Influence of Design on Real Estate Inventories by Members of Kenya Property Developers' Association in Nairobi County

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Abstract

The purpose of this study was to determine the influence of design on Unsold New Houses held by members of the Kenya Property Developers Association (KPDA). The study adopted a positivist philosophy and descriptive correlational research design. The study population consisted of 4,085 unsold new houses, where a sample size of 364 units was drawn using a multistage random sampling technique. Property managers in this study were the units of observation; hence data was collected through a self-administered questionnaire. Descriptive statistics focused on relative frequency distribution, means, and standard deviation. Inferential statistics included ordinal logistic regression to test hypotheses and one-way ANOVA to assess the differences between group means. The generalized ordinal logistic regression study results revealed that the design of the unsold new house explains 36% of the duration it remained unsold ($r^2 = 0.36$). The findings further indicated that having other bedrooms ensuite ($\beta = -1.548$, $p < 0.05$), having a domestic servant's quarter ($\beta = -1.888$, $p < 0.05$), and having a swimming pool within the property development ($\beta = -2.510$, $p < 0.05$) were significant predictors of the duration of unsold new houses. The study concluded that the design of the unsold new house significantly influences the duration the house remained unsold. The study recommends that property developers should incorporate a swimming pool and domestic servant quarters in their development as well as having other bedrooms ensuite for houses with more than one bedroom.

Key Words: Design, Kenya Property Developers' Association, Unsold new house, real estate inventories.

Introduction

The issue of unsold new housing stock (UNHS) is significant as it directly impacts the financial standing of construction firms operating within the housing market and has broader implications for the socio-economic status of a nation (Wittowsky et al., 2020). The occurrence of UNHS serves as a significant metric within the housing market framework, as it directly impacts the profitability of the construction industry. This phenomenon arises from an inherent disparity between the demand and supply of residential properties (Xiong et al., 2020). The housing market experiences fluctuations in demand and supply due to a variety of factors and this is connected to UNHS. The term "UNHS" refers to residential houses that have been constructed and made available for sale, but have not been applied for by potential buyers, resulting in the absence of sales contracts (Judd, 2020).

The phenomenon of UNHS poses a significant global challenge. In 2018, Italian developers encountered this issue, with an estimated 100,000 units of UNHS observed (Bassi & Moscatelli, 2020). This figure is noteworthy, particularly considering reports indicating that the market is unable to adequately meet the potential demand emanating from both young individuals and immigrants. The housing market in the United States (US), which has long been characterized by insufficient inventory, is currently experiencing an unexpected surplus of unsold homes, with over 450,000 units remaining unsold in 2021 (Gopal & Saraiva, 2022). Since 2008, this UNHS has been recognized as the largest in the United States. The Canadian housing market continues to experience a significant surplus, as evidenced by the increasing number of unoccupied and unutilized housing units (Hawari & Rozari, 2022).

In the context of Kenya, it is observed that property developers are experiencing a significant surplus of newly constructed houses within their portfolios, despite the prevailing housing shortage (Cytonn, 2021). This surplus persists despite the government's efforts to address the issue through investments, subsidies, and the implementation of policies aimed at promoting affordable housing (KPDA, 2019). According to the Kenya Property Developer's Association (KPDA), there were a total of 4,085 unsold new houses in the Nairobi County and its metropolis in the year 2021 (KPDA, 2021). Moreover, according to Cytonn (2021), certain units of the UNHS had not been sold for a duration exceeding one year. This situation results in the immobilization of funds for housing developers, thereby posing a threat to their ability to undertake the construction of additional new houses to cater to the continuously growing demand. Design is closely related to the homebuyer’s preference, and it has an independent influence on the consumer purchase decision (Krapf & Wagner, 2020). The objective of this study was to investigate the effect of design on the inventory of unsold new houses owned by members of the KPDA in Kenya.

Statement of the Problem

The Centre for Affordable Housing Finance in Africa (CAHF) posited that Kenya faces an annual requirement of 250,000 residential housing units, whereas the projected availability of units amounts to 50,000 (CAHF, 2021). As a result, a deficit of 200,000 units is generated and based on the findings of the World Bank (2021), it is projected that the housing deficit will increase if suitable interventions are not implemented, as a result of a consistent annual population growth rate of 2.8% observed over the past two decades. The primary cause of the housing supply and demand imbalance can be attributed to economic factors, with the issue of unaffordability being particularly significant (Cytonn, 2021). Despite the existing housing scarcity in Kenya, property developers consistently encounter a notable surplus of newly constructed houses that remain unsold in their portfolios. This situation persists despite the government's endeavors to tackle the problem through investments, subsidies, and the implementation of affordable housing policies (KPDA, 2019). According to the data presented by the KPDA, there was a total of 4,085 unsold residential properties in Nairobi County and its metropolis (KPDA, 2021). Moreover, according to Cytonn (2021), certain segments of the UNHS experience a prolonged period of unsold inventory, resulting in the immobilization of capital for developers in the housing sector. Consequently, this situation poses a potential obstacle to the developers’ capacity to participate in the development of additional residential properties to address the continuously growing demand.

Considerable research has been undertaken to investigate how design influence UNHS, but these studies have been conducted in other countries that have different real estate sectors to Kenya’s. In Malaysia, Yuhaniz and Jusan (2016) determined that Malay housewives base their housing design preferences on their sleeping patterns, where those with the least

sleeping hour preferring larger master bedrooms. Moreover, a study carried out by Olanrewaju and Woon (2017) found that number of bedrooms were a significant determinant. Besides, Yusoff et al. (2017) determined that house aesthetics was less influential to housing buyers. However, Mulyano et al. (2020) found that aesthetics aspects such as technical installation, and the quality of the building itself are key attributes to attracting demand for the properties. BuHamdan et al. (2020) determined that parking bays, health clubs and swimming pools were a vital aspect that influence house purchase. It is evident that there is a scarcity of scholarly investigations conducted in Kenya regarding the matter of influence of design on UNHS within the purview of housing developers and this study sought to fill this gap.

Study Hypothesis

H_0: Design does not significantly influence Unsold New Houses by members of Kenya Property Developers Association (KPDA).

Literature Review

Theoretical Review

The present study was grounded in the economic theory of housing demand, which originated from the seminal works of Menger and Jevons in 1871 (Arnott, 1987). The development of the theory regarding determinants of housing demand, which challenges the neoclassical economists' assertion that income and price are the primary factors, has been the subject of investigation by numerous scholars (Boelhouwer, 2011). According to Follain and Jimenez (1985), housing possesses a distinct set of inherent qualities that distinguish it from other commodities, thereby rendering the housing market markedly distinct from other markets. Additionally, Arnott (1989) indicates that the demand for housing is influenced by various factors such as demographic characteristics, location, household income, prices, and the design of the house. When a household engages in the acquisition of a housing unit, it acquires not only the tangible structure itself, but also the immobility associated with the design. Wen and Tao (2015) expanded upon the elements of economic modelling pertaining to the determinants of housing demand by emphasising the significance of the house design in influencing the residential housing demand. The aspects of design that are vital are indicated to be build quality, number of bedrooms, size of the house, the type of house and other amenities provided such as parking bays, swimming pools, play area and work-out areas (Wen et al., 2015). This theory was employed to in this study to link design aspects with UNHS.

Empirical Review

The most common type of houses are apartments, town houses, bungalows, and luxury villas. Glaeser et al. (2017) examined vacancies in the Chinese Market that included both completed units unsold by developers and purchased units that remained unoccupied and found that the modular skyscraper design remained unsold for a long duration. Similarly, Yoo and Kwon (2019) analyzed the different factors affecting vacant housing in South Korea and found that design of the houses characterized by the housing type and the main type of vacant housing was apartments and this influenced time that it took for a house to be sold. In Malaysia, Malay housewives base their housing design preferences on the number and size of bedrooms, and they prefer larger master bedrooms (Yuhaniz & Jusan, 2016).

Another study by Mulyano et al. (2020) found that aesthetics aspects such as technical installation, and the quality of the building itself are key attributes to attracting demand for the properties. Further, BuHamdan, Alwisy and Boufergueneet (2020) explored how condominiums' physical attributes affect the time on market. The results of their study showed that using concrete or concrete blocks as building materials or having the building prefabricated can reduce the time to market. A study in South Korea by Yoo and Yoon (2021) analyzed the effect of green characteristics on sales of unsold housing stock, using a multilevel growth model, in Gyeonggi Province. The green characteristics that were estimated were external factors such as the proximity to urban parks and mountain trails located outside the housing complex and internal factors such as whether the area of communal open space within the complex exceeds a certain percentage. The results suggest that potential homebuyers are interested in green space inside rather than outside a housing complex in a suburban setting. In another empirical study by Majelan et al. (2020), it was established that physical design aspects of housing are among the factors that are considered in homeownership. Each household has different tastes for the home depending on the type of home, the furniture used, the floor area and the type of residence.

Conceptual Framework

The conceptual framework depicted in Figure 1 illustrates the hypothesised relationships.

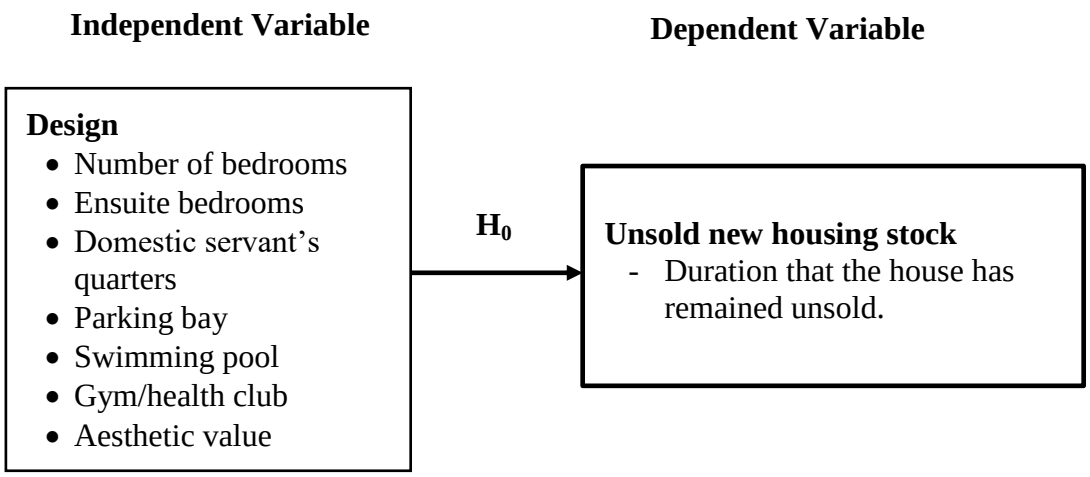

Figure 1. Conceptual Framework

Methodology

The present study employed a positivist approach. The target population for this study consisted of property developers who were members of KPDA and held ownership of 4,085 unsold new houses within high-rise flats developments in Nairobi County. The units of analysis in this study were the unsold new houses, while the units of observation were the managers of the housing development firms.

The authors employed a multi-stage probability sampling technique to account for the wide geographical distribution of the population. The census was implemented during the first phase. The subsequent phase involved the implementation of stratified random sampling, the new high-rise flats that remained unsold were categorized according to region, as mandated

by the 2019 guidelines set forth by the Department of City Planning, Nairobi City Council (City Council of Nairobi, 2019). The allocation of the sample was done in a proportional manner to ensure representation across all clusters. The sample size of 364 units from every cluster of the population was determined using simple random sampling.

Results and Discussion

Descriptive Statistics for Unsold New Houses

The study examined several factors pertaining to the UNHS, including the characteristics of the development, the current occupancy rate of the development, and the length of time in months that the houses had remained unsold. The findings are presented in Table 1.

Table 1. Nature of the Property Development

Nature of development	Frequency	Percent
Exclusive 1 bedroom	22	6.7
Exclusive 2 bedroom	49	14.9
Exclusive 3 bedroom	127	38.8
Exclusive 4 bedroom	48	14.6
Mixed development (1, 2, 3, 4 and more bedrooms)	82	25.0
Total	**328**	**100.0**

The study results presented in Table 1 indicate that a significant proportion of the unsold new houses (38.8%) were located within an exclusive development consisting of 3-bedroom properties.

The study further examined the likelihood of a residential property remaining unsold when situated within a mixed-use development. The findings are displayed in Table 2.

Table 2. House Likely to Remain Unsold If Development Is Mixed

Type of House	Frequency	Percent
1 bedroom	3	3.7
2 bedrooms	21	25.6
3 bedrooms	52	63.4
4 bedrooms	6	7.3
Total	**82**	**100.0**

The findings presented in Table 2 reveal that most of the participants (63.4%) indicated that three-bedroom houses in mixed developments were the most susceptible to remaining unsold. However, 3.7% of respondents expressed that 1-bedroom houses were the most probable to remain unsold in a mixed development.

The current occupancy rate was also investigated, and the findings are presented in Table 3.

Table 3. Current Percentage of Occupancy for the Development

Percentage of occupancy	Frequency	Percent
Less than 15%	19	5.8
16-30%	139	42.4
31-45%	88	26.8
46-60%	25	7.6
More than 60%	57	17.4
Total	**328**	**100.0**

The results presented in Table 3 demonstrate that 42.4% of the developments consisted of unsold new houses with an occupancy rate ranging from 16% to 30%, whereas only 5.8% of the developments had an occupancy rate below 15%.

The research further examined the length of time that the houses had remained unsold since the commencement of its marketing efforts, and the findings are presented in Table 4.

Table 4. Duration That the House Has Remained Unsold

Duration	Frequency	Percent
6 months and below	81	24.7
7-12 months	78	23.8
13-18 months	106	32.3
19-24 months	15	4.6
over 24 months	48	14.6
Total	328	100.0

The results presented in Table 4 demonstrate that within the sample of unsold new houses examined in this study, 32.3% of them had not been sold for a duration ranging from 13 to 18 months. The results additionally indicate that 4.6% of the newly constructed houses that were not sold had remained in an unsold state for a duration ranging from 19 to 24 months.

Descriptive Statistics for Design of Unsold New House

Table 5. Number of Bedrooms of the Unsold New House

Number of bedrooms	Frequency	Percent
1 bedroom	57	17.4
2 bedrooms	31	9.5
3 bedrooms	208	63.4
4 bedrooms	25	7.6
More than 4 bedrooms	7	2.1
Total	**328**	**100.0**

The findings summarized in Table 5 show that 63.4% of the unsold new houses were 3-bedroom houses while only 2.1% had more than four bedrooms. The study further enquired about the design features of the unsold new houses. The findings are provided in Table 6.

Table 6. Design Features of the Unsold New House

Design feature		Frequency	Percent
Is the master bedroom of the Unsold New Houses ensuite?	Yes	298	90.9
	No	30	9.1
	Total	**328**	**100.0**
If more than one bedroom, are the other bedrooms ensuite?	Yes	215	79.3
	No	56	20.7
	Total	**271**	**100.0**
Does the Unsold New Houses have a domestic servant's quarter?	Yes	200	61.0
	No	128	39.0
	Total	**328**	**100.0**
Is there a swimming pool within the property development?	Yes	250	76.2
	No	78	23.8
	Total	**328**	**100.0**
Does the Unsold New Houses have allocated parking bay(s)?	Yes	304	92.7
	No	24	7.3
	Total	**328**	**100.0**
Does the Unsold New Houses have a Gym/Health club?	Yes	201	61.3
	No	127	38.7
	Total	**328**	**100.0**
Does this Unsold New Houses have external and internal aesthetics?	Yes	297	90.5
	No	31	9.5
	Total	**328**	**100.0**

The study results summarized in Table 6 show that 90.9% of the unsold new houses had an ensuite master bedroom while 79.3% of those that had more than one bedroom had the other bedrooms ensuite. Besides, 61% of the unsold new houses had a domestic servant's quarter with 76.2% of the unsold new houses being in property developments that had swimming pools. Additionally, 92.7% of the unsold new houses had allocated parking bays while 61.3% of the unsold new houses had access to a gym / health club. The findings also indicated that 90.5% of the unsold new houses had external and internal aesthetics.

Ordinal Logistic Regression Results

An ordinal logistic regression model was fitted to investigate the influence of design of the unsold new house on the duration that the unsold new houses had remained in that state. independent variables, no multi-collinearity and assumption of proportionate odds or parallel lines. These assumptions were met, and the model was thus fitted.

A number of generalized ordered logistic regression tests were conducted to test the hypothesis including the model fitting information test, pseudo r-square, goodness-of-fit and the parameter estimates test. First, the results of the pseudo r-squared for the model of design of the unsold new house against duration of the unsold new houses are provided in Table 7.

Table 7. Pseudo R-Square for the Model of Design against Duration of Unsold New Houses

Cox and Snell	.342
Nagelkerke	.360
McFadden	.142

Link function: Logit.

The findings in Table 7 indicate that the Nagelkerke pseudo r – squared was 0.360 indicating that design of the unsold new house explained 36% of the duration it remained unsold from the time it was marketed. The fitness of the model was also tested using the omnibus likelihood ratio chi-square test. The findings are summarized in Table 8.

Table 8. Omnibus Test for the Model of Design against Duration of Unsold New Houses

Likelihood Ratio Chi-Square	df	Sig.
137.039	8	.000

The study results provided in Table 8 indicate that the model was a good fit (Likelihood Ratio Chi-Square = 137.039, $p < 0.05$). This indicated that some house design parameters had a significant influence on the duration of the unsold new houses. This led to the rejection of the null hypothesis, which was.

H_0: There is a no significant relationship between design and unsold new houses held by members of KPDA.

This led to the acceptance of the alternate hypothesis that there is significant relationship between design and unsold new houses held by members of KPDA.

To determine the design aspects that had a significant influence on the duration of the unsold new houses, the parameter estimates were developed. The results are provided in Table 9.

Table 9. Parameter Estimates for Design against Duration of Unsold New Houses

Parameter		B	Std. Error	95% Wald Confidence Interval Lower	95% Wald Confidence Interval Upper	Hypothesis Test Wald Chi-Square	Hypothesis Test df	Hypothesis Test Sig.
Threshold	[6 or less=1]	.007	.7568	-1.476	1.490	.000	1	.993
	[7-12=2]	1.424	.7513	-.049	2.896	3.590	1	.058
	[13-18=3]	3.300	.7752	1.781	4.820	18.128	1	.000
	[19-24=4]	3.714	.7863	2.173	5.255	22.309	1	.000
Number of bedrooms of the unsold new house		.077	.1116	-.142	.296	.475	1	.491
Whether master bedroom of the Unsold New Houses is ensuite		-.042	.3545	-.737	.653	.014	1	.906
If more than one bedroom, whether other bedrooms are ensuite		-1.548	.3167	-2.168	-.927	23.883	1	.000
Whether Unsold New Houses has a domestic servant's quarter		-1.888	.2971	-2.470	-1.306	40.376	1	.000
Presence of swimming pool within the property development		-2.510	.3263	-3.150	-1.870	59.171	1	.000
Presence of allocated parking bay(s) for the Unsold New Houses		-.617	.3993	-1.399	.166	2.385	1	.123
Presence of Gym/Health club in the development		-.274	.2720	-.807	.259	1.012	1	.314
External and Internal aesthetics of the house		.008	.3578	-.693	.710	.001	1	.981

The ordinal regression models fitted from the results in Table 9 were.

$$\text{Logit } P(Y \leq 6 \text{ or less}) = 0.007 + 1.548X_3 + 1.888X_4 + 2.510X_5$$

$$\text{Logit } P(Y \leq 7\text{-}12) = 1.424 + 1.548X_3 + 1.888X_4 + 2.510X_5$$

$$\text{Logit } P(Y \leq 13\text{-}18) = 3.300 + 1.548X_3 + 1.888X_4 + 2.510X_5$$

$$\text{Logit } P(Y \leq 19\text{-}24) = 3.714 + 1.548X_3 + 1.888X_4 + 2.510X_5$$

Where Y is duration that the house had remained unsold, X_3 is if more than one bedroom, whether other bedrooms are ensuite, X_4 is whether unsold new houses have a domestic servant's quarter, and X_5 is presence of swimming pool within the property development.

The findings provided in 9 indicate that having other bedrooms ensuite ($B = -1.548$, $p < 0.05$), having domestic servant's quarter ($B = -1.888$, $p < 0.05$), and having a swimming pool within the property development ($B = -2.510$, $p < 0.05$) were significant predictors of the

duration of unsold new houses. These findings show that having all bedrooms of the unsold new house ensuite decreased the log-odds of the duration of the unsold new house rising from a lower level to a higher level by 1.548, while all other variables in the model remain constant. The findings imply that new houses with all bedrooms ensuite were likely to sell faster than those new houses that had all bedrooms not ensuite.

Besides, the findings indicate that unsold new houses with domestic servant's quarters reduced the log-odds of the duration of the unsold new house rising from a lower level to a higher level by 1.888, while all other variables in the model remain constant. The findings implied that unsold new houses with servant quarters were likely to sell faster than those new houses without servant quarters. Likewise, the findings indicated that unsold new houses that were in developments with a swimming pool reduced the log-odds of the duration of the unsold new house rising from a lower level to a higher level by 2.510, while all other variables in the model remain constant. These findings implied that new houses in a development that had a swimming pool were likely to sell faster compared to those in a development without a swimming pool. However, number of bedrooms, master bedroom of the Unsold New Houses is ensuite and presence of allocated parking bay(s), gym/health club and external and internal aesthetics were not significant predictors of the duration of the unsold new house.

Discussion of Findings

The study sought to determine the influence of design on unsold new houses held members of KPDA. The findings indicated that having other bedrooms ensuite ($B = -1.548$, $p < 0.05$), having domestic servant's quarter ($B = -1.888$, $p < 0.05$), and having a swimming pool within the property development ($B = -2.510$, $p < 0.05$) were significant predictors of the duration of unsold new houses. The results are not aligned with the outcome by Ishak et al. (2019) who found that there was no significant relationship between design on presence of ensuite bedrooms and the unsold houses. Ishak et al. (2019) determined that the homebuyers did not care about the presence of the ensuite bedrooms if the houses are comfortable and in good condition. The results, however, support Olanrewaju & Woon (2017) who found that number of bedrooms are a significant predictor since the number of bedrooms needs to be sufficient to accommodate all family members.

Contrary to the findings of this study, Turnbull and Waller (2018) found that number of bedrooms had no influence on the houses' sale probability. Besides, the findings indicate that unsold new houses with domestic servant's quarters reduced the log-odds of the duration of the unsold new house rising from a lower level to a higher level. The findings implied that unsold new houses with servant quarters were likely to sell faster than those new houses without servant quarters. The study results also found that number of bedrooms, master bedroom of the unsold new houses is ensuite and presence of allocated parking bays, gym/health club and external and internal aesthetics were not significant predictors of the duration of the unsold new house. The findings contradict Mulyano et al. (2020) who found that aesthetics aspects such as technical installation, and the quality of the building itself are key attributes to attracting demand for the properties. Further, the study findings disagree with the findings by Olanrewaju and Woon (2017) that presence of a parking was a significant determinant in the demand of the houses**.**

Conclusion and Recommendations

The findings from the generalized ordinal logistic regression analysis indicated that the likelihood ratio chi-square for goodness-of-fit test the model was a good fit (Likelihood Ratio Chi-Square = 137.039, $p < 0.05$) thereby providing justification to reject the null hypothesis that design has no significant influence on UNHS. Parameter estimates established that having other bedrooms ensuite ($B = -1.548$, $p < 0.05$), having domestic servant's quarter ($B = -1.888$, $p < 0.05$), and having a swimming pool within the property development ($B = -2.510$, $p < 0.05$). Hence, design has a significant influence on unsold new houses in Kenya. The study, therefore, recommends that developers should be strategic when choosing their design; they should incorporate swimming pool and domestic servant's quarters as well as having other bedrooms ensuite when the development has more than one bedroom.

The scope of the study was restricted to residential dwellings situated exclusively within high-rise apartment buildings. Therefore, it is recommended that future studies be undertaken to investigate additional types of property developments, such as commercial developments and residential houses, encompassing various architectural designs, including bungalows, villas, and townhouses. Furthermore, it should be noted that the scope of the study was confined to the timeframe ending in December 2020, a period that was significantly impacted by the global COVID-19 pandemic. Hence, it is imperative to undertake longitudinal research to ascertain the replicability of these findings across various years.

References

Abere, C. O., Ogunba, O. A., & Dugeri, T. T. (2018). An evaluation of property markets in Southwestern Nigeria. *Property Management*, *36*(3), 314–332. https://doi.org/10.1108/pm-04-2017-0022

Alias, A., Zyed, Z. A. S., & Ning, C. S. (2018). Strategies for High End High Rise Residential Property Using Marketing Mix during a Soft Market in Kuala Lumpur. *International Journal of Property Sciences*, *8*(1), 27–39. https://doi.org/10.22452/ijps.vol8no1.3

Arnott, R. (1987). Economic theory and housing. In *Handbook of Regional and Urban Economics* (pp. 959–988). Elsevier. https://doi.org/10.1016/s1574-0080(87)80010-x

Arnott, R. (1989). Housing vacancies, thin markets, and idiosyncratic tastes. *The Journal of Real Estate Finance and Economics*, *2*(1), 5–30. https://doi.org/10.1007/bf00161714

Augustyniak, H., Laszek, J., Olszewski, K., & Waszczuk, J. (2014). Housing Market Cycles A Disequilibrium Model and Its Application to the Primary Housing Market in Warsaw. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2841711

Bassi, A., & Moscatelli, M. (2020). Property Value and Sustainability. The Future of Living: Focus on Short-Term Rents in Italy. *Sustainability*, *12*(7), 2721. https://doi.org/10.3390/su12072721

Boelhouwer, P. (2011). Neo-classical Economic Theory on Housing Markets and Behavioural Sciences: Ally or Opponent? *Housing, Theory and Society*, *28*(3), 276–280. https://doi.org/10.1080/14036096.2011.599173

BuHamdan, S., Alwisy, A., & Bouferguene, A. (2020). Drivers of housing purchasing decisions: a data-driven analysis. *International Journal of Housing Markets and Analysis, 14*(1), 97–123. https://doi.org/10.1108/ijhma-02-2020-0018

Cai, W., & Lu, X. (2015). Housing affordability: Beyond the income and price terms, using China as a case study. *Habitat International*, *47*, 169–175. https://doi.org/10.1016/j.habitatint.2015.01.021

Ceritoğlu, E. (2019). Homeownership, Housing Demand, and Household Wealth Distribution in Turkey. *Emerging Markets Finance and Trade*, *56*(5), 1146–1165. https://doi.org/10.1080/1540496x.2018.1555461

Cetintahra, G. E., & Cubukcu, E. (2015). The influence of environmental aesthetics on economic value of housing: Empirical research on virtual environments. *Journal of Housing and the Built Environment*, *30*(2), 331–340. https://doi.org/10.1007/s10901-014-9413-6

Cooper, D. R., & Schindler, P. S. (2022). *Business Research Methods* (14th ed.). McGraw-Hill Education. https://www.amazon.com/Business-Research-Methods-Donald-Cooper/dp/0073521507

Follain, J. R., & Jimenez, E. (1985). Estimating the demand for housing characteristics: A survey and critique. *Regional Science and Urban Economics*, *15*(1), 77–107. https://doi.org/10.1016/0166-0462(85)90033-x

Gentili, M., & Hoekstra, J. (2018). Houses without people and people without houses: a cultural and institutional exploration of an Italian paradox. *Housing Studies*, *34*(3), 425–447. https://doi.org/10.1080/02673037.2018.1447093

Georg Heyer, K., & Holden, E. (2001). Housing as basis for sustainable consumption. *International Journal of Sustainable Development*, *4*(1), 48–58. https://doi.org/10.1504/ijsd.2001.001545

Glaeser, E., Huang, W., Ma, Y., & Shleifer, A. (2017). A real estate boom with Chinese characteristics. *Journal of Economic Perspectives*, *31*(1), 93–116. https://doi.org/10.1257/jep.31.1.93

Gopal, P., & Saraiva, C. (2022, March 12). Homes for Sale Surge as Builders Are Stuck With Too Much Inventory. *Bloomberg*. https://www.bloomberg.com/news/articles/2022-08-09/homes-for-sale-surge-as-builders-are-stuck-with-too-much-inventory#xj4y7vzkg

Halket, Jonathan; Nesheim, Lars; Oswald, F. W. (2015). *The housing stock, housing prices, and user costs: The roles of location, structure and unobserved quality*.

Hawari, N. N., & Rozari, N. N. B. (2022). Analysing the unsold housing stock problem using system dynamics approach. *AIP Conference Proceedings*, *2472*(1). https://doi.org/10.1063/5.0092723/2825785

Huang, Z., & Du, X. (2015). Assessment and determinants of residential satisfaction with public housing in Hangzhou, China. *Habitat International*, *47*, 218–230. https://doi.org/10.1016/j.habitatint.2015.01.025

Ishak, N. L., Yakub, A. A., & Achu, K. (2019). Buyers' perception on factors affecting affordable housing overhang in Johor , Malaysia. *Habitable Cities*, *13*(2), 48–58.

Jang, M., & Kang, C. D. (2015). Retail accessibility and proximity effects on housing prices in Seoul, Korea: A retail type and housing submarket approach. *Habitat International*, *49*, 516–528. https://doi.org/10.1016/J.HABITATINT.2015.07.004

Judd, B. (2020). A Review of the rise in vacant housing in post-growth Japan: housing market, urban policy, and revitalizing aging cities, Edited by Tomoko Kubo and Yoshimichi Yui. *International Journal of Housing Policy*, *20*(3), 457–460. https://doi.org/10.1080/19491247.2020.1791501

Krapf, S., & Wagner, M. (2020). Housing Affordability, Housing Tenure Status and Household Density: Are Housing Characteristics Associated with Union Dissolution? *European Journal of Population*, *0123456789*. https://doi.org/10.1007/s10680-019-09549-6

Kwoun, M.-J., Lee, S.-H., Kim, J.-H., & Kim, J.-J. (2013). Dynamic cycles of unsold new housing stocks, investment in housing, and housing supply and demand. *Mathematical and Computer Modelling*, *57*(9–10), 2094–2105. https://doi.org/10.1016/j.mcm.2011.08.005

Lee, C. L. (2014). The inflation-hedging characteristics of Malaysian residential property. *International Journal of Housing Markets and Analysis*, *7*(1), 61–75. https://doi.org/10.1108/IJHMA-10-2012-0053

Li, H., & Wei, Y. D. (2020). Spatial inequality of housing value changes since the financial crisis. *Applied Geography*, *115*, 102141. https://doi.org/10.1016/j.apgeog.2019.102141

Mahar, W., Knapen, E., & Verbeeck, G. (2017). *Methodology to determine housing characteristics in less developed areas in developing countries: A case study of Quetta, Pakistan*. *figure 1*, 1–17.

Majelan, N. A., Rangga, W., Jiram, A., Ismail, A., & Bujang, A. A. (2020). Efficiency Of Housing Delivery System for Affordable Homeownership In Malaysia: A Review Of Literature. *Jurnal Kemanusiaan*, *18*(2), 20–24.

Mohit, M. A., Ibrahim, M., & Rashid, Y. R. (2010). Assessment of residential satisfaction in newly designed public low-cost housing in Kuala Lumpur, Malaysia. *Habitat International*, *34*(1), 18–27. https://doi.org/10.1016/j.habitatint.2009.04.002

Mulyano, Y., Rahadi, R. A., & Amaliah, U. (2020). Millennials Housing Preferences Model in Jakarta. *European Journal of Business and Management Research*, *5*(1), 1–9. https://doi.org/10.24018/ejbmr.2020.5.1.240

Olanrewaju, A. L., & Woon, T. C. (2017). An exploration of determinants of affordable housing choice. *International Journal of Housing Markets and Analysis*, *10*(5), 703–723. https://doi.org/10.1108/IJHMA-11-2016-0074

Opoku, R. A., & Abdul-Muhmin, A. G. (2010). Housing preferences and attribute importance among low-income consumers in Saudi Arabia. *Habitat International*, *34*(2), 219–227. https://doi.org/10.1016/j.habitatint.2009.09.006

Rahadi, R. A., Wiryono, S. K., Koesrindartoto, D. P., & Syamwil, I. B. (2015). Factors influencing the price of housing in Indonesia. *International Journal of Housing Markets and Analysis*, *8*(2), 169–188. https://doi.org/10.1108/IJHMA-04-2014-0008

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research Methods for Business Students* (8th ed.). Pearson.

Tavakoli, D. B., Tafrishi, M., & Abbaspour, E. (2017). Criteria and Factors Affecting Sustainable Housing Design in Iran. *Journal of Sustainable Development*, *10*(3), 194. https://doi.org/10.5539/jsd.v10n3p194

Turnbull, G. K., & Waller, B. D. (2018). (What) do top performing real estate agents deliver for their clients? *Journal of Housing Economics*, *41*(June), 142–152. https://doi.org/10.1016/j.jhe.2018.06.005

Wen, H., & Tao, Y. (2015). Polycentric urban structure and housing price in the transitional China: Evidence from Hangzhou. *Habitat International*, *46*, 138–146. https://doi.org/10.1016/J.HABITATINT.2014.11.006

Wen, H., Zhang, Y., & Zhang, L. (2015). Assessing amenity effects of urban landscapes on housing price in Hangzhou, China. *Urban Forestry and Urban Greening*, *14*(4), 1017–1026. https://doi.org/10.1016/J.UFUG.2015.09.013

Wittowsky, D., Hoekveld, J., Welsch, J., & Steier, M. (2020). Residential housing prices: Impact of housing characteristics, accessibility and neighbouring apartments, a case study of Dortmund, Germany. *Urban, Planning and Transport Research*, *8*(1), 44–70. https://doi.org/10.1080/21650020.2019.1704429

Xiong, X., Guo, H., & Hu, X. (2020). The housing demand analysis and prediction of the real estate based on the AWGM model. *Grey Systems: Theory and Application*, *11*(2), 222–240. https://doi.org/10.1108/gs-09-2019-0035

Yoo, H., & Kwon, Y. (2019). Different factors affecting vacant housing according to regional characteristics in South Korea. *Sustainability (Switzerland)*, *11*(24), 1–14. https://doi.org/10.3390/su11246913

Yoo, H., & Yoon, H. (2021). The effect of green characteristics in reducing the inventory of unsold housing in new residential developments-a case of Gyeonggi Province, in South Korea. *Land*, *10*(4). https://doi.org/10.3390/land10040377

Yuhaniz, M., & Jusan, M. M. (2016). The Role and Activities of Malay Housewives and their Influence on Housing Design Preferences. *Procedia - Social and Behavioural Sciences*, *222*, 720–728. https://doi.org/10.1016/j.sbspro.2016.05.233

Yusoff, S. M., Shahril, M., & Rahman, A. (2017). Oversupply causes of double storey terrace houses in Johor, *Habitable Cities*, *11*(3), 119 – 127.