



The environmental challenges of urban living: Why willingness to pay for apartments matters

Aarce Tehupeior^a, Rachmat Mulyana^b, Imelda Masni Juniaty Sianipar^{c,d}, I Wayan Koko Suryawan^{e,*}, Iva Yenis Septiariva^f, Wisnu Prayogo^b

^a Doctor of Law Program, Universitas Kristen Indonesia, Cawang, Jakarta, 13630, Indonesia

^b Department of Building Engineering Education, Universitas Negeri Medan, Medan, Indonesia

^c PhD Student in Asia-Pacific Regional Studies, College of Humanities and Social Sciences, National Dong Hwa University Hualien 974, Taiwan

^d Department of International Relations, Faculty of Social Science and Political Science, Universitas Kristen Indonesia, Jakarta, 13630, Indonesia

^e Department of Environmental Engineering, Faculty of Infrastructure Planning, Universitas Pertamina, Jakarta, 12220, Indonesia

^f Civil Engineering Study Program, Faculty of Engineering, Universitas Sebelas Maret, Surakarta, 57126, Indonesia

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ABSTRACT

This study aims to understand the willingness of urban communities in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, Bekasi) to move to apartment dwellings, and a study was conducted using a quantitative survey method. The study aimed to analyze the sociodemographic factors influencing the decision to switch to vertical housing. The survey collected data from a sample of individuals representing the entire population in Jabodetabek. The participants in the study were selected from various locations within Jabodetabek, including Jakarta, Bogor, Depok, Tangerang, and Bekasi. These areas were chosen to comprehensively represent the metropolitan region and its urban communities. By including participants from different locations within Jabodetabek, the study aimed to capture individuals' diverse perspectives and experiences in this region. The survey covered a range of sociodemographic factors such as gender, income, education level, marital status, occupancy, and residence ownership. The participants were divided into two groups: those willing to pay for an apartment and those who were unwilling to pay for an apartment and those not. By comparing the characteristics of these two groups, the study aimed to identify significant differences and understand the factors influencing the willingness to move to apartment dwellings. The study results showed significant differences in income level, education level, marital status, and occupancy between the two groups. Income level was the most significant factor affecting an individual's willingness to pay for an apartment. Additionally, the perception of better apartment productivity, which includes reduced transportation time and costs associated with work or other business purposes, increased the demand for apartments. The study found that income level was the most significant factor affecting an individual's willingness to pay for an apartment. The perception of better apartment productivity also increased demand for apartments, as it reduces transportation time and costs associated with work or other business purposes. The study suggests that vertical development in metropolitan areas can provide a solution to increase population density and overcome the problem of limited land availability. The government can use the findings from this study to support policies that promote vertical development in cities.

Introduction

The house serves as the principal place of human activity. The house also functions as a place to live, a shelter from the weather and wild animals, and a private area for humans. The rapid increase in population each year increases the demand for housing, resulting in increasingly restricted land being created, causing land prices to rise (Cai et al.,

2020). The high price of landed or landed houses encourages people to switch to vertical housing, such as apartments (Widya et al., 2023). An apartment is the best choice for urban people, especially families and young executives (Florida et al., 2021). Urban communities' busy and fast life makes living in apartments more practical and affordable (Nijskens et al., 2018). The high growth in apartment projects has encouraged developers to compete to attract consumers by offering

* Corresponding author.

E-mail address: i.suryawan@universitaspertamina.ac.id (I.W.K. Suryawan).

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prices that vary according to the specifications of the apartment units they have. Several factors can affect the diversity of apartment values, namely physical factors and apartment location factors. Physical factors include the design, size, and quality of the building. In contrast, the location factor uses accessibility indicators, namely the property's distance to the CBD (central business district) or other facilities close to housing, such as schools, shops, and workplaces (Wittowsky et al., 2020).

Provision of housing on a large scale, such as on a national scale, requires the participation of many parties other than the government, namely the private sector, such as property/real estate entrepreneurs or developers, the community, and other related entities and institutions. The community's need for a place to live can be met by building your own house or buying a house provided by a developer company. Many developers offer various housing types, such as apartments. People in urban areas such as Jakarta generally prefer to buy housing or apartments from a developer.

Apartments are built to realize decent housing at affordable prices in a healthy, safe, comfortable, and sustainable environment (Kushendar et al., 2021) and create an integrated settlement to build an economic, social, and cultural defense. Making an informed decision about the benefits of green residential properties can impact a resident's inclination towards certified residential properties, leading to increased demand for eco-friendly homes (Chuweni et al., 2022). Apartments increase the efficiency and effectiveness of space and land utilization and provide green open spaces in urban areas. When someone buys a house or apartment from a developer, a relationship is established between them. A bond usually binds a person's relationship with an institution in buying and selling, called an agreement. Urban land consolidation based on spatial dimensions can be divided into 3 (three) models: horizontal-to-horizontal land consolidation, horizontal-to-vertical land consolidation (construction of flats), and vertical-to-vertical land consolidation. The urban land consolidation referred to in this study is horizontal to vertical land consolidation (in the form of apartment development plans). Since acceptance or rejection from the community is one of the main factors for whether or not the program can be implemented, it is necessary to measure and analyze the willingness to accept the program from the community as material for following up on the implementation of land consolidation.

Apartments can be important for metropolitan cities' environment because they can help overcome some environmental problems in big cities (Lashari et al., 2021). In addition, apartments can help expand green open spaces in big cities. For example, some modern apartments have roof gardens or green terraces that residents can use (Pham et al., 2021). This can help improve air quality and provide more green space in densely populated urban environments. Lifestyle is also a factor influencing the willingness of urban people to move into apartments (Kwon and Kim, 2019). Since apartments are usually smaller than houses, they are better suited to more active and busier societies and have less time to care for the house. Apartments can also be equipped with gyms, swimming pools, and standard rooms, attractive to urban residents who wish easy access to these facilities.

This study's importance to environmental challenges lies in exploring the factors that motivate people to move from landed houses to vertical housing such as apartments. As cities become more densely populated, the demand for living space increases, and the availability of land decreases. This can result in environmental challenges such as air pollution, deforestation, and the destruction of natural habitats. The study's findings provide insights into the potential for vertical development to solve these challenges. By analyzing the willingness of urban communities to pay for apartments, the study sheds light on the factors that can drive the adoption of vertical housing. The results suggest that the perception of better apartment productivity can be a significant factor in increasing demand for apartments, which can, in turn, reduce transportation time and costs associated with work or other business purposes. Moreover, by identifying income level as the most significant

factor affecting an individual's willingness to pay for an apartment, the study provides valuable information for policymakers to design targeted policies that support low-income communities access to vertical housing. In summary, this study's importance to environmental challenges lies in its potential to inform policies that promote sustainable urban development and mitigate the negative environmental impacts of urbanization.

This study aims to analyze the level of willingness of urban communities to move to apartment dwellings. In addition, this research also identifies sociodemographic variables. Finally, it analyzes how people's views influence the productivity, benefit, and land certificate consideration levels that affect people's willingness to pay (WTP) for an apartment. In addition, sociodemographics can affect WTP because factors such as age, marital status, income, education (Lee and Cheah, 2014; Suryawan and Lee, 2023; Sutrisno et al., 2023b), and housing availability play an important role in housing purchasing decisions.

The novelty of this study lies in its emphasis on metropolitan urban communities' WTP for apartments, a niche area inadequately addressed by prior research. Although previous investigations (Kim et al., 2018; Njo et al., 2021) have explored the drivers behind the demand for vertical housing, the specific dimension of WTP remains largely unexplored. Enhancing the state of the art, this research adopts both logit and probit models for a rigorous analysis, providing deeper insights into the dynamics influencing vertical housing demand.

Furthermore, the environmental implications of apartment living stand as a pivotal dimension in housing preferences. When urbanites indicate a WTP for apartments underlined by environmental consciousness, it underscores their recognition of apartments' potential for sustainability. Opting for apartments mitigates land degradation by requiring lesser land than conventional houses, conserving nature, and upholding urban green spaces. Many apartments also incorporate green innovations such as energy-efficient designs, sustainable construction materials, and integrated waste management, reflecting a reduced environmental impact. Strategically located apartments within cities can curb urban sprawl, endorsing compact city designs. This approach promotes efficient land utilization, diminishes extended transportation needs, and reduces greenhouse gas emissions. Apartments further offer shared eco-friendly amenities, including communal green spaces, rooftop gardens, and sustainable transportation solutions, underscoring their pivotal role in championing environmental sustainability.

Method

This study employs an explanatory research design to investigate the factors that influence an individual's willingness to pay for apartment accommodations. Adopting a quantitative approach, we utilized a survey method to gather data from a representative sample drawn from the target population. The sampling units were chosen from the general populace, while the units of analysis were individual homeowners or family heads, who were taken as representatives. Data collection was primarily facilitated through structured questionnaires. The responses were subsequently compiled, processed, and analyzed to derive meaningful conclusions. Study Location

Jabodetabek (Fig. 1) is a highly urbanized and densely populated metropolitan area that encompasses Jakarta, the capital city of Indonesia, and its surrounding satellite cities, including Bogor, Depok, Tangerang, and Bekasi. As one of the most populous regions in the world, Jabodetabek faces challenges related to urbanization, population growth, and limited land availability. This makes it an ideal area to study the impact of vertical housing as a solution to these issues. The high cost of purchasing landed houses in Jabodetabek is a prevalent issue. This factor has led many individuals and families to consider alternative housing options like apartments. By focusing on Jabodetabek, the research can explore the motivations and preferences of residents in a context where the cost of landed houses is a significant driver for considering vertical housing. Densely populated cities like those in

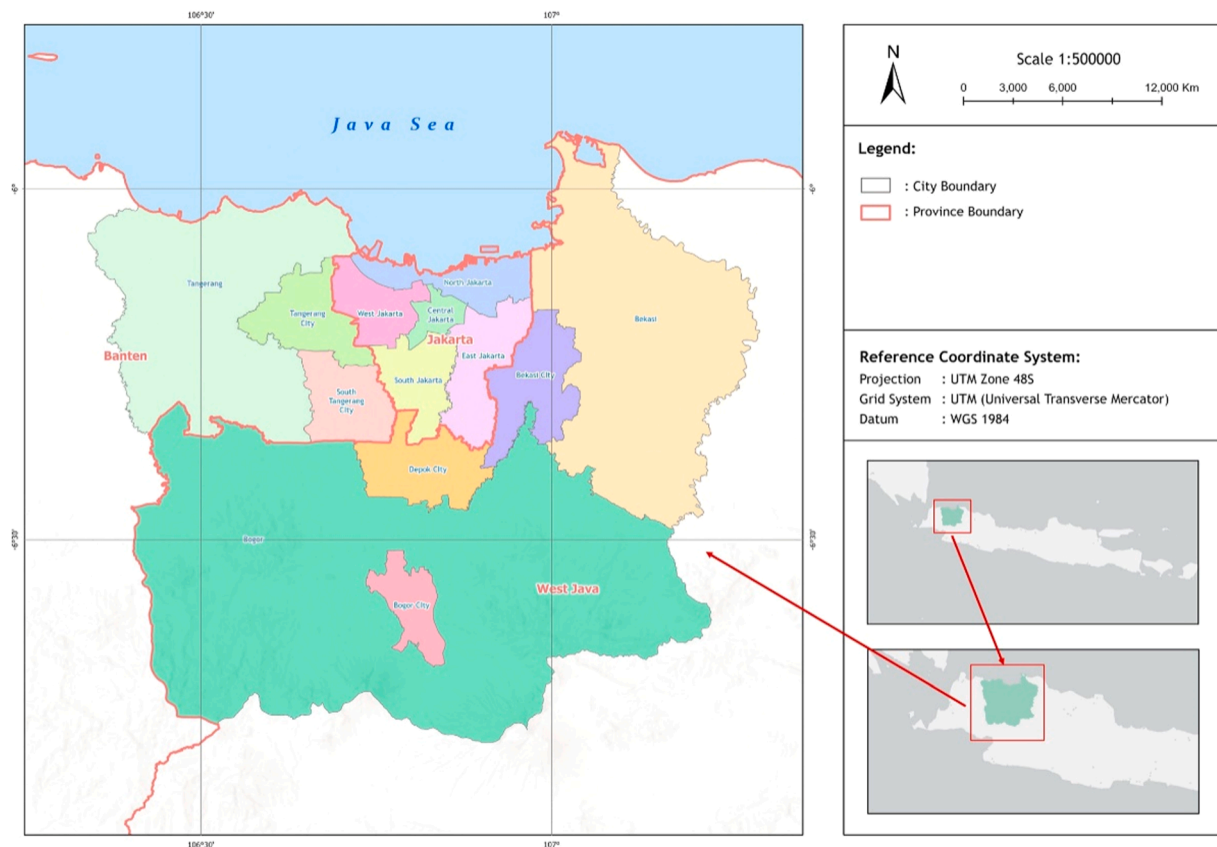


Fig. 1. Study Location.

Jabodetabek often face environmental challenges, including traffic congestion, air pollution, and the strain on infrastructure. The trend towards vertical housing, such as apartments, can help alleviate some issues by promoting higher population density and reducing commuting distances. Jabodetabek provides an appropriate setting to examine the potential environmental benefits of vertical development. Jabodetabek is home to various urban communities with different sociodemographic backgrounds, including income levels, education levels, and marital statuses. By conducting the research in Jabodetabek, the study can capture a broad spectrum of perspectives and experiences, enabling a more comprehensive analysis of the factors influencing the willingness to move to apartment dwellings. This research can provide valuable insights into the specific dynamics and considerations of urban communities in this metropolitan region. The findings can inform policy decisions, urban planning strategies, and housing development initiatives in Jabodetabek and other similar metropolitan areas facing similar challenges.

Survey execution

Before distributing the questionnaire, a preliminary survey was conducted on 30 individuals. The purpose of this preliminary survey was to test the validity and reliability of the data that would be collected through the questionnaire. The preliminary survey results were then used as a reference to improve the questionnaire design. By conducting a preliminary survey, the researchers ensured that the questions in the questionnaire were clear and understandable to the respondents and accurately captured the variables being studied. This helped to increase the reliability of the data collected and reduced the risk of measurement errors. Using a preliminary survey in the research process demonstrates a commitment to ensuring the quality and accuracy of the data collected. It is a valuable step in research design and can help to increase the

validity and reliability of the study's findings.

Respondent and data analysis

This study employed closed-ended questionnaires to gather extensive information from research participants, aligning with the research objectives. The target population for this study was the Jabodetabek metropolitan area, which encompasses a population of approximately 30 million individuals. The Slovin formula was utilized with a significance level of 5% to determine an appropriate sample size, resulting in a minimum sample size of 400. However, to enhance the study's statistical power, a sample size of $n = 570$ was ultimately used.

The sampling technique employed for landowners in this study was stratified random sampling. This method ensures that the obtained sample represents the diverse characteristics and perspectives present within the research area. By using stratified random sampling, the study aimed to capture a comprehensive understanding (Suryawan et al., 2023; Suryawan and Lee, 2023; Sutrisno et al., 2023a; Tehupeiry et al., 2023) of the WTP for apartments among landowners in the Jabodetabek metropolitan area. To determine the variables influencing the willingness to pay for apartments, the study conducted multiple regression analyses using the Logit and Probit models. Despite being non-linear regression models, the Logit and Probit models offer outputs as equations where the dependent variable possesses definite properties. In the simplest form, the output of these models represents a binary value with values 0 and 1, which facilitates the analysis and interpretation of the factors impacting individuals' willingness to pay for apartments.

Through the utilization of these methodologies, the study aimed to provide a comprehensive understanding of the variables influencing individuals' willingness to opt for apartment dwellings in the Jabodetabek metropolitan area. The Logit and Probit models enable the identification of significant predictors and their impact on the binary

outcome variable, contributing to a nuanced analysis of the research findings. Logit and probit models are efficient methods for measuring WTP because they can estimate the probability of an individual's WTP for a particular product or service. The logit and probit models are binary regression models, which means they estimate the probability of a binary response variable, in this case, whether an individual is willing to pay for an apartment. These models allow researchers to analyze the relationship between the WTP and various independent variables, such as income, education, and marital status.

Moreover, logit and probit models are appropriate for measuring WTP because they account for the fact that the relationship between the independent and dependent variables may not be linear. They assume that the relationship is non-linear and estimate the probability of a binary response based on the observed values of the independent variables. Furthermore, logit and probit models allow researchers to estimate marginal effects, which can be used to understand how changes in independent variables affect the probability of WTP. This information is valuable for policymakers who need to design targeted policies to increase WTP for particular communities.

Additionally, the chi-square Log-Likelihood Ratio (LLR) test is used to compare the fit of nested models in logistic regression. It assesses the improvement in model fit when adding or removing predictors. However, the chi-square LLR test does not directly measure or evaluate the normality of the model. Furthermore, McFadden's R-squared (pseudo R-squared) is commonly used to evaluate the goodness-of-fit in logistic regression. It quantifies the proportion of variance the model explains relative to a null model, indicating the model's predictive power. However, McFadden's R-squared does not directly address the normality assumption in logistic regression. The Logit and Probit models are employed to analyze the factors influencing willingness to pay for apartments, and the chi-square LLR test and McFadden's R-squared are used for model comparison and goodness-of-fit assessment, respectively. The normality assumption in logistic regression is evaluated by examining the distribution of residuals or errors.

Result

Respondent sociodemography

Respondents' sociodemography was used to describe the social and demographic characteristics of the survey in this study. This research covers sociodemographics such as gender, income, higher education, marital status, occupancy, and residence ownership. This study was divided into two groups: those with WTP for an apartment and those not WTP for an apartment. Significantly this grouping looks different in income level, education level, marital status, and occupancy groups. In addition, respondents who believe that property in the form of an apartment will make it easier for me in my daily activities tend to be WTP for apartments. Those with income above IDR 5,000,000.00 have a larger WTP in the income group (Table 1). This is appropriate in various studies that state that income will affect the desire to buy protein. Then, residents with the highest level of education, a bachelor's degree and above, tend to dominate the WTP with a value of 64.04% of the total respondents. Then, single residents also tend to be in WTP apartments, as much as 57.37% of the total respondents. Furthermore, respondents who are already working also answer that they will buy an apartment at 60.00%. Meanwhile, respondents who already own property tend not to buy apartments, with 53.16% of the total respondents.

Probit and logit models

Probit and logit models assessed the WTP connection for apartments (the dependent variable), with nine explanatory factors as independent variables. The result can be seen in Table 2. WTP data is categorical, where Yes equals 1 for respondents who want to pay for an apartment and Y = 0 for respondents who don't want to pay for an apartment.

Table 1
Sociodemographics data of the respondent base on their WTP for an apartment in the metropolitan area.

Variable	WTP		
	No	Yes	
Gender	Female	32	231
		5.61%	40.53%
	Male	45	262
		7.89%	45.96%
Income	Chi-Square = 0.752; df = 1; p value=0.386		
	≤ IDR 5000,000	49	215
		8.60%	37.72%
	> IDR5,000,000	28	278
		4.91%	48.77%
	Chi-Square = 10.742; df = 1; p value=0.001		
Higher education	Senior high school and below	34	128
		5.96%	22.46%
	Bachelor's degree and above	43	365
		7.54%	64.04%
	Chi-Square = 10.835; df = 1; p value=0.002		
	Marital status	Single	63
		11.05%	57.37%
	Married	14	166
		2.46%	29.12%
	Chi-Square = 7.395; df = 1; p value=0.001		
	Occupancy	No work	36
		6.32%	26.49%
	Working	41	342
		7.19%	60.00%
	Chi-Square = 7.855; df = 1; p value=0.005		
	Ownership of residence	Rent	31
		5.44%	33.33%
	Self-ownership	46	303
		8.07%	53.16%
	Chi-Square = 0.083; df = 1; p value=0.773		
	Property in the form of an apartment will make it easier for me in my daily activities.	Very Disagree	8
		1.40%	1.23%
	Disagree	7	29
		1.23%	5.09%
	Neutral	29	169
		5.09%	29.65%
	Agree	21	186
		3.68%	32.63%
	Very Agree	12	102
		2.11%	17.89%
	Chi-Square = 24.539; df = 4; p value=0.000		
	Property rental is not beneficial for me	Very Disagree	7
		1.23%	6.67%
	Disagree	15	79
		2.63%	13.86%
	Neutral	33	208
		5.79%	36.49%
	Agree	12	104
		2.11%	18.25%
	Very Agree	10	64
		1.75%	11.23%
	Chi-Square = 1.645; df = 4; p value=0.801		
	The type of land certificate is one of the primary considerations for buying/owning property at this time	Very Disagree	0
		0.00%	0.70%
	Disagree	0	4
		0.00%	0.70%
	Neutral	19	95
		3.33%	16.67%
	Agree	25	195
		4.39%	34.21%
	Very Agree	33	195
		5.79%	34.21%
	Chi-Square = 3.271; df = 4; p value=0.514		

Overall, the model results can be seen in Table 2. Table 2 produces a Log-likelihood of 135.614-135.942 with a McFadden Pseudo statistic of 0.25. The model is acceptable because this LLR value is far below the fundamental level of the chi-square table (df = 9, 0.05) (Suryawan and Lee, 2023; Sutrisno et al., 2023b). This means that the Logistic

Table 2
Probit dan logit model of respondent WTP for apartment.

Parameter	Probit Model		Logit Model	
Constant	-2.570***	0.469	-4.654***	0.848
Gender (1=mele; otherwise, 0)	0.445***	0.148	0.799***	0.267
Income (1=> Rp.5.000.000, otherwise 0)	1.002***	0.197	1.872***	0.370
Higher education (1=bachelor's degree and above, otherwise 0)	0.276*	0.164	0.500*	0.287
Marital status (1=single, otherwise 0)	0.392*	0.211	0.539	0.394
Occupancy (1=no work, otherwise 0)	-0.709***	0.184	-1.250***	0.325
Ownership of residence (1=self-ownership, otherwise 0)	-0.226	0.149	-0.451*	0.270
Productivity level (1-5 likert scale level)	0.411***	0.076	0.772***	0.141
Benefits level (1-5 likert scale level)	0.242***	0.083	0.406***	0.148
Land certificate considerations level (1-5 likert scale level)	0.274***	0.082	0.486***	0.146
Model Properties				
LLR	135.614		135.942	
McFadden Pseudo	0.2517		0.2523	
Chi-square (df=9, 0.05)	16.919			

Note: † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Regression Model Design is well characterized by at least one parameter β , which is not equal to zero at the 5% significance level.

The model results show that men are more likely to buy apartments. Several studies state that males choose apartments like in Bangladesh (Islam et al., 2022). This indicates males need an apartment for greater career aspirations or the desire for freedom and control in choosing where they live. Additionally, some people may think owning property such as an apartment or house is a sign of success and higher social status (Kusenbach, 2017), which may be more common among men in some cultures. In the model, the value of β in income is the highest compared to other parameters. This shows that this indicator greatly influences the WTP of apartments. Buying an apartment can be considered an intelligent investment for high-income residents (O Chestnut et al., 2022). Because apartment prices tend to increase over time, buying an apartment can provide financial benefits in the future. High-income people may buy apartments as part of their long-term investment strategy (Yang and Pan, 2020). Even if someone owns other properties, they may need additional living space for their family or business. With this income, working respondents are likelier to WTP an apartment. Therefore, WTP an apartment can be a practical solution to these additional needs. The significance of residence ownership in the logit model also supports this statement.

Next is the level of education and marital status, which shows a lower significance than the other models. Individuals who are highly educated and single may have busy and mobile lifestyles. They may work in a city and need a place to live that is close to the office or places of entertainment, or they may be on frequent business trips and need a place to live that is comfortable and accessible. The ideal choice is apartments in the city center or close to public facilities. Respondents' view of higher apartment productivity leads to a greater desire for WTP apartments. Most apartments are built strategically, such as close to the city center or business area (Lees, 2023). This can help reduce transportation time and costs to work or other business purposes. Thus, people who live in apartments can utilize their time more efficiently for productivity. In addition, apartments are easier to care for and maintain than traditional houses. Thus, apartment dwellers can save time and money in maintaining their homes and focus their time and energy on other productive activities. Therefore, in line with the level of productivity, the level of views of the benefits obtained will also increase. Therefore, respondents who perceive higher benefits in apartments will tend to have the WTP for larger apartments.

Respondents who see higher benefits in apartments tend to be more

willing to pay because they think investing in apartments will provide them with more significant benefits. This includes the ownership of certificates of ownership. A Freehold Certificate (SHM) or Building Use Right Certificate (SHGB) is a document that proves that a person has the right to a property such as an apartment. SHM or SHGB is very important in property investment because this certificate is proof of the legality of apartment ownership and shows that you have the rights to the property. Legal certainty is essential in property investment and legal documents to avoid legal problems.

Vertical development in metropolitan areas can provide a solution to increase population density and overcome the problem of increasingly limited land. The government can take several policies from this research to support vertical development. What needs to be considered the most is the level of productivity. The government can also provide a fiscal stimulus to developers to build vertical buildings to increase the population's productivity.

The findings of this study have several implications for supporting the United Nations' Sustainable Development Goals (SDGs), which aim to create a sustainable future for all. Firstly, the study's focus on promoting vertical housing and reducing land use for housing could contribute to SDG 11, which aims to make cities and human settlements inclusive, safe, resilient, and sustainable. By promoting sustainable urbanization and reducing urban sprawl, policymakers could help create more livable and sustainable cities to better meet their residents' needs. The study's also focus on sociodemographic factors such as income, education level, and marital status highlights the importance of promoting social inclusion and reducing inequalities, which are key components of SDG 10. By designing policies sensitive to the specific needs of different communities and promoting affordable housing options for low-income households (Suryawan and Lee, 2023), policymakers could help reduce inequalities and promote social inclusion.

Discussion

Several research studies have explored the concept of WTP for apartments, shedding light on the factors that influence individuals' decisions. For instance, (Portnov et al., 2018) found that individuals prioritizing environmental sustainability are more willing to pay a premium for apartments with green features. (Portnov et al., 2018) Identified location and proximity to transportation as significant determinants of WTP for apartment dwellers. Safety and security features influenced WTP, as highlighted by (Singla and Bendigiri, 2019), who reported that individuals are willing to pay more for apartments equipped with security systems and gated communities. Furthermore, (Portnov et al., 2009) found that individuals express a higher WTP for apartments near schools, shopping centers, parks, and public transportation hubs. Previous studies have shown mixed results regarding gender differences in WTP for apartments. At the same time, some studies indicate no significant gender disparities (Chau et al., 2010; Li et al., 2018). International implications include the need for gender-responsive housing policies that address different genders' specific concerns and preferences.

Income has consistently been identified as a significant determinant of WTP for apartments across various studies (Ko et al., 2020; Nguyen et al., 2023). Higher-income individuals generally exhibit higher WTP, while affordability becomes crucial for lower-income groups (Couture and Handbury, 2023; Suryawan and Lee, 2023; Sutrisno et al., 2023b). This result revolves around promoting income equality, providing housing subsidies, and implementing income-based housing programs to ensure affordable housing for all income levels. Previous research has shown a positive correlation between higher education levels and WTP for apartments (Kim et al., 2018). Education equips individuals with better employment opportunities and higher incomes, increasing their capacity to afford apartments. International implications involve investing in education and skill development to uplift individuals' earning potential and improve access to housing options.

The impact of marital status on housing preferences and WTP has been explored in previous studies. Findings suggest that married individuals or those with families may have higher WTP for larger apartments or those in family-friendly neighborhoods, while single individuals or empty nesters may prioritize affordability or location (Schwarz-Herion, 2020; Whitzman et al., 2013). We need to call for policies that cater to the diverse needs of various marital status groups, such as family-oriented housing initiatives or affordable options for single individuals. The influence of occupancy status on WTP has been well-documented in previous studies. Renters often exhibit lower WTP due to their preference for flexibility, while homeowners tend to have higher WTP for stability and investment purposes.

International implications include promoting affordable rental options, supporting homeownership programs, and ensuring housing security for renters and homeowners. Studies have indicated that ownership of a residence may impact WTP for apartments. Homeowners may display lower WTP due to their existing housing investment, while non-homeowners or those seeking a change may have higher WTP (Dyran, 2009; Fernandez et al., 2022). However, facilitating various housing tenures and addressing the needs of both homeowners and non-homeowners through policies supporting rental and ownership options. Although the specific influence of productivity on WTP for apartments has received limited attention in the literature, it is evident that enhancing productivity through infrastructure development, accessibility to amenities, and efficient transportation systems can positively influence WTP (Mell et al., 2016; Murakami, 2018). Emphasize the importance of holistic urban planning, promoting sustainable productivity, and providing supportive environments that reduce transportation costs and enhance work-life balance. While the influence of benefits on WTP for apartments has not been extensively studied, it aligns with the concept of amenity preferences.

Research gaps and future research directions

Despite the existing literature exploring various aspects of urban housing and the adoption of vertical housing such as apartments, several research gaps remain, providing opportunities for future investigations. This study touches on the potential benefits of apartments in addressing environmental challenges, and further research is needed to conduct comprehensive life-cycle assessments of apartment buildings. This could include evaluating their construction materials, energy consumption, water usage, waste generation, and overall sustainability to understand their long-term environmental impact. This study also identifies income level as a significant factor affecting the willingness to pay for apartments. However, there is a lack of in-depth research on how vertical housing adoption may impact socioeconomic equity in urban communities. Future research could delve into whether low-income communities have equitable access to quality vertical housing and explore potential challenges related to displacement or gentrification. More investigations are required to understand the factors influencing the perceived apartment productivity. Research could focus on the attributes of apartments most appealing to urban residents in terms of productivity, convenience, and efficiency, thereby shedding light on how these factors drive demand for vertical housing. Furthermore, the impact of green residential properties on residents' inclination towards eco-friendly homes should be explored in greater depth. Future studies could focus on the effectiveness of various environmental certifications in influencing housing choices and the actual environmental benefits of certified residential properties.

Additionally, understanding community acceptance of urban land consolidation for apartment development is crucial. Future research should explore the factors that influence community acceptance, potential barriers, and successful implementation strategies for such projects. The psychological and sociological aspects that shape housing preferences and lifestyle choices need further exploration. Future research could investigate the relationship between perceptions of

urban living, social interactions, and the desire for a sense of community in vertical housing. Moreover, more investigations are needed to understand how environmental awareness and sustainability concerns influence individuals' housing choices. Understanding this relationship can help inform targeted awareness campaigns and policy interventions. A comparative analysis of different cities or countries with varying vertical housing policies could provide valuable insights into the impact of policy measures on vertical housing adoption, environmental outcomes, and socioeconomic implications.

Addressing these research gaps can contribute to a more comprehensive understanding of the role of apartments in sustainable urban development, the factors influencing housing choices, and the potential environmental benefits of vertical housing adoption. Moreover, it will provide policymakers with evidence-based insights to develop effective strategies for promoting environmentally friendly and equitable housing options in rapidly urbanizing areas.

Conclusion

It's important to note that this grouping appears significantly different depending on income, education, marital status, and occupancy categories. The model's findings indicate that when compared to the values of the other variables, income has the highest value. Respondents' demand for WTP flats increases when they think apartments are more productive. This can assist in cutting down on the amount of time and money spent on commuting to work or other business-related activities. The problem of ever-decreasing land availability may be alleviated, and the challenge of rising population density can be handled by implementing vertical development in urban regions.

The findings of this study have important implications for policymakers and urban planners seeking to promote sustainable urban development. Firstly, the study's results suggest that income is the most important factor influencing willingness to pay for apartments in a metropolitan area. Therefore, policies aimed at increasing affordable housing options for low-income households could help to increase the demand for vertical housing and promote sustainable urbanization. The study found that respondents' perception of better apartment productivity increases their demand for WTP apartments. Therefore, policymakers could promote the development of high-quality, energy-efficient, and sustainable apartment buildings that offer modern amenities to meet the needs of urban dwellers.

This study's findings also support the need for policies to reduce transportation time and costs to work or other business purposes. This could include improving public transportation infrastructure or encouraging the development of mixed-use neighborhoods, where residents can access amenities and services within walking distance of their homes. Lastly, the study's focus on sociodemographic factors such as income, education level, and marital status highlights the need for policies sensitive to different communities' specific needs. Policymakers should consider these factors when designing and implementing policies to promote sustainable urban development and increase the demand for vertical housing.

CRedit authorship contribution statement

Aarce Tehupeiory: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft. **Rachmat Mulyana:** Data curation, Investigation, Methodology, Resources, Writing – review & editing. **Imelda Masni Juniaty Sianipar:** Conceptualization, Investigation, Project administration, Supervision, Writing – review & editing. **I Wayan Koko Suryawan:** Methodology, Project administration, Resources, Software, Writing – review & editing. **Iva Yenis Septiariva:** Data curation, Formal analysis, Investigation, Software, Writing – original draft. **Wisnu Prayogo:** Conceptualization, Formal analysis, Funding acquisition, Resources, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.envc.2023.100766](https://doi.org/10.1016/j.envc.2023.100766).

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