The Influence of Property Listing Attributes on the Performance of Real Estate Sales

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Abstract: In recent years, due to the adjustment of the real estate market, such as policy regulations, changes in market demand, and alterations in the business models of developers. This experiment utilized Kaggle to search for the experimental data, processed the dataset using OLS regression, and conducted data analysis using Excel. The influence of different property attributes and the combined effect of these attributes on the sales performance of real estate was studied. The results show that under the condition of a single independent variable, Square, Ladder Ratio, and Have Subway have a significant impact on real estate sales performance. Under the condition of the co-variables, the combined effect of Subway and Ladder Ratio and the combined effect of High and Ladder Ratio have significant impacts on the performance of real estate sales. However, the combined effect of Low and Ladder Ratio has no significant impact on the performance of real estate sales. This is helpful for understanding the current real estate market model and predicting its future development trend.; it also provides a basis for decision-making for developers.

1 INTRODUCTION

In the rapidly changing real estate environment, understanding the relationship between property attributes and real estate sales performance is more crucial than ever before. The property attribute serves as a crucial factor influencing the decision-making of home buyers, facilitating sales, and differentiating products in a highly competitive market. With the acceleration of urbanization and the rising demands for residents' living standards, consumers' considerations for housing have shifted from a single focus on the residential function to a comprehensive evaluation of multiple attributes such as transportation convenience, space design, and building quality.

In UK, the rent has risen by nearly 40% within 2023-2024 years. Changes in nature of the property will also affect the rent. Due to the high requirements for the property's attributes and the persistent imbalance between the rising demand for British properties and the decreasing supply. Many respondents predict that rents will continue to rise in the future. The relationship between the surrounding environment of housing and the sales performance of real estate has been extensively studied by many experts and scholars. Analysis of the characteristics of houses in the vicinity of the Twin Cities area is conducted to estimate the impact of nearby community parks, regional, state and federal parks and natural areas, golf courses and cemeteries on the value of houses (Soren T, 2006). These external attributes of the properties will exert an influence on the final sales performance by affecting the utility evaluation of the buyers. Especially during the current market adjustment period, the quality of the property's attributes has become a crucial factor determining the speed of project sales and its premium potential. The physical attributes and supporting facilities of the housing units have also been the subject of numerous academic studies that investigate their significant impact on prices (Niu, 2020). And nowadays, in order to achieve high-quality development of the real estate sector and create higher-quality residences. This development direction has become a new model for the development in the new era (Pan, 2025).

This study aims to systematically analyze the influence mechanism of different property attributes on the sales performance of real estate, and to

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investigate whether there are any interactions among these attributes. The data was obtained from Kaggle. The dataset was processed using OLS regression, and the obtained data was analyzed using Excel..

2 LITERATURE REVIEW AND RESEARCH HYPOTHESIS

2.1 Literature Review

Domestic and foreign experts and scholars have extensively analyzed the relationship between housing attributes and real estate sales.

Under the influence of the sharing economy, some scholars, in their exploration of the relationship between housing attributes and real estate sales, started from specific platforms in order to obtain more detailed data.For example,Wu Xiaojun and others used Airbnb for data scraping and studied the influencing factors of rental prices. Many variables have a significant impact on the price of housing. The higher the consumers' trust in landlords and properties, the higher the house sale rate will be, thereby promoting the performance of the real estate market.And consumers are more likely to purchase properties that are close to medical and educational resources, which meets their social needs. Eg. factors such as the degree of trust that consumer have in the landlords and the properties, and the extent to which the properties meet the social needs of the consumer, etc. (Wu, 2019). This helps analyze the variables that have the greatest impact on the sales performance of real estate and formulating corresponding strategies.

Conducted a study to analyze the most favored property attributes of transaction users and investigated which location resources were most favored by consumers. Finally, they processed these property attributes collaboratively. And the mixed property attributes were obtained (Piao, 2022).

The characteristics of the housing units have the highest explanatory power for housing prices. Among the housing attributes, the accessibility by transportation, tourist attractions, and the supply of nearby hotels have a significant and positive impact on housing prices (Lai, 2022).

That currently the year-on-year decline in the sales prices of commercial residential properties in all major cities has continued to narrow. New real estate sales have remained stable. It is continuing to move in the direction of stabilizing. However, further adjustments to real estate policies and optimization of property attributes are still needed (Meng, 2025).

At present, in the Chinese real estate industry, with the continuous intensification of macro-control measures by the government and the significant changes in the internal and external environment, the real estate market has gradually returned to rationality. Due to the general decrease in prices and the supply exceeding the demand, the development of the real estate industry has been lackluster. Therefore, this article puts forward the following hypotheses.

House Square is a crucial factor influencing the performance of real estate sales. Numerous studies have shown that properties within the 80-120 square meter range have a faster sales speed. As the size of the house increases, the sales speed also slows down. Therefore, the selling price increases with the increase in building area. However, when the area exceeds a certain limit, the sales difficulty increases, and the growth rate of the selling price slows down accordingly.

2.2 Research Hypothesis

The impact of completed construction area and sales area on the average unit price of commercial housing was analyzed using a regression model. The study shows that both have a significant influence on the unit price of commercial housing (Liu, 2008).

Assumption 1: Square has a significant impact on real estate sales. Moreover, the sales price is positively correlated with Square.

The Ladder Ratio can be understood as the number of elevators in the same unit divided by the number of residents on the same floor. It is also one of the important influencing factors for real estate sales performance. With the development of the real estate industry in recent years, many old residential areas have undergone renovations. Especially those with buildings over 5 floors and without elevators. This indirectly reflects the convenience of the community. eg. Studied the impact of internal and external variables of housing on its price. The housing price reflects the expectations of the sales market. However, during the period from 2002 to 2024, there were relatively few studies on Ladder Ratio among the internal variables.(Maria, 2025)

Assumption 2: The Ladder Ratio has a significant impact on the performance of real estate sales.

Subway transportation reflects the level of transportation convenience. Convenience in transportation can reduce travel costs and time for residents. Properties located close to the subway are more attractive to consumers. Eg. The opening of the subway can significantly increase the sales volume and prices of real estate along the line. Studies have

shown that the housing prices within a 1600-meter radius around subway stations are most significantly affected by the subway. The closer the location, the higher the premium; within this 1600-meter range, the housing prices decrease as the distance increases.(Yao, 2007)

Assumption 3: Subway has a significant impact on real estate sales performance.

To more accurately understand the impact of property listing attributes on the performance of real estate sales. This experiment designed three sets of collaborative item experiments. This experiment conducted collaborative analyses of Layer Height with a Ladder Ratio, Subway with a Ladder Ratio, and Urban Area with a Ladder Ratio respectively.

The synergy between Layer Height and Ladder Ratio will affect the consumer experience. Residents living in the HighLayer have a higher usage rate of the elevator. When consumers are considering purchasing a house, they will consider the Ladder Ratio in the Middle and High Layers. If the Ladder Ratio in the Middle and High Layers is too small, the living comfort will decrease, especially during peak periods.

Assumption 4: The combined effect of Layer Height and Ladder Ratio has a significant impact on the performance of real estate sales.

The synergy between the Subway and Ladder Ratio can be regarded as the relationship between commuting efficiency and elevator waiting time. Commuting by subway implies fast travel, but a low Ladder Ratio would cause elevator congestion, resulting in slower travel time. This means that a high Ladder Ratio close to Subway is more attractive to consumers.

Assumption 5: The synergy between Subway and Ladder Ratio has a significant impact on the performance of real estate sales.

3 DATA COLLECTION AND STATISTICS

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The copyright form is located on the authors' reserved area. The form should be completed and signed by one author on behalf of all the other authors.

3.1 Data Collection

This experiment used Excel for data collection and preprocessing. To ensure the accuracy of the data, irrelevant variables such as community ID, user ID, and renovation time were removed. Additionally, missing data was deleted, and the data was filtered. This experiment had two dependent variables, Total Price and Unit Price. When no interaction was involved, a double-dependent-variable experiment was conducted. When the interaction was involved, a single-dependent-variable experiment was conducted, and at this time, the dependent variable was totalPrice. The independent variables of this experiment included 5 groups, including 2 interaction groups. The control variables included Followers, DOM, and Community Average.

3.2 Data Statistics

In this experiment, the variables were statistically analyzed in terms of Number, Mean, and SD, as shown in Table 1 and Table 2.

Table 1: The N, Mean, and SD of the internal factors of the property listing.

	Square			Ladder Ratio		
	N	Mean	SD	N	Mean	SD
Total Price	2925	609.7649	204.0203	2925	609.7649	204.0203
Unit Price	2925	67422.96	18091.35	2925	67422.96	18091.35

Table 2: The N, Mean, and SD of the external factors of the property listing.

	Have Subway			Haven't Subway		
	N	Mean	SD	N	Mean	SD
Total Price	1904	609.7649	204.0203	1021	609.8852	204.0709
Unit Price	1904	67422.96	18091.35	1021	67401.56	18069.56

4 MODELLING

4.1 Identification Strategy

Identification strategy follows a typical linear regression framework, where total price and unit-price are the dependent variables. We define attributes such as Square, Ladder Ratio, etc. as independent variables to capture the impact of property attributes on sales performance. We controlled for the values of factors that might affect the property attributes as well as the product characteristics of sales performance (such as Followers), which helps to ensure that we take into account potential heterogeneity between different categories.

This model is applied to the entire dataset. We used binary variables and interaction terms to capture the impact of different attribute characteristics on the performance of real estate sales. The entire approach enabled us to test the main hypotheses and simultaneously control the influence of confounding factors.

4.2 Result Analysis

4.2.1 The Impact of the Housing Inventory on the Performance of Real Estate Sales

This experiment first focused on the linear relationships between the Square and Ladder Ratio of the housing units and the sales performance of the real estate. And each independent variable had a corresponding dependent variable to accurately reflect the relationship between the housing attributes and the sales performance. We used the following method to verify this relationship:

This experiment uses Equation (1) to do regression analysis. Define the housing property type as "Square". Table 3 presents the new results. In the Total Price environment, the p-value of the Square is significantly less than 0.001, and the Multiple R is approximately 0.579, while the R Square is approximately 0.335. It is indicated that 33.5% of the Square data have a highly significant impact on the Total Price, and the relationship is positive. However, in the Unit Price environment, the Square p-value is less than 0.05, while R Square and Multiple R are approximately equal to 0. Although Square has a significant impact on the Unit Price, the current model does not explain the changes in the dependent variable. The reasons for this result are twofold. Firstly, the degree of change in the dependent variable is different. The degree of change in Total Price is much greater than that of Unit Price. Secondly, in the Total Price model, the p-value of Square is extremely small and it plays a dominant explanatory role. In the Unit Price model, the p-value of Followers is lower than that of other variables. Therefore, Followers have a dominant explanatory power in this model, and the explanatory power of Square will decrease.

$$Total\ price(or\ Unit\ price) = \alpha + \beta Square + \gamma\_1\ Followers + \gamma\_2\ DOM + \varepsilon \quad (1)$$

Table 3: The impact of Square on real estate sales performance.

	Total Price		Unit Price	
	Coefficients	P-value	Coefficients	P-value
Square	6.4228	8.7E-258	-45.1631	0.0137
Followers	-0.1065	0.0252	-14.4429	0.0052
DOM	0.0407	0.4110	5.7976	0.2806
Multiple R	0.5789		0.0674	
R Square	0.3351		0.0045	

The next experiment uses Equation (2) to do regression analysis. Define the housing property type as " Ladder Ratio ". Table 4 presents the new results. In the Total Price and Unit Price environment, the p-values of the Ladder Ratio were all less than 0.05, the Multiple R values were all close to 1, and the R Square values were all greater than 30%. It is indicated that both dependent variables of the Ladder Ratio have a significant positive correlation effect. Moreover, the explanatory power of the independent variables for the dependent variables is all higher than 30%.

$$Total\ price(or\ Unit\ price) = \alpha + \beta Ladder\ Ratio + \gamma\_1\ Followers + \gamma\_2\ DOM + \gamma\_3 Community\ Average + \varepsilon \quad (2)$$

Table 4: The impact of Ladder Ratio on real estate sales performance

	Total Price		Unit Price	
	Coefficients	P-value	Coefficients	P-value
Ladder Ratio	125.9890	1.82E-16	2400.9343	0.0158
Followers	-0.0469	0.2821	4.5950	0.1069
DOM	-0.0292	0.5209	-11.9669	5.6426E-05
Community Average	77.9122	0	8876.2059	0
Multiple R	0.6659		0.8353	
R Square	0.4434		0.6978	

4.2.2 The Influence of External Factors on the Sales Performance of Real Estate

This experiment also investigated whether there was a subway station nearby. These one external factors were converted into binary values. The linear relationship between Subway, and the sales performance of real estate was explored.

The next experiment uses Equation (3) to do regression analysis. Define the housing property type as " Subway Binary " Convert Subway into binary. Table 5 presents the new results. In both environments, the p-value of Subway Binary was less than 0.001, indicating a highly significant impact on the dependent variable. However, the Multiple R and R Square values remain relatively low. It is speculated that this is due to the absence of important control variables in the data.

$$Total\ price(or\ Unit\ price) = \alpha + \beta Subway\ Binary + \gamma\_1\ Followers + \gamma\_2\ DOM + \varepsilon \quad (3)$$

Table 5: The impact of Subway on real estate sales performance

	Total Price		Unit Price	
	Coefficients	P-value	Coefficients	P-value
Subway Binary	39.6637	5.09E-07	5572.106	1.56E-15
Followers	-0.2254	9.9E-05	-14.3938	0.0048
DOM	0.0968	0.1090	2.8644	0.5906
Multiple R	0.1179		0.1547	
R Square	0.0139		0.0239	

4.2.3 The Influence of Property Attributes, Under the Interaction Effect, on the Sales Performance of Real Estate

To further reflect the impact of property attributes on the sales performance of real estate, this experiment will conduct interactions among some property attributes. We will explore how the sales performance of real estate will change under such interactions. All the interactive experiments were conducted in the Total Price environment.

This experiment uses a new Equation(4) to do regression analysis. This experiment only explored the interaction between the High Layer and Low Layer and the Ladder Ratio. Table 6 presents the new results. The p-value of the High Layer * Ladder Ratio is less than 0.05, indicating a significant impact on the dependent variable. The p-value of the Low Layer *

Ladder Ratio is greater than 0.05, indicating no significant impact on the dependent variable. The values of Multiple R and R Square are normal.

$$Total\ price(or\ Unit\ price) = \alpha + \beta\_1\ High\ Binary \times Ladder\ Ratio + \gamma\_1\ Followers + \gamma\_2\ DOM + \varepsilon \quad (4)$$

Table 6: The impact of Layer Height * Ladder Ratio on real estate sales performance

	Total Price	
	Coefficients	P-value
High * Ladder Ratio	35.2173	0.0138
Low * Ladder Ratio	28.2267	0.0589
Followers	-0.0615	0.1628
DOM	-0.0429	0.3502
Community Average	78.4823	0
Multiple R	0.6571	
R Square	0.4317	

The next experiment uses new Equation (5) to do regression analysis. The interaction between Subway and Ladder Ratio was explored. Table 7 presents the new results. The p-value of the "Subway * Ladder Ratio" is less than 0.05, indicating a significant impact on the dependent variable. The multiple R-value is approximately 0.657, and the interaction term "Subway * Ladder Ratio" shows a positive correlation effect on the dependent variable. The square value is approximately 0.432, and the experimental data fits well with the model.

$$Total\ price(or\ Unit\ price) = \alpha + \beta Subway \times Ladder\ Ratio + \gamma\_1\ Followers + \gamma\_2\ DOM + \gamma\_3 Community\ Average + \varepsilon \quad (5)$$

Table 7: The impact of Subway Ladder Ratio on real estate sales performance

	Total Price	
	Coefficients	P-value
Subway * Ladder Ratio	36.1862	0.0021
Followers	-0.0608	0.1669
DOM	-0.0429	0.3493
Community Average	77.5556	0
Multiple R	0.6574	
R Square	0.4321	

5 CONCLUSIONS

This article employs the OLS regression analysis method to process the data and arrives at the following conclusions. First Square can significantly affect the Total Price and Unit Price. Square directly determines the actual usable space of the house and the living comfort. Here is one suggestion: when targeting the group purchasing small Squares, by optimizing the spatial layout, functional diversity can be achieved to provide a more comfortable living experience. However, when studying Square and Unit Price, a phenomenon of an extremely small R Square occurred. This study believes that the reason for this phenomenon is that there is no simple linear relationship between Square and Unit Price; there are also missing variables that have masked the relationship between Square and Unit Price.

Second The Ladder Ratio can significantly affect the Total Price and Unit Price, and there is a linear relationship. The reason is that a Low Ladder Ratio indicates that more households are using the limited elevators, which will result in longer waiting times. The ability to attract consumers is weaker, leading to poor performance in real estate sales. A High Ladder Ratio means that fewer households are using the limited elevators, and there are rarely situations of elevator congestion. It can attract a large number of consumers and has a faster sales speed.

Third The subway has a significant impact on the performance of real estate sales. The subway makes the surrounding properties more accessible and convenient, enhancing their location advantages. Properties along the subway line tend to have higher values than those not along the line. However, the experimental data shows that the R Square is lower than 30%. This indicates that the data may be biased. This experiment believes that this is caused by the small sample size.

Fourth The synergy effect of High and Ladder Ratio has a significant impact on real estate sales performance; while the synergy effect of Low and Ladder Ratio has no significant impact on real estate sales performance. This experiment suggests that people living on higher floors have a greater demand for elevators. People living on lower floors have a smaller demand for elevators. When encountering peak periods, people living on high floors can effectively solve the congestion problem and save time with the high elevator-to-household ratio. The sales performance brought about by the synergy effect of High and Ladder Ratio is greater than that brought about by the synergy effect of Low and Ladder Ratio.

Fifth The combined effect of the "Subway and Ladder Ratio" has a significant impact on real estate sales performance. Properties along the subway line and those with a high number of floors can both enhance the convenience for the surrounding residents; elevators facilitate the vertical movement of residents, while the subway provides the convenience of horizontal transportation. When these two factors work together, they greatly improve the convenience for residents, increase the attractiveness of the properties, and thereby enhance the sales performance of real estate.

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