

Defining and Measuring Housing Location in Appraisal and Hedonic Price Models: A Systematic Review

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Abstract

Location is a complex, multidimensional aspect often highly preferential and dependent on personal preference. In general discussions, this may not pose a significant problem. However, in quantitative analyses such as housing appraisals (sales comparison approach) or applied research using the hedonic price model, the nature and characteristics of location can become a major issue. Even though location is often included in housing studies, there is no clear and straightforward way to measure it as a single variable. This challenge is exacerbated in Indonesia due to the lack of a valid and reliable property database. Therefore, this study conducts a systematic review that contributes to the understanding of how location can be measured objectively. The present study aims to propose an alternative method for defining and measuring the strategic location of housing in appraisal practice, particularly through the sales comparison approach. Based on the review, location is measured using two aspects: spatial aspects and circumstantial aspects. Generally, spatial aspects are much more dominant than circumstantial aspects. The identified location dimensions include distance to the Central Business District (CBD), transportation facilities, commercial/shopping centers, employment centers, health facilities, educational facilities, recreational areas, as well as the conditions and accessibility to these amenities. The results of this study provide practical implications for improving the accuracy of property appraisal practices and offer a useful reference for future research, particularly in data-limited contexts such as Indonesia.

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Introduction

Location is widely recognized as a primary determinant of property value in real estate markets. The well-known adage "location, location, location" underscores its importance in influencing both housing prices and buyer preferences (Dai et al., 2026; Yu et al., 2023; Zhou et al., 2025; Zali et al.,

2025). A better location can significantly increase the desirability and value of a property, often outweighing other considerations such as the property's physical attributes. Prior research has indicated that the location factor is regarded as the most crucial element in housing decisions (Dilek et al., 2018). Research by Li & Ye (2025) characterizes housing selection as a complex interplay between objective constraints (costs, career opportunities) and subjective valuations (residential satisfaction). Using structural equation modeling, they find that while economic factors directly drive location choices, neighborhood satisfaction mediates these decisions. The study highlights the difficulty of measuring these subjective preferences, which vary widely across different household types and life stages.

The location of housing can be defined through various key factors, some of which contribute to the importance of location in real estate/housing. Firstly, proximity to amenities such as schools, shopping centers, hospitals, parks, and public transportation can significantly impact the value of a property. Properties located near these amenities are often more desirable to potential buyers or renters, leading to higher demand and potentially higher prices. Secondly, the neighborhood and overall environment in which a property is situated play a vital role in its value. In the context of economics, the neighborhood and environment can be considered externalities. Factors, including safety, cleanliness, and the overall aesthetic appeal of the neighborhood, significantly influence the desirability of a property. Properties located in well-maintained, safe, and attractive neighborhoods are generally in greater demand and command higher prices. Moreover, location has been identified as a statistically significant factor affecting housing prices, although it may not hold as much importance as housing attributes or neighborhood characteristics (Aliyev et al., 2019).

In housing appraisal practices, location is typically measured using accessibility indicators such as Euclidean distance, travel time, or network distance. However, these measures often fail to capture the full complexity of location, leading to potential biases in empirical studies, notably when using hedonic price models (HPMs) for real estate valuation. The heterogeneity in accessibility specifications, including spatial separation, cumulative opportunities, and gravitational potential, further complicates the assessment of location's impact on housing prices. Research by Liu et al. signifies that high-speed rail accessibility has a significant effect on urban housing prices, yet the extent of this impact can vary based on the specific accessibility measure employed (Liu et al., 2021). Correspondingly, previous studies have demonstrated that factors such as proximity to schools can lead to spatial heterogeneity in housing prices, with some studies indicating that distance to the nearest school is a predominant factor affecting prices (Xu & Zhang, 2021).

This variability in findings illustrates the inconsistencies that arise from different accessibility measures, which can result in significant issues in model estimation and ultimately affect the reliability of conclusions drawn about the impact of location on housing prices. Such inconsistencies can undermine both the reliability and validity of the findings. Research has demonstrated that location is a multifaceted construct encompassing various elements such as proximity to amenities, neighborhood characteristics, and socio-economic factors (Aliyev et al., 2019). Consequently, a thorough understanding of location requires a comprehensive measurement approach that integrates multiple accessibility specifications. These elements play a crucial role in shaping housing preferences and choices, which in turn affect housing prices. The lack of standardization in defining and measuring location has been identified as a key limitation in the existing literature. Therefore, a more nuanced approach to measuring location in housing appraisal and hedonic price models is necessary to capture its true impact on property value.

The exploration of location's influence on housing prices has revealed significant gaps in existing research, particularly regarding the standardized measurement of accessibility and its relationship with various socio-economic factors. Many studies have acknowledged that location encompasses a multitude of characteristics instrumental in determining housing values. For instance, the intricacies of residential satisfaction stem from multiple dimensions of the built environment and social factors.

Research demonstrates that walkability, distance to public parks, outdoor shelters, public transportation access, and mixture of vegetation are critical physical environmental variables, while social satisfaction factors significantly influence overall quality of life and housing valuations (Leng & Han, 2022). Additionally, research emphasizes that comprehensive evaluation of location requires simultaneous consideration of both subjective/functional and objective/technical dimensions, demonstrating that a singular focus on either dimension overlooks significant aspects that contribute to housing desirability and neighborhood quality (Liu et al., 2023). While housing studies consistently recognize location as a critical determinant of property values, there remains no standard, straightforward metric that captures its multidimensional character in a single variable. This lack of a unified approach complicates not only the comparison of findings across different studies but also the clarity with which the inherent nuances of locational influences are understood. Addressing this gap is essential for advancing more precise and generalizable appraisal and hedonic pricing models. By fostering a nuanced understanding of locality through enhanced measurement strategies, the study aims to contribute significantly to filling the prevalent gaps in current housing market research, thereby paving the way for more informed decision-making processes within the field.

The disparities arising from diverse accessibility measures underscore the need for an objective, comprehensive evaluation of location, especially given its multifaceted nature and its substantial impact on housing price estimates. Research indicates that location comprises a range of elements—from proximity to key amenities to nuanced neighborhood characteristics—that are often measured independently, leading to reliability issues in model estimation. Consequently, a standardized measurement approach is vital to overcome these limitations and accurately capture the true contribution of location in both hedonic price models and appraisal practices. To address this challenge, this study employs a systematic review method. This approach is selected as it enables a meticulous and replicable synthesis of the existing literature, ensuring that various accessibility specifications are integrated into a unified measurement framework. By systematically assessing previous research, the study identifies best practices and gaps in current methodologies, ultimately proposing a single, comprehensive variable for location. This robust review not only enhances academic rigor but also provides practical guidelines for appraisers and policymakers, particularly in regions like Indonesia where reliable property databases are limited.

Based on the discussion above, location is a complex multidimensional construct. It can be defined broadly and encompasses a wide spectrum of factors. To some extent, location is a highly preferential variable and depends on individual tastes and interests. In the context of general discussions, this may not be a significant problem. Research by Bishop et al. (2020) identified that inadequate or overly simplistic measures of location can lead to significant biases when estimating individuals' willingness to pay for environmental quality and other locational attributes. Their findings underscore the need for standardized methods that accurately capture the heterogeneity of locational effects in property markets. However, in quantitative analyses such as housing appraisals (sales comparison approach) or applied research using the hedonic price model, the nature and characteristics of location can become a significant problem. Despite being the most important aspect of real estate/housing, location is still very difficult to define measurably in appraisal practice or applied research.

This issue is exacerbated in Indonesia due to the lack of a valid and reliable property database. Therefore, this study conducts a systematic review of how location can be measured objectively. This is crucial because, so far, the location aspect has not been fully included in the analysis, either in the context of appraisal or applied research. By doing so, this study seeks to improve the accuracy and reliability of housing price estimates, which is crucial for both academic research and practical applications in real estate appraisal. The contribution of this study lies in filling a critical gap in housing appraisal research by conducting a systematic review of the methods used to measure

location objectively. Recognizing that location is a complex, multidimensional, and often preferential variable one that can lead to significant biases in property valuation the study challenges existing simplistic measures that fail to capture the full heterogeneity of locational effects. Moreover, it addresses a pressing issue in contexts like Indonesia, where the absence of a valid and reliable property database further complicates accurate housing price estimation. By proposing a robust, standardized framework to quantify location, this research not only advances theoretical understanding but also offers practical guidance for improving the precision and reliability of real estate appraisal models.

Literature Review

Housing location is a crucial aspect of housing research, influencing various factors such as accessibility, amenities, and community characteristics. The most influential factors in residential location choices include household income, proximity to employment, accessibility to schools, quality of neighborhood characteristics, and distance to friends and family, with variations depending on demographic groups (Gomaa, 2022; Saini & Pandit, 2023). Residents prioritize location for better amenity access, showing a clear willingness to pay more for proximity to waterfronts and green spaces (An et al., 2023). The research also examines how space and location influence housing values through market price dynamics (Batista et al., 2023; Lisi & Iacobini, 2020).

Discrete choice models, particularly multinomial logit specifications, have become standard analytical approaches for examining housing location decisions in developed countries, enabling researchers to understand how households select residential locations among numerous alternatives (Mirzahosseini et al., 2023). These models provide a framework for understanding the trade-offs individuals make when selecting a residential location based on various attributes. Location is a critical decision variable in housing choice, with research demonstrating that geographic factors including parcel characteristics, land use patterns, transportation accessibility, neighborhood quality, and accessibility to services significantly influence where households choose to reside (Orvin et al., 2024). The importance of location also emphasizes from research which the results indicate that the geostatistical model performs better because it considers, in addition to certain inherent characteristics of each house, the effect of its spatial location on the selling price (Armijos-Toro, 2022).

Research reveals a complex, nonlinear relationship between transportation infrastructure and urban housing values. While accessibility to transit nodes (like train stations) increases property value by reducing commute times, immediate proximity often decreases value due to noise, pollution, and congestion. The net impact depends on the balance between these accessibility benefits and environmental disamenities, varying by neighborhood context (Lieske et al., 2021). Additionally, studies have examined housing preferences across different demographic groups, such as seniors, highlighting the importance of understanding the unique needs and preferences of specific populations (Jancz & Trojanek, 2020). The research reveals that employing artificial neural networks and fuzzy logic methods in real estate appraisal offers significant practical advantages in terms of time, cost efficiency, and the ability to create large databases for regional real estate analysis (Tabar et al., 2023). This is particularly relevant for housing location research, as it demonstrates how computational methods can handle complex locational variables and their relationships to property values across different neighborhoods in each area.

Furthermore, the literature has extensively addressed the relationship between housing quality and health outcomes, particularly among vulnerable populations. Research on elderly individuals in challenging environmental contexts demonstrates that housing and environmental planning significantly affect health, residential satisfaction, and overall quality of life. Studies identify key housing related factors including accessible design features, outdoor environment quality, walkability in difficult conditions, shelter from environmental hazards, and proximity to health

facilities—as critical determinants of health outcomes and well-being in vulnerable populations (Leng & Han, 2022). Housing quality and adequacy have been linked to various health and well-being outcomes, with a critical emphasis on ensuring safe and healthy living conditions. Research identifies comfortable and healthy indoor environments as essential critical success factors in housing, alongside improvements in dwelling design and access to community facilities, underscoring the need for comprehensive policies and regulations that prioritize occupant health and well-being (Moghayedi et al., 2021).

Additionally, research has explored the role of housing in promoting resilience in communities, highlighting the importance of adequate housing in enhancing overall well-being and sustainability (Equere et al., 2021). To accurately measure housing location in hedonic price models, it is essential to incorporate locational, structural, and amenity characteristics. Location significantly impacts house prices through proximity to key amenities including schools, transportation infrastructure, and neighborhood quality, which are critical determinants of residential property values (Ozsoy, 2025). Hedonic price models combined with spatial econometric techniques, particularly spatial error models and geographically weighted regression, are widely used to analyze how transportation infrastructure and neighborhood characteristics affect residential property values. These approaches account for spatial dependence and heterogeneity that can significantly influence estimated effects on housing prices (Lieske et al., 2021; Liu et al., 2022).

In hedonic price modeling, housing is understood as a composite commodity with distinct attribute bundles that vary between properties. Traditional hedonic approaches using regression analysis estimate how different housing characteristics including property size, materials, location, and amenities bundle together to determine overall property values. Contemporary applications demonstrate that advanced machine learning approaches which building on traditional hedonic frameworks effectively capture the composite nature of housing by simultaneously incorporating multiple characteristic categories and complex nonlinear relationships. Housing value emerges from a composite bundle of distinct attributes including structural features (size, bedrooms, materials), location characteristics (proximity to amenities, accessibility), and property amenities (parking, appliances, climate control). Traditional hedonic models operate on the assumption of linear attribute relationships, yet empirical evidence demonstrates that the actual relationship between bundled housing attributes and market prices is frequently nonlinear, with diminishing marginal returns and threshold effects.

Machine learning algorithms including random forests, neural networks, and decision trees have proven particularly effective at capturing these nonlinearities and complex attribute interactions. This advancement in modeling methodology strengthens the foundation for systematic mass appraisal and valuation across heterogeneous property markets, enabling more accurate prediction of housing prices when bundled attributes interact in complex ways (Daga et al., 2024). Property size is the predominant factor influencing home costs, while amenities significantly influence property value; homes equipped with security systems command approximately 7.8% higher prices, while those with parking spaces sell for roughly 5.9% more (Ozsoy et al., 2022). It is crucial to control for location and spatial market structures to accurately explain price differentials and derive precise coefficient estimates in hedonic residential price models. Moreover, the hedonic pricing model not only considers the house's characteristics but also its location and surrounding facilities as key influencers of house prices (Nguyen, 2020; Siahaan, 2022). By segmenting the housing market based on property types and locations, separate hedonic price models can be estimated for each submarket, enabling a more detailed analysis of housing values (Yazdani, 2021; Ludick et al., 2021).

Accurately measuring housing location requires systematic assessment of distance-based factors that influence residential location choices and property values. Essential considerations include proximity to downtown/employment centers, accessibility to public transportation networks, and neighborhood-level characteristics affecting housing desirability. Research on residential location

decisions reveals that accessibility characteristics including distance to transit stations, workplace proximity, and neighborhood quality significantly influence where households choose to reside and what they pay for housing. These proximity measures, when carefully incorporated into appraisal models, provide more accurate assessment of how specific locational factors determine property values (Orvin et al., 2024). It is crucial to incorporate these locational variables into appraisal models to ensure a precise assessment of housing prices.

In addition, incorporating spatial autocorrelation in house sale price prediction models can help capture the effects of absolute geographic location on house sale prices (Hu et al., 2022). This method aids in understanding how the spatial relationships between properties influence their values, leading to a more comprehensive evaluation of housing location in the sales comparison process. Moreover, Hedonic price modelling has become the standard methodological approach for estimating housing prices across different districts and neighborhoods while accounting for locational factors. Recent research demonstrates that hedonic models can be substantially improved by incorporating urban design characteristics, examining spatial dependence and spatial heterogeneity, and carefully assessing geographic scale effects. Results show that street connectivity, density patterns, and proximity to transportation infrastructure significantly influence property values across neighborhoods, with spatial error models reducing the extent to which spatial autocorrelation overstates the effect of locational factors on prices. (Lieske et al., 2021)

Previous research on housing location and valuation exhibits several methodological and data-related limitations. Many studies rely heavily on stated preference data and aggregate measures that fail to capture the dynamic, three-dimensional nature of housing. Conventional hedonic models simplify complex features into basic quantitative variables and often depend on data from developed urban contexts, limiting their generalizability to rapidly evolving or less-studied markets. Additionally, the frequent use of cross-sectional data neglects temporal dynamics and spatial autocorrelation, while traditional linear regression models struggle with the inherent spatial heterogeneity of urban housing. Emerging techniques that integrate neural networks with spatial regression, as well as advanced technologies like building information modeling (BIM), remain underutilized. Furthermore, existing frameworks typically overlook the integration of health outcomes and community resilience factors, thereby restricting the scope of policy recommendations.

Method

This study employs a systematic review approach to examine how location is measured in housing appraisal and hedonic price models. The methodology follows the systematic review framework of Heyman et al. (2019), which comprises three primary stages: searching, screening, and reviewing. The process begins with searching two databases for publications from 2000 to 2023, followed by screening and filtering before the final review. Initially, 105 articles were identified, but the final number included in the review was narrowed down to 45. The goal is to identify, evaluate, and synthesize existing studies that have utilized accessibility measures within hedonic price models and to highlight the variations and limitations in the methodologies used (see Figure 1).

The review process is structured into three main stages: (1) searching, (2) screening and filtering, and (3) reviewing. In the searching stage, a comprehensive search for articles was conducted using the Web of Science, Scopus, and Sinta databases, known for their extensive coverage of peer-reviewed academic literature. To ensure that the study captures the latest advancements and contemporary research on location measurement in housing studies, the search was limited to articles published between 2000 and 2023. Additionally, to ensure the inclusion of region-specific methodologies and findings, the search was expanded to local and regional journals, provided they met the quality standards set for peer-reviewed publications. The keywords used in the search strategy included the following: "measuring location", "hedonic price models", "sales comparison

approach", "accessibility", and other related terms. These keywords were chosen to specifically identify studies that utilized accessibility measures within the context of hedonic price models and real estate valuation. This search strategy allowed for identifying a broad sample of literature that encompasses various theoretical frameworks and empirical findings related to location measurement.

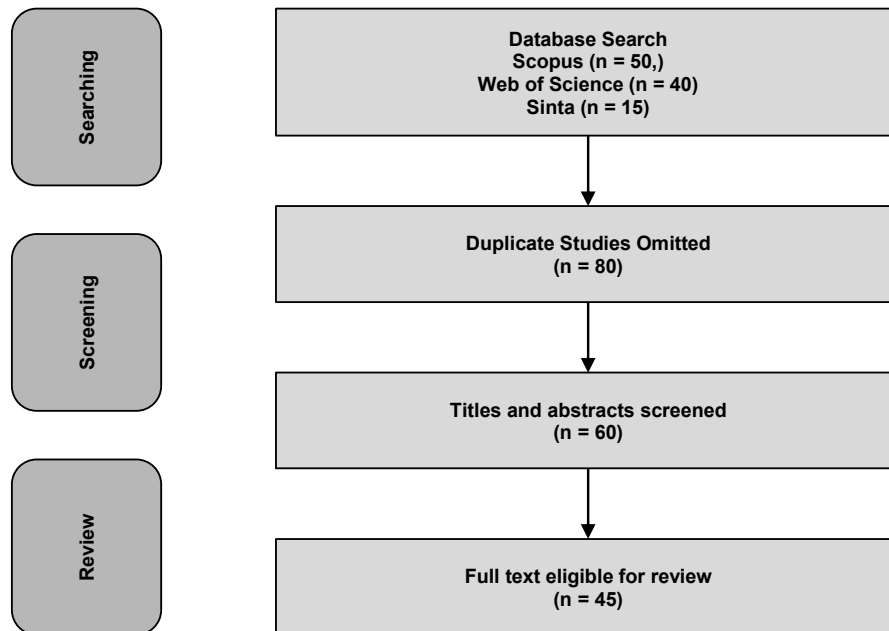


Fig. 1. The process of Systematic Review
Source: Processed data, 2024.

In the screening and filtering stage, the initial search results were screened for relevance based on titles and abstracts. Exclusion criteria were applied to remove studies that did not focus on residential housing or did not use hedonic price models as the primary methodology. Further filtering was conducted to exclude articles that examined non-residential properties, inter-metropolitan comparisons, meta-studies, or submarket analyses, as these studies typically employ different accessibility measures and frameworks. Articles that did not include sufficient methodological details regarding accessibility measures were also excluded. This filtering process resulted in a final sample of studies that focused on the use of accessibility measures in residential housing appraisal.

In the reviewing stage, the final set of articles was reviewed in detail to extract information on the accessibility measures used, including their type, impedance, and the opportunities they represent. The classification of accessibility measures followed the framework used by Heyman et al. (2019), distinguishing between spatial separation, cumulative opportunities, and gravitational potential models. The analysis also noted the use of specific impedances such as Euclidean distance, network distance, and travel time, as well as the integration of socio-economic opportunities. In addition, the review evaluated how these measures were operationalized in relation to consumer perception and housing value, and whether they adhered to the fundamental theories of hedonic pricing, which emphasize the urgency of perceived accessibility in property valuation.

The findings of this review will be used to identify gaps in current methodologies and propose a comprehensive framework for location measurement that aligns with the theoretical underpinnings of hedonic price models and improves the robustness of housing appraisals. Moreover, the study

intends to offer practical guidelines for integrating more sophisticated accessibility measures, such as network-based and perceived accessibility, into housing valuation models. This aims to contribute to more accurate and reliable assessments of the impact of location on housing prices, which is pivotal for real estate professionals, policymakers, and researchers.

Result and Discussion

Based on the systematic review, location is indeed a very complex and multidimensional variable. In the context of academic research, location is measured through various aspects that contribute to its complexity. This complexity poses challenges for appraisal practice, as it can be difficult to apply in practical settings. This study lists all aspects that affect the quality of location in the context of housing. The more frequently an aspect appears, the more important it is considered and the more it becomes a strategic consideration in location assessment.

Table 1. Frequency of Location Measurements

Measurements	Frequency
Distance to Transportation Facilities	18
Distance to Central Business District	16
Distance to Commercial/Shopping Center	9
Distance to Entertainment/Recreational Place	8
Distance to Health Facilities	7
Distance to Education Facilities	6
Distance to Employment Center	6
Security factors and environmental conditions	1
Physical barriers/ease of access	1
Disturbance/noise factors	1

Table 1 presents a summary of the different metrics serving to quantify the "location" aspect in housing research and how frequently each metric appears across reviewed studies. The table is divided into two columns: (1) Measurements: This column lists the various location-related factors employed in housing appraisal and hedonic pricing studies. Each item represents a specific measurable aspect of location. (2) Frequency: This column indicates the number of studies or data points in which each measurement was employed. In summary, Table 1 illustrates which aspects of location are prioritized in existing literature and highlights the diversity of approaches used to measure location. It sets the stage for a discussion on whether current measurement practices adequately capture the complex, multidimensional nature of location in housing appraisal and hedonic price models. In general, the measurement can be divided into two categories: spatial dimensions and circumstantial dimensions.

Based on frequency, the spatial dimension tends to be more dominant because it shows the availability and accessibility to supporting housing facilities. The circumstances dimension tends to be rarely discussed because it is specific and not too general. Two frequently used location measures are distance to transportation facilities and distance to the Central Business District (CBD). The distance to transportation facilities plays a critical role in determining housing location due to its significant impact on accessibility, housing prices, and residents' overall satisfaction. Proximity to public transport, such as streetcars and metro systems, has been shown to influence residential density and land use patterns. For instance, research on transit accessibility and residential patterns demonstrates that residential development is strongly influenced by proximity to transportation infrastructure, with significant implications for suburban development patterns. Studies show that areas with high transit station density within walkable distances experience greater residential clustering and development intensity (Ma & Tan, 2025). The research investigates which residential district is most suitable for homebuyers by evaluating customer preferences for housing location in Erzurum province, Turkey (Eme, 2022). The study identifies critical criteria that influence housing

location choices, including transportation accessibility, housing price, population density, noise and air pollution, infrastructure safety, and social and cultural activity areas. This aspect of transportation facilities is more relevant for countries, provinces, or cities with adequate transportation infrastructure. In Indonesia, public transportation facilities are still not optimal. People often choose between private vehicles and public transportation. Therefore, there needs to be an adjustment in measurement if this aspect is to be applied in Indonesia.

Distance to the CBD is also a frequently used location measurement. In housing appraisal practices, distance to the CBD is often referred to as distance to a Point of Interest (POI). The distance to the CBD is a critical factor in determining housing location due to its significant influence on property values, accessibility to employment, and the availability of amenities. The relationship between distance from the CBD and housing prices has been well-established in recent research, where proximity to urban employment centers is associated with higher property values. This phenomenon reflects the demand for accessibility to jobs and services concentrated in urban centers, with housing costs and transit accessibility jointly driving residential location patterns. Improved accessibility to urban employment centers significantly influences where households choose to reside and the prices they pay for housing (Ma & Tan, 2025). The problem with measuring the distance to the CBD is determining the CBD point itself. This is because determining the CBD point is closely related to transportation. Additionally, suboptimal city planning makes identifying the CBD point difficult and biased (see Table 1.).

Apart from the two most important aspects in location measurement, which have their own challenges, measuring location in various dimensions will give rise to conceptual and implementation problems. In the hedonic price model, most previous studies utilize various variables to measure location. However, we want to know the impact of location as a single variable that influences housing. Many variables are related to apartment attributes and location. Identifying and understanding the complex interactions of these variables is often challenging. Additionally, many explanatory variables used in the hedonic price model can result in multicollinearity (Bonnafeous & Kryvobokov, 2011; Bourassa et al., 2025; Mitsis, 2023). Apart from the problem of multicollinearity, combining various dimensions to form location variables or indices will be difficult to measure objectively, so alternative methods of measuring location are needed.

One common approach to integrating location into hedonic models is using dummy variables that represent different geographic areas or neighborhoods. This method allows researchers to capture the effects of location without requiring complex spatial data. For instance, studies have shown that using postcode area dummy variables can yield price indices similar to those obtained from more sophisticated geographically weighted regression (GWR) models, which treat location as a separate characteristic (Gong & Haan, 2018). This is particularly beneficial for statistical agencies that may lack the resources to implement more advanced spatial analysis techniques (Gong & Haan, 2018).

Based on the research results, this study proposes a categorization of locations into three groups: very strategic, strategic, and less strategic. This categorization is based on the availability and accessibility of key dimensions such as the CBD, transportation facilities, health facilities, educational facilities, and other relevant amenities, as identified through the systematic review. Next is how to define the categories: very strategic, strategic, and less strategic.

Existing research indicates that urban attraction and labor-market accessibility significantly influence housing prices and residential location decisions. Employment centers create powerful urban attraction effects, drawing workers to seek residential proximity to job opportunities. Recent studies further show that housing costs and transit accessibility jointly shape residential location patterns relative to employment centers, as households make trade-offs between proximity to labor markets and housing affordability. The dynamic relationship between employment location, labor-market accessibility, and residential housing choices demonstrates why the definition of strategic

location must explicitly incorporate both the attractiveness of urban labor markets and the accessibility of housing to these economic opportunities.

Where housing supply fails to accommodate demand near employment centers, housing prices escalate sharply, reflecting competition for proximity to labor-market opportunities (Zhang et al., 2025). Similarly, research identifies location characteristics, including proximity to urban centers and accessibility to key facilities, as critical determinants of housing prices. Recent hedonic analyses reveal that location effects operate across multiple spatial scales, with proximity to major urban centers having significant and measurable impacts on property values (Liu et al., 2022; Yang et al., 2023). The accessibility of housing to urban centers and central services demonstrates differentiated effects across neighborhoods and spatial contexts. These multiscale effects suggest that strategic location is not merely defined by distance to the city center, but also by its position within complex urban spatial networks. Properties in advantageous locations relative to major urban centers, employment hubs, and key facilities command substantial price premiums reflecting their strategic value (Liu et al., 2022; Yang et al., 2023). Based on this framework, the strategic level of a property is determined by its proximity to key amenities, where shorter distances indicate higher strategic value.

Table 2. Location Categories

Location Categories	Radius of Available and Accessible Amenities
Very Strategic	4 km
Strategic	8 km
Less Strategic	More than 8 km

Table 2 is a comprehensive synthesis that categorizes and compares the various methodological approaches used to measure the complex notion of location within housing appraisal and hedonic price models. While Table 1 outlines the frequency with which specific distance-based metrics appear in the literature, Table 2 takes a deeper dive into understanding the measurement techniques themselves. The purpose of Table 2 is to provide a clear, side-by-side comparison of these methods, thereby highlighting the diversity in measurement approaches and offering insights into which techniques may offer the most reliable or holistic capture of locational effects in property valuation.

The choice of a 4 km threshold for identifying a "very strategic" location originates from adapting international urban planning standards to local conditions in Indonesia. Many urban planning studies use an 800-meter threshold—typically interpreted as a 10-minute walk to define what is considered "near" an amenity (Ahmed & Alipour, 2021; Nyanda, 2023; Zhang et al., 2022). This measure aligns with the "15-minute city" principle, which underscores accessibility to essential services within a short, predominantly walkable, distance. Nevertheless, due to the poor pedestrian infrastructure prevalent in many Indonesian cities, the traditional walkability measure is impractical. Instead, the study converts the concept of a 10-minute walk into an equivalent distance traveled by motorbike or car while considering local traffic conditions. This conversion results in approximately 4 km being covered in what would equate to a 10-minute journey via vehicle. Thus, 4 km is proposed as the threshold for a "very strategic" location areas that are highly accessible to key amenities despite the challenges of pedestrian travel. The 8 km threshold serves as an additional benchmark, essentially extending the evaluation of locational advantages further. By doubling the 4 km standard, the study recognizes that there is often a gradation in accessibility: properties within 4 km can be viewed as exceptionally well-located, whereas those within 8 km may still be considered strategically located, though they likely experience a diminished level of accessibility compared to those within the tighter 4 km boundary. These thresholds are not arbitrary; they are derived from established urban planning research, adjusted for local transit conditions, and reflect a pragmatic method to evaluate location

strategically in housing appraisal models. This approach allows for a clear categorization, facilitating more precise and contextually relevant assessments of the impact of location on housing values.

A house is considered to have a very strategic location if, within a 4 km radius, there are complete amenities such as a CBD, transportation, commercial/shopping centers, entertainment/recreational places, health facilities, education facilities, and employment centers. This contrasts with the results of the review where proximity to transportation modes is one of the main aspects in assessing whether a location is strategic or not because private vehicles remain in use by most people in Indonesia as their main mode of transportation. The availability of amenities can be applied to the concept of substitution, meaning that not all amenities have to be present; if substitution can still be done, the availability and accessibility of these amenities are still considered. With this kind of location categorization, it is expected that accurate location variables can be used for applied research analysis of hedonic price models and in market approaches in appraisal practices.

According to the results above, there are several research topics that can be focused on in the future research. It is important to identify the role of amenity substitution in defining strategic housing location, assessing incomplete amenity sets and their impact on housing valuation, and exploring the spatial dynamics of urban amenities to determine the threshold of substitution in defining strategic housing locations. Each of these potential research topics opens a distinct pathway for deepening the understanding of how amenity presence and substitution affect property values. They challenge the conventional wisdom that only “complete” amenity sets define strategic locations by investigating the nuanced roles different amenities might play when they serve as substitutes for one another.

Conclusion

Location is a complex variable that is difficult to measure objectively and is often treated as a partial attribute in both research and appraisal practice, leading to inconsistencies in its application. This study addresses this issue by proposing a comprehensive approach to measuring location based on a systematic review, showing that location can be defined through two main aspects, spatial and circumstantial, with spatial aspects being more dominant. The key dimensions include proximity to the CBD, transportation, commercial centers, employment, health and educational facilities, recreational areas, as well as accessibility conditions. To improve its application in hedonic price models and appraisal practice, location should be measured as a single, integrated variable rather than separately. Accordingly, this study proposes a categorization of location based on strategic importance using dummy variables: very strategic (within 4 km), strategic (4–8 km), and The contribution of this study lies in filling a critical gap in housing appraisal research by systematically reviewing and synthesizing existing methods for measuring location objectively. This study also provides a clearer conceptual and operational linkage between accessibility measures and their practical implementation in appraisal models. Furthermore, it offers a structured foundation for standardizing location measurement across different studies and applications. These findings have important implications for improving the accuracy and consistency of property valuation, supporting better decision-making for researchers, practitioners, policymakers, and investors. However, further research is needed to refine location measurement, particularly in defining appropriate CBD reference points, adapting the framework to local contexts such as Indonesia, incorporating transportation factors, and understanding public perceptions of proximity.

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Declarations

- Author contribution** : The first author conceptualized the study, oversaw the data analysis, and drafted the manuscript. The second author was responsible for instrument development, field data collection, and data processing. Both authors collaborated on the literature synthesis, revised the manuscript, and approved the final version for publication.
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