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Factors Affecting Land Prices in Singaraja City, Bali Province

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Abstract
Land is a natural resource that plays a strategic role in supporting regional development and serves as a spatial asset whose use is closely related to spatial planning. Singaraja City, as the administrative, economic, and higher education center of North Bali, has experienced rapid urban development, leading to increased demand for land and substantial variation in land prices. This study aimed to identify the factors influencing land prices in Singaraja City using a descriptive qualitative approach supported by quantitative spatial analysis, including Ordinary Least Squares (OLS) regression and Getis-Ord Gi* hot spot analysis based on 52 land-price sample points. The results indicated that the distance-related variables collectively had a statistically significant effect on land prices; however, they explained only 17.95% of the observed variation. Furthermore, a statistically significant hot spot cluster was identified only in Baktiseraga Village. The study concluded that land prices in Singaraja City were influenced by the interaction between locational accessibility and the availability of public facilities and infrastructure, rather than by proximity to a single activity center alone.

INTRODUCTION

Land is a natural resource that plays a strategic role in supporting sustainable regional development while also serving as a spatial asset whose use is closely linked to the spatial planning process (Arba & SH, 2022). Although the physical supply of land is limited and administratively fixed, its function may change in response to development needs (Martanto, 2019). Consequently, increasing demand for land can create relative scarcity, which may in turn increase land values and prices. As an economic asset, land generally does not depreciate in the same manner as many other assets (Yusmita, 2020); therefore, land prices within a region reflect the dynamic interaction among demand, supply, location, and land availability. Land prices, expressed in nominal currency per unit area, represent the market value of land and are influenced by its economic utility and spatial development potential (Karina, Surjono, & Septiana, 2009; Fragmawanty, 2018).

The dynamics of land prices have become increasingly relevant in areas functioning as regional growth centers, including national strategic areas, urban centers, tourism destinations, and educational hubs (Yunus, 2000). Studies on the determinants of land prices have been conducted in various Indonesian cities and have produced complementary findings. Nugraditama, Akil, and Ihsan (2020) found in Makassar that road classification, distance to commercial areas, the number of activity nodes, and distance to the city center were important determinants of land prices. In Malang, Asri (2021) identified building size, ownership status,

availability of utility networks, and proximity to the city center and educational facilities as factors influencing residential land prices. Meanwhile, Fortuna, Setyono, and Hasyim (2026), in areas surrounding Jabodebek LRT stations, reported that land area, ownership status, distance and travel time, and residential infrastructure influenced land prices near mass-transit nodes.

Singaraja City, as the administrative capital of Buleleng Regency and a center of economic, commercial, and higher education activities in North Bali, has experienced substantial physical development in recent years. The presence of several higher education institutions, including Universitas Pendidikan Ganesha, Sekolah Tinggi Agama Hindu Negeri Mpu Kuturan, and Universitas Panji Sakti (Pusdatin Kemendikdasmen, 2025), together with government and commercial activities in the city center, has created multiple activity nodes that simultaneously generate demand for land. Based on indicative data from Bhumi ATR/BPN (2025), land value zones in Singaraja City are grouped into four ranges, from IDR 200,000 to IDR 5,000,000 per square meter, with the highest values concentrated around higher education institutions and commercial centers. This spatial variation indicates that land prices in Singaraja are not uniformly distributed and may be shaped by complex interactions among multiple determinants.

A fundamental issue in understanding urban land-price dynamics is that land prices can rarely be explained adequately by a single variable. Previous studies have often focused on a particular type of activity center, such as higher education areas in Adnyana's (2020) study in Jimbaran Village or LRT station areas in Fortuna et al.'s (2026) study, whereas Singaraja is influenced simultaneously by governmental, educational, economic, and tourism-related activities. Classical land-value theories provide an important conceptual basis for examining this complexity, particularly Von Thünen's (1826) concept of location rent (as cited in Rustiadi, Saefulhakim, & Panuju, 2009) and Alonso's (1964) bid-rent theory (as cited in Yunus, 2000). These frameworks emphasize distance and accessibility to activity centers as important determinants of spatial variations in land value from central to peripheral areas.

Several studies have operationalized these theoretical concepts by combining quantitative and spatial approaches. Asri (2021) and Sarifuddin, Pratama, Irfandi, and Arafat (2022) employed multiple regression analysis to assess the effects of distance and facility availability on land prices. Sarifuddin et al. (2022), for example, found that facility availability accounted for up to 82% of the variation in land prices along the studied road corridor. Nugraditama et al. (2020) combined qualitative descriptive analysis, quantitative correlation, and grid-based spatial analysis to identify areas with relatively high land-price potential, while Fortuna et al. (2026) applied kriging interpolation to visualize the spatial distribution of land prices around mass-transit nodes.

Qualitative descriptive approaches based on field observations also remain useful for explaining the mechanisms underlying quantitatively observed land-price patterns. Adnyana (2020), in Jimbaran Village, employed a descriptive approach with purposive sampling and found that land-price patterns developed along road networks that enhanced accessibility, forming minor peaks consistent with the concept introduced by Berry (1963) as cited in Yunus (2000), with proximity to educational facilities identified as a dominant factor. These findings are consistent with Wolcott's (1987) framework of four land-value factors, which was subsequently expanded by Fahirah (2010) into six dimensions: physical, social, economic,

governmental, locational accessibility, and facility availability. This perspective reinforces the view that land prices emerge from the interaction of multiple dimensions rather than from distance alone.

The literature reviewed above indicates that studies examining land-price determinants in urban areas with multiple activity centers—such as government, education, commerce, and tourism—using an integrated qualitative and quantitative spatial approach remain relatively limited, particularly in medium-sized cities in North Bali. Most previous studies have focused on a single driver of land-price variation or have been limited to descriptive analysis and global regression without further identifying where statistically significant clusters of high land values occur spatially. This gap provides the basis for the present study.

Based on this background, this study aimed to identify the factors influencing land prices in Singaraja City, Bali Province, with specific objectives of identifying the spatial distribution of land prices and analyzing their determinants. The novelty of this study lies in integrating qualitative descriptive analysis based on field observations with quantitative verification through Ordinary Least Squares (OLS) regression and Getis-Ord Gi* hot spot analysis of land-price data. This approach enables the statistical assessment of locational accessibility factors while simultaneously identifying significant spatial clustering patterns. The study covered the delineated area of the Singaraja Urban Detailed Spatial Plan (Rencana Detail Tata Ruang [RDTR]), totaling 3,683.47 hectares, and focused on residential and commercial land transactions represented by 52 sample points distributed across nine villages and urban administrative areas.

METHOD

This study employed a qualitative descriptive field-research approach supported by quantitative spatial analysis to examine and map land-price patterns in Singaraja City, Bali Province. The qualitative component was used to identify and describe variations in factors associated with land prices, while statistical and spatial analyses were used to provide quantitative and geographic evidence.

The study population comprised land parcels within the delineated Singaraja Urban Detailed Spatial Plan (Rencana Detail Tata Ruang [RDTR]) area, covering 3,683.47 hectares. The sample consisted of 52 land-price observation points distributed across nine villages and urban administrative areas representing different functional and spatial characteristics. Sampling points were selected purposively to represent variations in land value zones based on the Bhumi ATR/BPN database.

The study used secondary data from official institutional sources, including the Tax Object Sales Value (Nilai Jual Objek Pajak [NJOP]), Land Value Zones (Zona Nilai Tanah [ZNT]), spatial planning and administrative maps, demographic and economic data, satellite imagery, and road-network data. These data were obtained from relevant government institutions, including ATR/BPN, the Public Works and Spatial Planning Office of Buleleng Regency, and the Central Bureau of Statistics (Badan Pusat Statistik [BPS]) of Buleleng Regency, and were processed using Geographic Information Systems (GIS).

Data were collected through document review and direct field observations. Field observations were conducted to assess physical conditions, land-use intensity, land-use activities, infrastructure availability, and other relevant spatial characteristics within the

Singaraja urban area. Field findings were systematically recorded and supported by photographic documentation.

Data analysis was conducted in three stages. First, qualitative descriptive analysis was used to interpret variations in land prices based on land value zones and the physical, social, locational-accessibility, and facility characteristics of the sampled areas. Second, Ordinary Least Squares (OLS) regression was used to examine the effects of three distance variables—distance to the city center, port, and campus areas—on land prices per square meter across the 52 sample points, following the OLS interpretation guidelines provided by ESRI (2024). Third, Getis-Ord Gi* hot spot analysis (Getis & Ord, 1992) was applied to identify statistically significant spatial clusters of high and low land prices at the 90%, 95%, and 99% confidence levels.

RESULTS AND DISCUSSION

RESULTS

The study area encompasses the delineation of Singaraja Urban Area, covering 3,683.47 hectares. It is bordered by the Bali Sea to the north, Kubutambahan District to the east, Sukasada District to the south, and Banjar District to the west (Figure 1). Based on the land value zone mapping from the Bhumi ATR/BPN database in 2026, the distribution of land prices in Singaraja City is structured into four Land Value Zone (ZNT) classes. The main commercial zone and city center, which include the corridors of Jalan Ngurah Rai, Jalan Pahlawan, Jalan Dr. Sutomo, and Jalan Ahmad Yani, record the highest indicative values, ranging from IDR 3,000,000 to IDR 5,000,000 per square meter. The education and dense residential zone around Undiksha and Universitas Mpu Kuturan campuses falls within the range of IDR 2,000,000 to IDR 3,000,000 per square meter. The coastal tourism corridor shows a wider variation, with land along provincial roads valued between IDR 1,500,000 and IDR 2,500,000 per square meter, while second-layer plots range from IDR 700,000 to IDR 1,200,000 per square meter. Meanwhile, the agribusiness and satellite development zone in the upper Sukasada area records the lowest values, ranging from IDR 350,000 to IDR 600,000 per square meter for active farmland, and IDR 750,000 to IDR 1,500,000 per square meter for new residential lots.

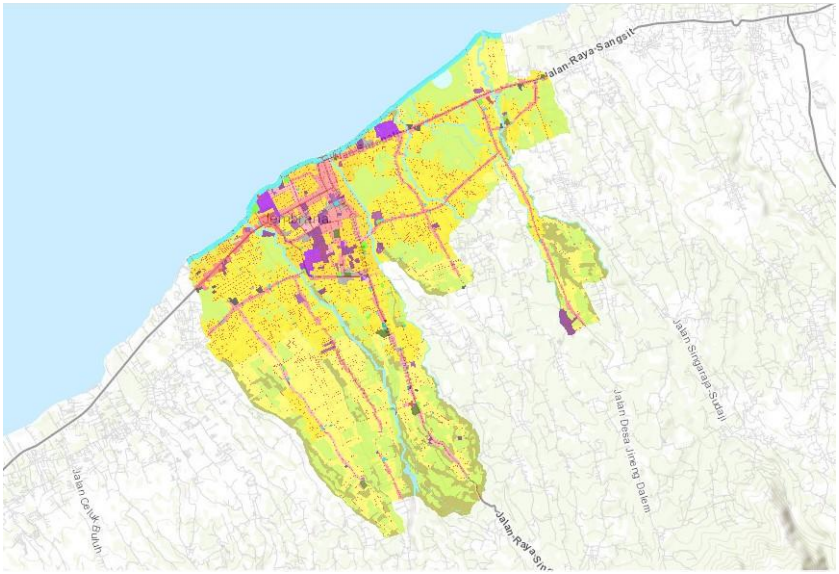

Figure 1. Research Location Map, Singaraja Urban Area
Source: Singaraja Urban Detailed Spatial Plan (RDTR) 2021–2041

The analysis of 52 land price sample points (Table 1) reveals a significant disparity between premium commercial areas and buffer zones. The highest price was recorded at IDR 9,000,000 per square meter in Kaliuntu Village, while the lowest was IDR 500,000 per square meter in Baktiseraga Village. The median value stood at IDR 2,000,000 per square meter, with the mean at IDR 2,062,259 per square meter. Kaliuntu emerged as the most expensive area due to its role as a center of trade, business, and a major road corridor adjacent to higher education institutions.

Baktiseraga and Banyuasri displayed the widest price ranges, from IDR 500,000 to IDR 3,500,000 and IDR 650,000 to IDR 3,000,000 per square meter respectively, reflecting sharp transitions between inland agricultural land and mature plots along main roads. Banyuning and Penarukan showed relatively consistent prices within the range of IDR 1.2 million to IDR 3 million per square meter. Meanwhile, Sambangan and Panji recorded the lowest average prices, at IDR 1.54 million and IDR 1.26 million per square meter respectively.

Table 1. Land Prices in Singaraja City

Yes	Region Name	Price per m2
1	Banyuning Village 1	1.115.384,62
2	Banyuning Village 2	2.000.000,00
3	Banyuning Village 3	1.650.000,00
4	Banyuning Village 4	3.000.000,00
5	Banyuning Village 5	2.250.000,00
6	Banyuning Village 6	3.000.000,00
7	Banyuning Village 7	1.300.000,00
8	Banyuning Village 8	1.300.000,00
9	Baktiseraga Village 1	1.969.696,97
10	Baktiseraga Village 2	500.000,00
11	Baktiseraga Village 3	2.750.000,00
12	Baktiseraga Village 4	2.750.000,00
13	Baktiseraga Village 5	3.500.000,00
14	Baktiseraga Village 6	2.750.000,00
15	Baktiseraga Village 7	2.000.000,00
16	Baktiseraga Village 8	2.750.000,00
17	Baktiseraga Village 9	3.000.000,00
18	Baktiseraga Village 10	2.750.000,00
19	Baktiseraga Village 11	2.800.000,00
20	Baktiseraga Village 12	2.954.545,45
21	Sambangan Village 1	1.600.000,00
22	Sambangan Village 2	1.650.000,00
23	Sambangan Village 3	1.300.000,00
24	Sambangan Village 4	1.500.000,00
25	Sambangan Village 5	1.500.000,00
26	Sambangan Village 6	2.000.000,00
27	Sambangan Village 7	1.250.000,00
28	Sambangan Village 8	1.450.000,00

Yes	Region Name	Price per m2
29	Sambangan Village 9	1.400.000,00
30	Sambangan Village 10	1.800.000,00
31	Panji Village 1	1.500.000,00
32	Panji Village 2	850.000,00
33	Panji Village 3	1.100.000,00
34	Panji Village 4	1.391.304,35
35	Panji Village 5	1.500.000,00
36	Banyuasri Village 1	1.850.000,00
37	Banyuasri Village 2	3.000.000,00
38	Banyuasri Village 3	2.000.000,00
39	Banyuasri Village 4	3.000.000,00
40	Banyuasri Village 5	1.850.000,00
41	Banyuasri Village 6	650.000,00
42	Banyuasri Village 7	2.500.000,00
43	Penarukan Village 1	2.391.304,35
44	Penarukan Village 2	2.200.000,00
45	Penarukan Village 3	1.285.714,29
46	Penarukan Village 4	2.100.000,00
47	Penarukan Village 5	1.300.000,00
48	Penarukan Village 6	1.000.000,00
49	Banjar Tegal Village 1	1.750.000,00
50	Banjar Tegal Village 2	3.500.000,00
51	Astina Dynasty	2.250.000,00
52	Kaliuntu Exodus	9.000.000,00

Source: Data Processing Results, 2026.

To quantitatively test the influence of location and accessibility dimensions, an Ordinary Least Squares (OLS) regression analysis was conducted, with land price per square meter as the dependent variable and distance to the city center, port, and campus areas as the independent variables (Table 2). The regression model proved statistically valid, as indicated by a Joint F-Statistic of 3.501 ($p = 0.022$) and a Joint Wald Statistic of 12.644 ($p = 0.005$), meaning that the three distance variables collectively have a significant effect on land prices. However, the explanatory power of the model is relatively low, with a Multiple R-Squared value of 0.1795 and an Adjusted R-Squared of 0.1283. This suggests that the three distance variables account for only about 17.95 percent of the variation in land prices, while more than 80 percent of the variation is determined by other factors beyond distance.

Table 1. OLS Model Diagnostic Statistics

Diagnostic Statistics	Value	Probability
Number of Observations (n)	52	—
Multiple R-Squared	0,179547	—
Adjusted R-Squared	0,128268	—
Akaike's Information Criterion (AICc)	1.605,447	—

Diagnostic Statistics	Value	Probability
Joint F-Statistic	3,501415	0,022336*
Joint Wald Statistic	12,644273	0,005473*
Koenker (BP) Statistic	4,529189	0,209701
Jarque-Bera Statistic	593,365865	0,000000*

Source: Data Processing Results, 2026. The sign (*) indicates statistical significance at p < 0.01.

At the individual variable level (Table 3), the distance to the port (PELABUHAN) shows a negative and statistically robust effect (coefficient -521.156; robust prob. = 0.0078), indicating that land prices tend to decrease as the distance from the former Buleleng Port increases. The distance to the city center (PUSAT_KOTA) has a positive coefficient of 421.892 but is not statistically significant (prob. = 0.636). Meanwhile, the distance to campus areas (KAMPUS) has a negative coefficient of -411.243, consistent with theoretical expectations, though also not significant (prob. = 0.510). Diagnostic tests further clarify the model's reliability. The Koenker (BP) Statistic of 4.529 (p = 0.210) is not significant, suggesting no evidence of heteroskedasticity. However, the Jarque-Bera test result of 593.366 (p ≈ 0.000) indicates that the residuals are not normally distributed, primarily due to extreme outliers in the sample from Kaliuntu Village.

Table 3. Estimation of the Results of the OLS Regression Coefficient of Land Price

Variable	Coefficients	Prob.	Robust Prob.	t-Statistics	VIF
Intercept	3.647.310,998	0,000000*	0,000008*	7,038	—
PUSAT_KOTA	421,892	0,636206	0,563367	0,476	29,282
PORT	-521,156	0,146813	0,007801*	-1,475	5,228
CAMPUS	-411,243	0,509857	0,391037	-0,664	17,134

Source: Data Processing Results, 2026. The sign (*) indicates statistical significance at p < 0.01.

As a continuation of the OLS analysis, a Getis-Ord Gi* hot spot analysis was conducted to identify the spatial clustering of land price values (Figure 2). The results indicate that the only significant hot spot cluster was formed in Baktiseraga Village, specifically within the residential area developed through land consolidation (LC) on the western side of the city. In this location, nine out of twelve sample points recorded land prices ranging from IDR 2,750,000 to IDR 3,500,000 per square meter. Conversely, although the highest price in the dataset was found in Kaliuntu Village (IDR 9,000,000 per square meter), this point did not form a hot spot, as it behaved as a single outlier not surrounded by comparable values. No extensive cold spot clusters were detected within the study area, and most other sample points in Banyuning, Penarukan, Sambangan, Panji, and the central city area were spatially non-significant.

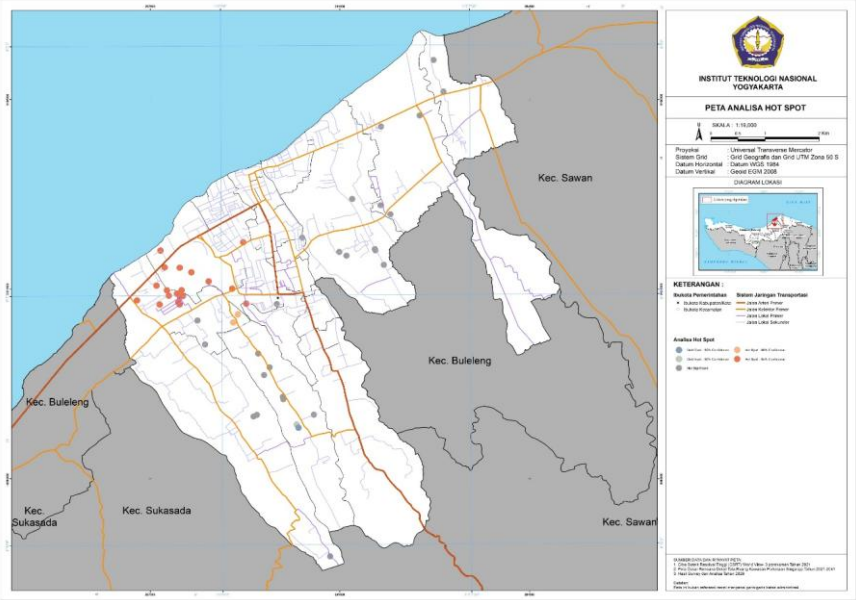

Figure 2. Map of Hot Spot Analysis (Getis-Ord Gi*) Land Prices in Singaraja City
Source: Data Processing Results, 2026

A further description of accessibility factors and facility availability reinforces the quantitative findings above. Land located along national or provincial road corridors with widths exceeding 8–10 meters, such as in Kaliuntu, Baktiseraga, and Banyuasri, commands premium prices. In contrast, plots situated on village roads or alleys less than 3 meters wide, particularly in Panji and the inland areas of Baktiseraga, record the lowest values. The completeness of infrastructure networks, including piped water from PDAM and fiber optic internet concentrated in urban zones, helps sustain land prices at the upper range. Meanwhile, hillside areas such as Panji and Sambangan, which rely on bore wells and community-based water systems (Pamsimas), tend to maintain land prices at lower levels.

DISCUSSION

The quantitative findings of this study confirm that the land price structure in Singaraja City cannot be adequately explained by a simple monocentric city model, which assumes that the highest land prices are concentrated in a single city center and decline regularly toward the periphery, as predicted by Alonso's bid rent theory (1964) in Yunus (2000). The positive but insignificant coefficient for the distance to the city center (PUSAT_KOTA) contradicts the theoretical direction of that model, while the distance to the port (PELABUHAN) emerges as a more statistically robust determinant of land prices. This condition aligns with the deviations reported by Ratcliff (1949) in Yunus (2000) and Berry's (1963) critique in Yunus (2000), which suggest that land prices in cities with complex transport networks form minor peaks at specific accessibility nodes rather than following a single distance-decay principle.

The relatively low explanatory power of the OLS model, which accounts for only 17.95 percent of land price variation, is consistent with Wolcott's (1987) land valuation framework, later expanded by Fahirah (2010) into six factor groups: physical, social, economic, governmental, location-accessibility, and facility availability. The fact that more than 80 percent of land price variation remains unexplained by distance alone indicates that land prices in Singaraja are heavily influenced by non-distance factors, such as road width and pavement

quality, the completeness of water and internet networks, land legality status, and the quality of spatial planning. Descriptive findings show that plots resulting from land consolidation (LC) with legal certainty and well-organized neighborhood road networks command much higher and more homogeneous prices compared to similar plots without structured planning, a pattern consistent with the role of governmental factors (zoning and spatial planning) as emphasized by Wolcott (1987).

The hot spot analysis provides spatial clarification of the limitations of the global regression model. The formation of a significant hot spot cluster exclusively in Baktiseraga Village, rather than in the city's administrative center, underscores that land price premiums in Singaraja are polycentric, emerging at multiple activity nodes such as the commercial hub of Kaliuntu, higher education areas, Banyuasri's market and terminal, and the coastal tourism corridor. The statistical nature of Gi*, which measures clusters of high values surrounded by other high values rather than identifying a single maximum, explains why Kaliuntu—with the highest price of IDR 9,000,000 per square meter—did not form a hot spot, while twelve consistently high and homogeneous samples in Baktiseraga did. This distinction reveals two different land market phenomena: point premiums resulting from the uniqueness of specific parcels in Kaliuntu, and area premiums arising from collective environmental maturity in Baktiseraga, an empirical manifestation of Berry's (1963) concept of mini peaks in Yunus (2000).

The strategic position of Baktiseraga along the corridor connecting Singaraja City with the Lovina tourism area, its proximity to Universitas Pendidikan Ganesha, and its short distance from the city center enables the area to capture spillover demand from three segments simultaneously: urban households seeking ready-to-build plots, entrepreneurs investing in boarding houses and student-related services, and investors treating mature land as an asset for capital appreciation. Since the supply of plots within consolidated land (LC) areas remains relatively fixed, the pressure from these three demand segments converges into synchronized price increases across plots. This mechanism mirrors Adnyana's (2020) findings in Jimbaran Village, where land price patterns developed along road networks supporting accessibility in higher education-based areas, forming minor peaks.

The significance of port distance and the statistical insignificance of city center distance also align with the patterns reported by Nugraditama, Akil, and Ihsan (2020) in Makassar, who found that road classification and the number of activity nodes, rather than distance to a single city center, shaped the classification of areas with the highest land price potential. Similarly, Sarifuddin, Pratama, Irfandi, and Arafat (2022) in Palu's Jalan I Gusti Ngurah Rai corridor discovered that facility availability contributed far more to land prices than strategic location alone. These parallels across different urban contexts strengthen the argument that urban land prices in Indonesia—particularly in cities with multiple activity nodes—tend to be polycentric and multifactorial, making approaches that rely solely on distance to a single city center prone to misleading generalizations.

From the perspective of facility and infrastructure availability, the completeness of piped water (PDAM) and fiber optic internet networks has proven to be critical components of build readiness for plots. This is evident in Panji's hillside area, where land prices remain at around IDR 850,000 per square meter due to the absence of comprehensive PDAM coverage. Such conditions are consistent with Asri's (2021) findings in Malang, which showed that electricity,

telecommunications, and clean water networks are key determinants of residential land prices, and reinforce Fahirah's (2010) framework that places facility availability among the six main factors influencing land value. The phenomenon of hidden costs—such as the need for bore wells in areas without PDAM networks—illustrates that infrastructure factors not only directly affect land prices but also create latent costs that the market incorporates into land transaction values.

The methodological limitations of this study also need to be considered to ensure a balanced interpretation of the findings. The presence of extreme outliers in the Kaliuntu sample caused the residuals of the OLS model to deviate from normal distribution, which means that comparisons between standard probabilities and robust probabilities for the PELABUHAN variable must be read with caution, as conventional standard errors are vulnerable to distortion from such outliers. In addition, the Gi* statistic is sensitive to the choice of spatial conceptualization and the relatively small sample size, so the extent of detected hot spot clusters could shift if analytical parameters were altered. Nevertheless, the convergence of three lines of evidence—OLS regression statistics, Getis-Ord Gi* hot spot mapping, and qualitative descriptions of area characteristics—consistently points to the same conclusion: land prices in Singaraja City are polycentric and multifactorial in nature. This triangulation strengthens the reliability of the study's insights, even while acknowledging the methodological constraints.

CONCLUSION

This study found that land prices in Singaraja City were shaped by the interaction between locational accessibility and infrastructure availability rather than by distance to a single activity center alone. Quantitative evidence from the Ordinary Least Squares (OLS) regression indicated that the three distance variables collectively had a statistically significant effect but explained only 17.95% of the variation in land prices, with distance to the port emerging as the most statistically robust predictor. The Getis-Ord Gi* hot spot analysis further supported this finding by identifying the only statistically significant cluster of high land prices in Baktiseraga Village, a land-consolidation area characterized by greater legal certainty and relatively complete infrastructure, rather than in the city's administrative center.

The main implication is that the spatial structure of land prices in cities with multiple activity nodes, such as Singaraja, may exhibit a polycentric pattern and may not be adequately explained by a simple monocentric urban model. The contribution of this study lies in demonstrating that the combination of global regression analysis and local spatial clustering can reveal distinct land-market phenomena, including parcel-specific price premiums associated with the characteristics of individual plots and area-wide premiums associated with more developed surrounding environments. These spatial differences may not be fully captured through descriptive analysis or global regression alone.

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