a more nuanced understanding of how urban form, infrastructure investments, and spatial development strategies shape property values beyond traditional financial indicators.

Investment efficiency refers to the ability of investors and institutions to allocate capital optimally in order to maximize returns relative to the level of risk undertaken. Drawing on Modern Portfolio Theory (MPT), real estate finance, and sustainable investment principles, investment efficiency encompasses not only expected returns but also risk diversification, market conditions, asset-specific characteristics, and long-term value creation. In the real estate sector, investment efficiency is typically associated with:

- strong alignment between project design and market demand;
- environmentally sustainable and energy-efficient construction practices;
- resilient and adaptable property assets;
- strategic geographic location within economically dynamic and policy-supported areas.

According to contemporary studies, sustainable and well-planned real-estate investments deliver higher risk-adjusted returns, promote long-term asset stability, and contribute positively to local economic development-particularly in developing markets where regulatory frameworks and spatial planning are evolving (Chen et al., 2023; Ziberi, 2022). Investment efficiency thus acts as a mediating mechanism that translates policy signals and spatial productivity advantages into concrete financial performance and value creation.

Building on the theoretical pillars outlined in the previous section, this study advances a multidimensional valuation framework designed to move beyond traditional financial-based appraisal approaches. Instead of treating policy, spatial dynamics, and investment performance as isolated determinants, the proposed model conceptualizes them as interdependent components that jointly shape sustainable real estate value. This integrated perspective is particularly relevant in emerging markets, where institutional reforms, urban development trajectories, and investment decision-making processes evolve simultaneously.

At the core of this model lies the functional relationship: *Property Value = f(Policy Environment, Spatial Productivity, Investment Efficiency)*. Each of these components captures a distinct but complementary dimension of value creation.

The policy environment refers to the constellation of governmental and institutional mechanisms-tax incentives, zoning regulations, building permits, sustainability certifications, and land-use policies-that create the regulatory and operational context for investment. A supportive policy environment reduces uncertainty, enhances transparency, and encourages both domestic and foreign investment. Conversely, inconsistent or restrictive policies can

create friction, distort market signals, and reduce the attractiveness of real-estate assets (Rexha, et al., 2021). In this model, the policy environment functions as a *macro-level enabler* that shapes investor expectations, long-term planning horizons, and overall market stability.

Spatial productivity reflects the degree to which land and urban space generate economic, social, and environmental value. It includes:

- Efficient land-use allocation;
- High-quality physical and digital infrastructure;
- Accessibility to transportation, services, and economic centres;
- Proximity to employment hubs, commercial districts, and amenities;
- Urban density, clustering, and agglomeration economies.

Empirical research demonstrates that spatial productivity has a nonlinear relationship with property value: improvements in spatial efficiency increase valuation, but beyond a certain threshold, congestion, over-density, or infrastructure stress may lead to diminishing or even negative marginal returns (Li & Zhang, 2021; Tran & Pham, 2021). Within the model, spatial productivity acts as a *locational and structural determinant* that directly influences demand, liquidity, and long-term appreciation potential.

Investment efficiency captures the capacity of real-estate investments to generate stable, long-term, and risk-adjusted returns. This component integrates financial, operational, and sustainability metrics, including:

- Net operating income and return on investment;
- Volatility and market risk exposure;
- Environmental performance (energy efficiency, green certifications);
- Lifecycle sustainability of the property;
- Effective asset and facility management practices.

As emphasized in recent research, efficient investment aligns capital allocation with market demand, mitigates risk, and enhances value through sustainable and strategically located developments (Ibraimi et al., 2025; Ziberi, 2022). In the model, investment efficiency represents the *micro-level financial engine* that translates policy and spatial advantages into measurable value outcomes.

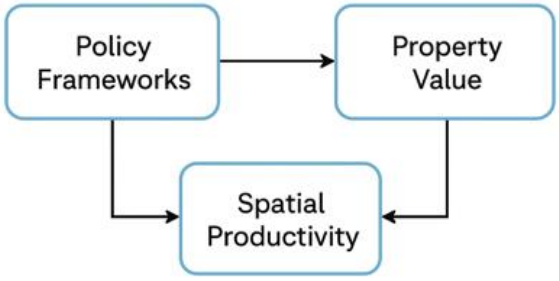
Figure 2 illustrates the synergistic relationships among these three dimensions. The model emphasizes that sustainable real estate valuation does not emerge from any single factor; rather, it is the *interaction* among policy clarity, spatial performance, and investment efficiency that ultimately drives property value. Improvements in one dimension can amplify or moderate the effects of the others. For example:

- Strong policy incentives may accelerate the impact of spatial productivity on property value;
- High investment efficiency can enhance the value of assets even in moderately productive areas, provided that policies support long-term asset performance;
- Conversely, weak governance or poorly designed spatial plans can suppress value even when individual investments perform well.

As depicted in Figure 3, the relationship between spatial productivity and property value follows a positive but nonlinear trajectory. At moderate levels, improvements in spatial organization, connectivity, and infrastructure significantly elevate property values. However, once spatial systems reach saturation-such as excessive density, traffic congestion, or infrastructure overload-the marginal benefits decline, leading to diminishing returns.

This nonlinear pattern aligns with urban economic theory, which shows that cities benefit from agglomeration up to an optimal point, after which diseconomies of scale emerge.

Figure 3: Relationship Between Spatial Productivity and Property Value



Source: Authors

This model bridges existing gaps in the literature by recognizing the interdependencies among regulatory, economic, and spatial factors. It allows for a more nuanced understanding of property markets and informs both investment strategy and policy-making.

Theoretical Propositions

Grounded in the multidimensional valuation framework integrating policy environments, spatial productivity, and investment efficiency, this study formulates three core theoretical propositions. These propositions synthesize insights from institutional economics, urban and regional development theory, and real-estate finance, offering a structured foundation for empirical validation. They articulate how external regulatory structures, locational attributes, and investment behaviour jointly shape long-term property value and contribute to market resilience.

Proposition 1 (P1): Policy quality exerts a positive effect on sustainable real estate valuation.

This proposition is rooted in the understanding that stable, transparent, and development-oriented policy frameworks function as foundational enablers of real-estate market performance. Regulatory clarity-such as predictable zoning laws, efficient permitting systems, fiscal incentives for green construction, and well-defined property rights-reduces transaction costs, minimizes uncertainty, and fosters investor confidence.

From an institutional economics perspective, favourable policies mitigate information asymmetries and institutional voids, which are particularly prevalent in developing or transitioning markets. As a result, investors perceive policy-stable environments as lower-risk ecosystems, thereby allocating more capital to such markets. Additionally, sustainability-oriented policies (e.g., energy-efficiency standards, green tax incentives) increasingly influence global investment flows, positioning supportive jurisdictions as more competitive and investment-attractive.

Thus, the first proposition asserts that better-designed policy environments not only elevate property values through reduced risk and enhanced predictability but also stimulate stronger domestic and international investment inflows.

Proposition 2 (P2): Spatial productivity positively affects real estate market performance and sustainable property values.

Spatial productivity-defined by land-use efficiency, accessibility, infrastructural quality, and the economic vitality of specific geographic zones-plays a central role in shaping real-

estate performance. Urban economic theory suggests that productive locations benefit from agglomeration effects, knowledge spillovers, connectivity advantages, and higher concentrations of economic activity. Empirical studies show that properties situated in areas with high spatial productivity typically experience:

- Higher and more stable rental demand;
- Faster property appreciation;
- Lower vacancy rates;
- Stronger liquidity and investor interest;
- Increased potential for mixed-use development and urban renewal.

This proposition reinforces the idea that place-based economic performance is a critical determinant of long-term property value. The value premium associated with productivity-rich locations reflects both the enhanced utility they offer to residents and businesses, as well as the structural resilience embedded in well-planned urban ecosystems.

Proposition 3 (P3): Investment efficiency mediates the positive relationship between policy quality and sustainable property values.

The third proposition introduces a mediating mechanism that links macro-level policy structures with micro-level investment performance. While a favourable policy environment establishes the conditions for sustainable market functioning, the realized value ultimately depends on how efficiently investors allocate resources within that environment.

Investment efficiency-capturing elements such as risk-adjusted returns, financial performance, sustainability metrics, and strategic positioning-acts as the conduit through which policy impacts translate into actual property valuation outcomes. This mediating role is supported by several theoretical mechanisms:

- Policy incentives (e.g., tax reductions, sustainability grants) enhance the profitability of efficient investments;
- Strong governance improves due diligence processes and reduces market failures, allowing efficient investments to perform optimally;
- Spatially productive areas amplify the returns of well-designed investments by providing high-demand environments and long-term growth prospects.

Consequently, even in policy-supportive environments, inefficient or poorly located investments may underperform. Conversely, investments that align strategic planning, sustainability criteria, and market demand tend to outperform, thereby reinforcing property value stability and long-term appreciation.

Thus, Proposition 3 conceptualizes investment efficiency as the key mechanism that transforms favourable policy signals into substantive economic benefits in the real-estate sector.

Together, these propositions form the analytical backbone for the study's empirical strategy. They guide the formulation of hypotheses to be tested through:

- Mixed-methods analyses, combining quantitative indicators with qualitative insights;
- Comparative case studies, examining how policy–productivity–investment interactions operate across different spatial contexts;
- Regression modelling, assessing the magnitude and direction of effects;
- Thematic analysis, exploring investor perceptions and policy impacts.

They also provide a coherent logic for examining real-estate sustainability, enabling a structured evaluation of how institutional, spatial, and financial dimensions converge to determine long-term asset value.

4. Research Methodology

This study adopts a mixed-methods research design, integrating both quantitative and qualitative approaches to achieve a comprehensive and multidimensional analysis of sustainable real estate valuation. The choice of a mixed-methods design is grounded in the complexity of the research problem, which encompasses institutional, spatial, and financial dimensions that cannot be fully captured through a single methodological lens.

Following Creswell & Plano Clark (2021), the mixed-methods design enhances the validity and depth of the findings by enabling the convergence, complementarity, and triangulation of data from multiple sources. The combination of methods allows the study to capture:

- Objective market indicators (prices, yields, infrastructure metrics, productivity indices);
- Subjective expert insights (investor perspectives, urban planners' assessments, regulatory interpretations);
- Contextual dynamics (policy influence, spatial patterns, risk-return considerations).

This integrative approach is particularly appropriate for real estate research, where market performance is shaped by both quantifiable economic factors and qualitative institutional and behavioural dynamics. A mixed-methods design enables a comprehensive assessment of the complex drivers of sustainable valuation, including policy frameworks, spatial characteristics, and investment performance, while capturing the interactions among these dimensions. Quantitative data provide robust empirical evidence of market behaviour, whereas qualitative evidence offers contextual and interpretive insights that help explain the underlying mechanisms of observed patterns. The integration of multiple data sources also strengthens the validity and reliability of the findings through methodological triangulation, reducing the risk of bias associated with single-method approaches. Furthermore, combining empirical analysis with expert perspectives facilitates the refinement and validation of the theoretical propositions developed in the conceptual framework, thereby enhancing the explanatory power and practical relevance of the study.

The study adopts a sequential explanatory mixed-methods design implemented in two complementary phases. The first phase consists of a quantitative analysis aimed at empirically assessing the determinants of sustainable real estate valuation using market-based indicators. The analysis incorporates property price trends, rental yields, occupancy rates, infrastructure accessibility indices, spatial productivity measures, and investment performance indicators. Statistical techniques, including correlation analysis and multiple regression models, are employed to examine the relationships between policy variables, spatial productivity, and valuation outcomes.

The second phase comprises a qualitative analysis designed to complement and interpret the quantitative findings. Semi-structured interviews are conducted with key stakeholders, including policymakers, investors, real estate developers, and urban planners, to explore perceptions of policy effectiveness, spatial planning challenges, and the determinants of investment decision-making. The interview data are analysed using thematic analysis, allowing the quantitative results to be interpreted within their broader institutional,

regulatory, and market contexts. This approach provides a deeper understanding of the mechanisms through which sustainable valuation is shaped in practice.

The findings from both phases are subsequently integrated through comparative interpretation, methodological triangulation, and iterative model refinement. Comparative interpretation examines the extent to which qualitative evidence explains, complements, or challenges the quantitative results, while triangulation enhances the robustness and credibility of the findings by combining multiple sources of evidence. Finally, empirical insights from both phases are used to validate and refine the proposed multidimensional valuation framework. This integrative methodological approach not only enables rigorous testing of the theoretical propositions but also provides a comprehensive understanding of the economic, institutional, and behavioural mechanisms underlying sustainable real estate valuation.

Qualitative Analysis

The qualitative component complements the quantitative analysis by providing contextual evidence on the institutional, behavioural, and market mechanisms underlying sustainable real estate valuation. While the quantitative phase identifies statistical relationships among investment efficiency, spatial productivity, policy interventions, and valuation outcomes, the qualitative analysis explores how these relationships are perceived and operationalized by market participants and public authorities.

Data are collected through semi-structured interviews with purposively selected stakeholders representing two principal groups: (i) industry professionals, including real estate investors, developers, asset managers, financial analysts, and valuation consultants; and (ii) public-sector representatives, including urban planners, municipal officials, land-use regulators, and policymakers responsible for taxation, infrastructure, and sustainable urban development. These participants are selected because of their direct involvement in investment decisions, property valuation, and spatial planning.

The interviews focus on four interrelated themes: (1) investment decision-making and risk assessment; (2) the influence of spatial characteristics, infrastructure, and accessibility on property values; (3) the effectiveness of planning regulations, fiscal incentives, and land-use policies; and (4) the integration of sustainability criteria into valuation and investment practices. Particular attention is given to identifying institutional barriers, information asymmetries, regulatory constraints, and market conditions that may affect investment efficiency and sustainable property valuation.

Interview data are analysed using thematic analysis. Audio recordings are transcribed verbatim and systematically coded to identify recurring concepts and emerging themes. The resulting thematic framework is subsequently compared with the quantitative findings through methodological triangulation. This integration enables the qualitative evidence to explain, refine, and contextualize the statistical results, thereby strengthening the interpretation of the empirical relationships and validating the proposed multidimensional framework for sustainable real estate valuation. By combining quantitative market evidence with stakeholder perspectives, the study provides a more comprehensive understanding of how investment efficiency, spatial productivity, and public policy jointly influence sustainable real estate valuation and investment decisions.

Quantitative Analysis

The quantitative component empirically examines the effects of policy quality, spatial productivity, and investment efficiency on sustainable real estate valuation. The analysis is based on a cross-sectional dataset comprising 1,500 property observations collected between 2020 and 2025 from national cadastral agencies, municipal real estate registries, and publicly available market reports. Combining administrative and market data provides a comprehensive basis for evaluating the structural and market determinants of property values.

The dataset includes four groups of variables. The dependent variable is *Property Value,* measured as the market price per square metre (€/m²). The principal explanatory variables are the *Policy Index*, a composite indicator reflecting regulatory quality, transparency, and investor-friendliness; the *Spatial Productivity Index*, derived from GIS-based measures of accessibility, infrastructure availability, land-use intensity, and proximity to public services; and *Investment ROI (%),* representing investment efficiency through the relationship between financial returns and investment risk. To improve model specification and reduce omitted-variable bias, the regression also incorporates several control variables, including property size, building age, distance from the city centre, and property type.

Descriptive statistics for the main variables are presented in Table 2, providing an overview of their distributions and variability across the sample. To test the proposed theoretical relationships, the study estimates the following multiple linear regression model:

$$PropertyValue_i = \beta_0 + \beta_1(PolicyIndex_i) + \beta_2(SpatialProductivity_i) + \beta_3(InvestmentROI_i) + \varepsilon_i$$

where: PropertyValue_i denotes the market value of property *i*, PolicyIndex_i measures institutional quality, SpatialProductivity_i captures locational efficiency, InvestmentROI_i represents investment performance, and ε_i - stochastic error term.

Table 2: Descriptive Statistics of Key Variables

Variable	*Mean*	*SD*	*Min*	*Max*	*N*
Property Value (€/m²)	2,150	450	1,200	3,800	1,500
Policy Index	3.8	1.1	1	5	1,500
Spatial Productivity Index	72.4	12.5	40	95	1,500
Investment ROI (%)	6.8	2.3	2.5	12.1	1,500

Note: SD = Standard Deviation; N = Number of observations.
Source: Author's analysis.

Prior to estimation, the dataset is examined using descriptive statistics and diagnostic procedures to verify the assumptions of linear regression. Multicollinearity is assessed through the Variance Inflation Factor (VIF), while residual diagnostics are used to evaluate model adequacy. The estimated VIF values remain below the commonly accepted threshold of 2.5, indicating no evidence of harmful multicollinearity among the explanatory variables.

The regression results are reported in Table 3, where the estimated coefficients, standard errors, t-statistics, and significance levels are presented. The empirical findings are subsequently interpreted in relation to the proposed conceptual framework and the theoretical propositions developed in Section 3.

Table 3: Regression Results: Impact on Property Value

Predictor	*Coefficient (β)*	*SE*	*t*	*p-value*
Policy Index	0.042	0.011	3.82	<0.001
Spatial Productivity Index	0.065	0.014	4.64	<0.001
Investment ROI	0.038	0.010	3.80	<0.001
Constant	1,050	120	8.75	<0.001

Note: Dependent Variable = Property Value (€/m²). SE = Standard Error.
Source: Author's analysis.

The regression results indicate that the three principal explanatory variables—policy quality, spatial productivity, and investment efficiency—are all positively and statistically significantly associated with property values ($p < 0.001$), providing empirical support for the theoretical framework proposed in Section 3. The estimated coefficients suggest that sustainable real estate valuation is influenced by a combination of institutional, spatial, and financial factors rather than by any single determinant.

Among the explanatory variables, the Spatial Productivity Index exhibits the largest standardized effect ($\beta = 0.065$), indicating that accessibility, infrastructure quality, land-use efficiency, and proximity to public services are the strongest drivers of property values. This finding highlights the importance of productive urban environments in enhancing real estate market performance and supports the view that well-connected locations command a valuation premium due to improved economic opportunities and reduced transaction costs.

The Policy Index also demonstrates a positive and statistically significant effect on property values ($\beta = 0.042$). Municipalities characterized by transparent regulatory frameworks, efficient administrative procedures, and supportive fiscal policies tend to exhibit higher property values, confirming the role of institutional quality in reducing investment uncertainty and strengthening market confidence.

Investment efficiency, measured through investment return on investment (ROI), is likewise positively associated with property values ($\beta = 0.038$). This result suggests that properties capable of generating higher risk-adjusted returns are more highly valued by investors, reinforcing the importance of financial performance in sustainable real estate investment decisions. Although its estimated effect is smaller than that of spatial productivity and institutional quality, investment efficiency remains a significant determinant of market valuation.

Overall, the findings indicate that sustainable property valuation is driven by the interaction of favourable institutional conditions, productive spatial environments, and efficient investment performance. These results provide empirical evidence that integrating policy quality, spatial productivity, and investment efficiency into valuation models improves the understanding of real estate market dynamics and supports more informed investment and urban planning decisions.

Case Study Analysis

To complement the quantitative and qualitative analyses, the study incorporates comparative case studies that illustrate how policy quality, spatial productivity, and investment efficiency interact in different real estate market contexts. The case study approach provides contextual evidence that supports the interpretation of the econometric results and demonstrates the practical applicability of the proposed multidimensional valuation framework.

Cases were selected through purposive theoretical sampling to capture contrasting institutional and spatial environments. The analysis distinguishes between developed and developing real estate markets, allowing the examination of how differences in regulatory quality, infrastructure provision, and market maturity influence sustainable property valuation. Developed markets, represented by countries such as Germany and the Netherlands, illustrate the effects of mature regulatory systems, integrated spatial planning, and stable investment environments on long-term property performance. In contrast, emerging markets in Southeast Europe provide evidence of how ongoing institutional reforms, infrastructure investments, and urban development initiatives influence investment opportunities and valuation dynamics under conditions of greater market uncertainty.

A complementary case focuses on the residential real estate market in Prishtina, Kosovo, where recent investments in transport infrastructure, public services, and energy-efficient construction have significantly influenced property values. The case demonstrates how accessibility, infrastructure quality, and supportive planning policies contribute to higher market liquidity, stronger rental performance, and valuation premiums in rapidly developing urban areas. It therefore provides an applied illustration of the interaction between spatial productivity and investment efficiency identified in the quantitative analysis.

The study also examines selected green-certified developments, including projects certified under internationally recognised sustainability standards such as LEED, BREEAM, and EDGE. These developments illustrate how environmental performance, energy efficiency, and sustainable urban design contribute to enhanced investment performance, increased market attractiveness, and higher long-term property values. Their inclusion enables the assessment of how sustainability-oriented investments complement institutional quality and spatial productivity in shaping real estate market outcomes.

The evidence derived from the case studies is integrated with the quantitative and qualitative findings through methodological triangulation. Comparative analysis across cases enables the validation of the proposed conceptual framework, identifies best practices applicable to emerging markets, and highlights the contextual factors that moderate the relationships between public policy, spatial productivity, investment efficiency, and sustainable real estate valuation. This integrated approach strengthens the explanatory power of the study while enhancing the practical relevance of its conclusions for policymakers, investors, and urban planners.

5.Results and Discussion

This section presents the empirical findings of the quantitative analysis and integrates them with evidence obtained from the qualitative interviews and comparative case studies. The discussion focuses on the practical implications of the proposed multidimensional valuation framework by examining how policy quality, spatial productivity, and investment efficiency jointly shape sustainable real estate valuation.

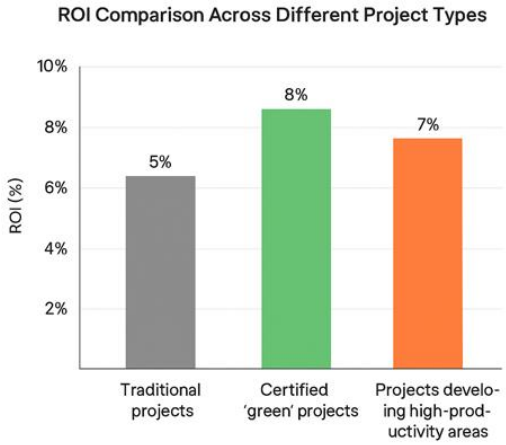
The empirical analysis suggests that regulatory quality is positively associated with property values. The estimated regression results show that improvements in the Policy Index are accompanied by higher market valuations, suggesting that transparent regulatory frameworks, fiscal incentives for sustainable development, and effective urban planning contribute to stronger market confidence and increased investment attractiveness.

These findings are further supported by the interview evidence, where investors and urban planners consistently identified regulatory stability and sustainability-oriented incentives as key determinants of investment decisions.

The results are consistent with previous studies highlighting the role of institutional quality and regulatory support in enhancing market performance and reducing investment uncertainty (Goh & Lee, 2020; Zhang et al., 2022b). They further demonstrate that policy interventions are most effective when implemented alongside broader urban development strategies and sustainability objectives.

To illustrate differences in investment performance across development typologies, Figure 4 compares the average return on investment (ROI) for conventional developments, green-certified projects, and developments located in highly productive urban areas.

Figure 4: ROI Comparison Across Different Project Types



Source: Adapted from Chen, et al. (2023)

Spatial productivity emerges as the strongest determinant of property values in the estimated model. Properties located in areas characterised by high accessibility, well-developed infrastructure, and proximity to essential public services consistently exhibit higher market values, stronger rental performance, and greater transaction liquidity than comparable properties in less productive locations.

These quantitative findings are supported by the qualitative interviews, which emphasise that transport accessibility, infrastructure quality, and integrated urban planning significantly influence both investment attractiveness and long-term market resilience. The results therefore reinforce the predictions of location theory and hedonic pricing models by demonstrating that spatial characteristics constitute a fundamental driver of sustainable property valuation (Li & Zhang, 2021; Tran & Pham, 2021).

Investment efficiency also demonstrates a significant positive relationship with property values. Projects combining favourable policy environments with productive spatial locations generate superior risk-adjusted returns and exhibit greater stability over time. In particular, green-certified developments consistently outperform conventional projects owing to lower operating costs, stronger market demand, and improved long-term investment resilience.

From an applied valuation perspective, these findings suggest that property appraisal should extend beyond traditional market comparables by incorporating indicators of regulatory quality, spatial productivity, and sustainability performance. Consequently, the proposed multidimensional framework provides a practical decision-support tool for valuers, institutional investors, developers, and policymakers seeking to integrate environmental, institutional, and spatial considerations into real estate investment decisions.

The findings are broadly consistent with previous studies demonstrating the positive effects of regulatory quality on real estate market performance (Goh & Lee, 2020; Zhang et al., 2022b), the importance of spatial productivity in explaining property value differentials (Li & Zhang, 2021; Tran & Pham, 2021), and the superior long-term performance of sustainable real estate investments (Chen et al., 2023). However, unlike earlier studies, the present research integrates these dimensions within a single analytical framework, illustrating their complementary rather than independent contributions to sustainable property valuation.

The proposed framework has several practical implications. First, policymakers should align regulatory incentives with spatial planning strategies to maximise long-term property values and sustainable urban development. Second, investors should incorporate spatial productivity and institutional quality into portfolio allocation and risk assessment decisions. Finally, urban planners and valuation professionals can employ the framework to support evidence-based appraisal practices that account for sustainability, infrastructure quality, and long-term investment performance.

6. Policy Implications and Recommendations

The findings of this study provide several practical implications for policymakers, investors, valuation professionals, and urban planners. First, regulatory policies should be closely aligned with spatial planning strategies to maximise investment efficiency and support sustainable property value creation. Fiscal incentives, transparent planning procedures, and streamlined permitting systems can strengthen market confidence while encouraging environmentally sustainable developments. Second, investors should incorporate spatial productivity indicators, including accessibility, infrastructure quality, and urban connectivity, into investment appraisal and portfolio allocation decisions. Integrating these factors with ESG considerations and long-term financial performance enables more robust risk-adjusted investment strategies. Third, valuation professionals should complement conventional appraisal methods with multidimensional indicators reflecting institutional quality, spatial productivity, and sustainability performance. Such an approach can improve valuation accuracy and better capture long-term market potential.

Finally, policymakers should promote digital transformation through open-data platforms, standardized ESG reporting, digital permitting systems, and transparent AI-assisted valuation practices. These measures would enhance market transparency, reduce information asymmetries, and facilitate sustainable urban development while improving investment attractiveness in high-productivity areas.

Conclusion

This study developed and validated a multidimensional framework for sustainable real estate valuation by integrating regulatory quality, spatial productivity, and investment efficiency within a mixed-methods research design. The findings demonstrate that property values are jointly influenced by institutional, spatial, and financial factors, highlighting the limitations of conventional valuation approaches based solely on market transactions or financial indicators.

Among the three dimensions, spatial productivity emerged as the strongest determinant of property value, while supportive regulatory frameworks and investment efficiency further enhance market performance and long-term resilience. The integration of quantitative evidence, stakeholder perspectives, and comparative case studies confirms that sustainable valuation requires a holistic assessment of market, institutional, and locational characteristics.

The proposed framework contributes to the literature by combining economic, spatial, and policy dimensions within a unified analytical model and offers a practical decision-support tool for valuers, investors, urban planners, and policymakers seeking to promote sustainable real estate development.

The proposed multidimensional framework provides a foundation for further research on sustainable real estate valuation across different institutional and market contexts. Future studies should extend the geographical scope of the analysis by examining rural areas, small and medium-sized cities, and developing economies where governance quality, spatial dynamics, and investment behaviour may differ substantially from those observed in this study. Comparative cross-country analyses would also enable the assessment of how institutional quality, spatial planning systems, and regulatory environments influence valuation mechanisms and would facilitate the development of internationally comparable benchmarks for sustainable real estate appraisal.

From a methodological perspective, future research should adopt longitudinal designs to examine the long-term effects of regulatory reforms, infrastructure investments, and changing market conditions on property values. Combining panel data with advanced analytical techniques, including GIS-based spatial modelling, machine learning algorithms, and big data analytics, would improve predictive accuracy and provide deeper insights into the dynamic interactions among policy quality, spatial productivity, and investment efficiency. Such approaches could also capture nonlinear relationships and support more robust evidence-based decision-making.

Finally, the proposed framework could be expanded by incorporating additional environmental, social, and governance (ESG) indicators, together with behavioural dimensions of investment decision-making. Integrating measures of environmental performance, social inclusion, institutional transparency, and investor behaviour would contribute to the development of more comprehensive valuation models aligned with international sustainability objectives. Further research should also explore sector-specific applications of the framework across residential, commercial, industrial, tourism, and green-certified developments in order to identify context-specific valuation drivers and enhance the practical applicability of sustainable real estate appraisal.

CRediT Authorship Contribution Statement

Fjolla Trakaniqi: Conceptualization, Methodology, Investigation, Formal analysis, Data curation, Visualization, Writing – original draft. Shqiponja Nallbani-Berisha: Conceptualization, Validation, Supervision, Interpretation of results, Writing – review & editing, Project administration. Both authors contributed to the development of the theoretical framework, approved the final version of the manuscript, and agree to be accountable for all aspects of the work.

Conflict of Interest Statement

The authors declare that they have no known financial or personal relationships that could have influenced the work reported in this paper.

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The study is based exclusively on publicly available secondary data obtained from national cadastral agencies, municipal real estate registries, and publicly available market reports.

Ethical Approval Statement:

This study relied exclusively on publicly available secondary data and did not involve human participants, personal data, surveys, interviews, or experimental procedures. Consequently, ethical approval and informed consent were not required.

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